SUMMER 1959

Progressive Agriculture IN ARIZONA

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

Nature's Weatherman

See Page 3

Not 'For Men Only'

Traditionally we regard agriculture as a male occupation, although goodness knows that the history of American agriculture has shown that success has come only where the farmer and his wife have worked, side by side, toward the common goal. The farm wife's part, with home and garden and perhaps chickens, has been just as arduous and just as important as the man's work in the fields and with the livestock.

Today in Arizona many successful ranching operations are directed by women, and young women are more and more turning toward the college training which will make them successful ranch operators or successful helpmates to ranchmen-husbands.

This was strikingly shown at the University of Arizona's first annual "Little Arizona National" livestock show a few weeks ago. Of the winners in five divisions of showmanship — sheep, swine, horses, Herefords and Angus — three were women students in the College of Agriculture.

They fitted and showed their animals in full competition with the boys — in fact the program for that show lists 14 young ladies as contestants. Miss Jocelyn McAlpine with her Hereford, Miss Deirdre Tucker with her pig and Miss Volney Douglas with her Angus calf topped their divisions.

It is true throughout the varied fields of agricultural training. Dr. Fossland, in our Department of Dairy Science, points to a young lady as his top student and best judge of dairy cattle. Horticulture certainly is important to the distaff sex, for the housewife has a keen interest in flowers, gardens, trees, shrubs, ornamentals.

In fact, the ladies have invaded all fields of agriculture — and have proven their competence and have won the good will and respect of their male colleagues.

There is no sign saying "For Men Only," in agriculture, nor in the colleges which teach the agricultural scientists for tomorrow.

Harold E. Myers

Dean
College of Agriculture and
School of Home Economics

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Coming Events

JULY
1-11—U of A Summer Session Course in Extension Education.
13-15—Joint Meeting — Western Section American Society of Animal Production & Western Division of American Dairy Science Assoc. U of A Campus.
28—Arizona Cotton Planting Seed Dist., Annual Directors Meeting, Phoenix.

AUGUST
3- 7—State 4-H Roundup. U of A Campus.
5—Arizona Cotton Planting Seed Dist., Annual Membership Meeting, Phoenix.
12-14—FFA Leadership Conference. U of A Campus.

SEPTEMBER
1- 3—Soil Survey Conference, U of A Campus.
5- 7—Coconino County Fair.
18-20—Yavapai County Fair.
23—Cotton & Sorghum Field Day, Marana.
25—Annual Crops & Soils Field Day, Safford Experiment Station.

OCTOBER
1- 2—Arizona Turf Conference. Student Union Bldg.
2- 4—Greenlee County Fair.
6—Santa Rita Range Day. Santa Rita Experimental Range.
9—Dairy Field Day. U of A Dairy Science Research Center.
12—Aggie Seminar Meeting. UA Cotton Research Center.
14—Field Day. Cotton Research Center, Phoenix.
16—Cotton Commodity Day. Yuma Valley Station.
23—Fall Field Crops Day. Mesa.
29—Citrus Field Day. U of A Salt River Valley Citrus Farm, Phoenix.

Progressive Agriculture IN ARIZONA

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In This Issue

New Bulletins

These new U of A publications are available at your county agent's office. Phone or write your agent for a copy.

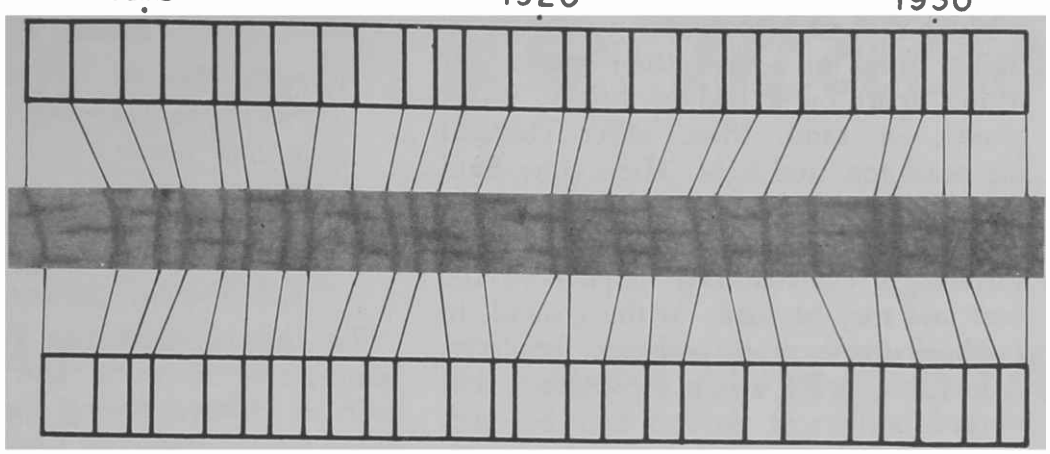
Circulars
112 Revised — Prevent and Control Poultry Diseases and Parasites
179 Revised — Cotton Insect Control, 1959
210 Revised — Arizona Insect Control Recommendations, 1959
266 Revised — Arizona Christmas Foods
269—Pinal County Agriculture
271—Electric Equipment for Irrigation Pumps
272—Using Tallow in Feedlots

Folders
77—Inventory and Record of Important Papers
78—How "4 H Wise" Are You?
79—Know Your Hard Floor Coverings
80—Arizona 4-H
81—The Rug-Carpet Picture
82—Sprayer Calibration

Special Reports
No. 1—Prices and Production of Arizona Farm and Ranch Products (Available in July)
No. 2—Your Range — Its Management (Available in July)

Technical Bulletins
136—Lawn Diseases in Arizona
137—Los Angeles Market for Western Cattle

Popular Bulletins
293—Johnson Grass Control with Dalapon & Liquefied Petroleum Burners (revised)



AT LEFT is a ring series from a cross section of a sagebrush from the Grand Canyon National Park area. Note how winter rainfall is reflected in annual growth. This 1908-1932 year period, depicted here as "plant growth," is indicated by the heavy line overlying our cover picture of a cross section from the same plant. Compare ring series at left with the cover picture, from which it was taken.

Growth Rings of Sagebrush Reveal Rainfall Records

C. W. Ferguson

R. R. Humphrey

Department of Watershed Management

Because big sagebrush does have a definite annual ring, the rings can be counted to determine the age of any given plant or plant community. The oldest plants found, then, indicate the maximum age reached by the species in that area; or they may indicate the time that has elapsed since some catastrophe such as fire, plowing or flooding had occurred.

Most plant-growth research of an ecological nature is concerned primarily with what is happening today or what will happen in the future. Only rarely do these studies look into the past.

Dendrochronology, the study of tree rings, uses the present only as a starting point from which to explore the past. This science is based upon the fact that some tree species develop growth rings which vary in width from year to year in response to variations in climate. Hitherto, studies in the Southwest have been made only on coniferous trees such as Douglas fir and the pines.

Recently, however, a collection of 700 stem sections of big sagebrush (*Artemisia tridentata*) from seven western states and Baja California, Mexico, has shown that this shrubby plant has the same ring character as do the forest trees. The "ring" is the growth layer of a circular stem as seen in cross section. Some plants, such as big sagebrush, do not develop circular stems as they become older but may assume a variety of unusual shapes.

Distinct Growth Rings

This feature is shown in the photograph on our cover of a specimen from near the Grand View entrance to the Grand Canyon National Park. In spite of the lobed shape, the rings here are distinct and it is easy to tell, by their position within the ring chronology, the year in which they were formed. Some are narrow, some are wide, indicating differences in rainfall from year to year.

In the diagram at the top of this page, the ring series for the years 1908 through 1932 is compared with winter rainfall (above) and summer rainfall (below) from the park headquarters 20 miles to the west. The amount of rain in both periods for each year is tabulated in the table and is indicated in the diagram by the width of the space bounded by two lines.

Winter Rains Mean Growth

The stronger correlations of growth rate to winter rainfall is shown by the fact that as winter rainfall increases or decreases, so too does the width of the growth ring for the corresponding year. It will be seen that a similar relation between growth and summer rainfall occurs less often.

In 1912, 1918, 1921 and 1925 when summer rainfall totals were nearly twice that in the winter, the ring for each year corresponds in relative size to the winter precipitation. In these years, as in the average, the heavy portion of the May-October rains came in July, August and September, well after the plant had completed its growth. In contrast, the ring for 1930 more nearly represents the much heavier summer rainfall.

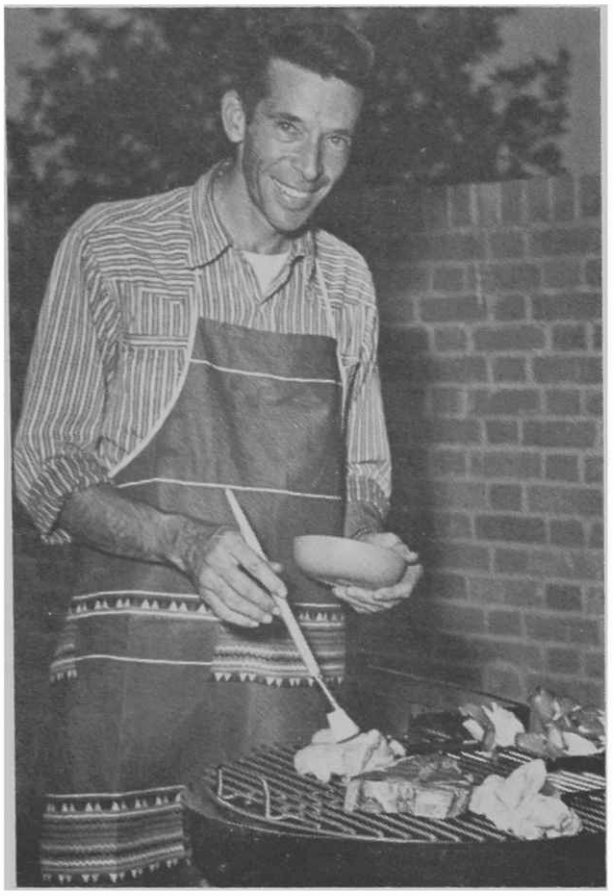
This is explained by an analysis of the monthly data which show that May, June and July rains were substantially above the average and occurred in time to be utilized by the plant during its growing season. In 1920 and 1930, the winter rains were more than twice that of the summer rains; here again, the ring widths parallel the winter rains.

Age of 200 Years

This study has shown that sagebrush produces a growth ring that is sensitive to changes in annual precipitation and sometimes reaches an age of slightly more than 200 years. The use of shrubs in this way thus provides an avenue for climatic and ecologic interpretation outside of the forested areas.

Rainfall, in Inches, at Grand Canyon Nat'l Park Headquarters

	Winter Nov.-Apr.	*Summer May-Oct.*
1908	9.14	10.27
1909	9.96	6.40
1910	7.85	4.43
1911	10.39	9.95
1912	4.65	7.15
1913	6.86	5.32
1914	9.52	6.34
1915	7.36	4.96
1916	9.62	7.28
1917	6.02	5.25
1918	5.73	10.33
1919	9.50	8.30
1920	10.89	4.20
1921	4.48	10.02
1922	9.19	6.96
1923	9.28	8.15
1924	9.14	6.78
1925	6.85	12.14
1926	8.79	7.40
1927	10.19	12.98
1928	8.08	6.12
1929	6.07	6.93
1930	4.49	8.85
1931	5.14	6.45
1932	10.84	5.25
25-year total	200.03	188.21



IN PATIO COOKERY, men man the meat.

PATIO MEALS CAN BE FUN

Mary Adele Wood

School of Home Economics

Patio meals are served out-of-doors for fun or recreation, and are popular for casual or informal entertaining.

To set the stage, everyone may wear barbecue aprons, and after dark hurricane lamps may be lighted. As with sports, some people prefer to be spectators, and others like to take part in the activities. All age groups seem to enjoy participating in the preparation of these meals.

A Few Easy Dishes

The menu for a patio meal is usually simple and may consist of a meat, a combination casserole to accompany the meat, salad or relishes, bread, dessert, and beverage. A potato or vegetable may be served instead of the casserole. Most of the food is prepared in the kitchen. The meat, however, is the center of attraction and is cooked with a flair of showmanship outdoors, usually over coals. Charcoal or charcoal briquets are the popular fuel.

The briquets are compressed and will burn longer than the regular charcoal. To have an even heat, ignite the charcoal 45 minutes before starting to cook. A good method is to shake briquets with charcoal lighter fluid in a can, then place four inches apart on a bed of bricks, rocks, gravel, or sand. Place other charcoal pieces on top, and light. The lighter fluid will blaze, and the charcoal will become glowing coals with a grey ash on the surface. A charcoal bed helps hold the heat and may be made in the ground, in a wheelbarrow, or in barbecue fireplaces. Adjustable grills are a convenience but hinged broilers or skewers may be used.

Foil Packing Is Handy

Foil packs are popular for cooking directly on the coals. Different food combinations may be used, but ground beef with sliced potatoes and onions, seasoned with salt, pepper and butter is well liked. Place the food on a rectangular piece of heavy foil about 10x18 inches. Bend foil over the food without tearing, and seal open edges by folding together at least twice. Place pack directly on the coals, and cook 8 to 10 minutes on each side. Remove from coals with tongs, cut open with scissors, and eat directly from the foil. Food inside will be cooked by steam, will be tender but not brown.

As a novelty some people cook steaks "on the rocks" by brushing off the ash and placing meat directly on the glowing charcoal. The heat will cook the meat, and steam formed will put out the fire. When the steak is turned a new spot of glowing coals must be used. Results depend on the amount of heat in the charcoal bed and the thickness of the steak.

With a thick steak the interior will be quite rare. To keep from charring outside edges by this method, a layer of moist salt may be spread over the meat. The salt will keep the meat from browning, and may be brushed off when dry.

Nothing Beats A Steak!

Broiled steak is, of course, a favorite. Tenderizer, when used according to directions, will improve many cuts. Tenderizers contain an enzyme which softens protein and is found in fresh pineapple and papaya. Tenderizer may be purchased in dry granular form, plain or mixed with salt and seasoning.

Other popular meats are hamburger, kabobs, barbecued chicken, and barbecued spareribs. To barbecue, the meat is marinated in a well-seasoned sauce for several hours, and then more sauce is added while the meat is broiling or roasting. Instead of applying sauce with a brush, the cook may wish to sprinkle it on from a squeeze bottle. The cooking may be done partially in the oven and finished on the grill, or it may be done entirely out-of-doors.

Barbecue sauces add a distinctive flavor, and the following two, I am sure, will add to your eating pleasure.

Chicken Marinade & Barbecue Sauce

2 parts olive oil
1 part wine vinegar
minced onion
minced garlic
salt and pepper
a sprinkle of tarragon, thyme, and chopped parsley

Let chicken stand 2 or 3 hours at room temperature in sauce. Use same mixture to baste chicken during cooking. (Recipe from Sunset Barbecue Cook Book.)

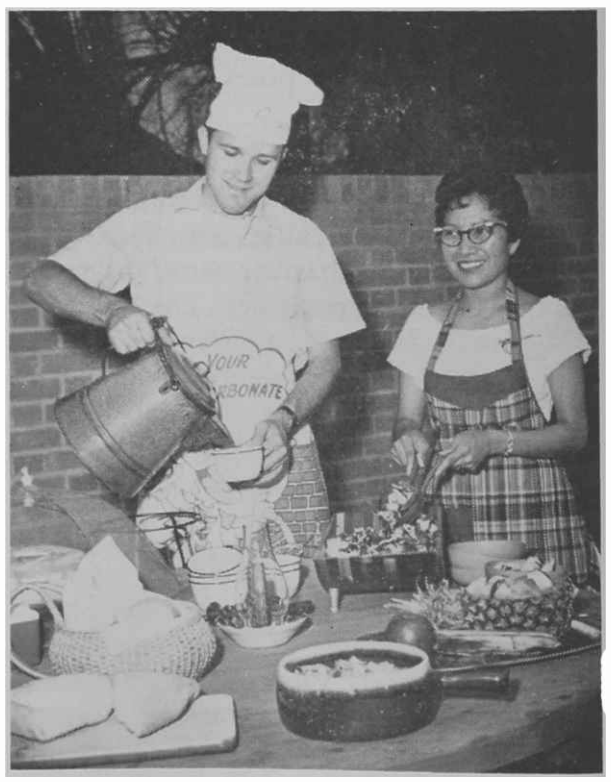
Spareribs (3 lbs.) Barbecue Sauce

2 tbsp. butter
1 onion, chopped
1 clove garlic, chopped
½ to 1 tsp. chili powder
½ lemon, juiced
2 tbsp. vinegar
2 tbsp. brown sugar
1 tsp. horseradish
1 cup chili sauce
salt and pepper to taste

Sauté onion and garlic in butter; add remaining ingredients, heat together. Use to baste spareribs while cooking.

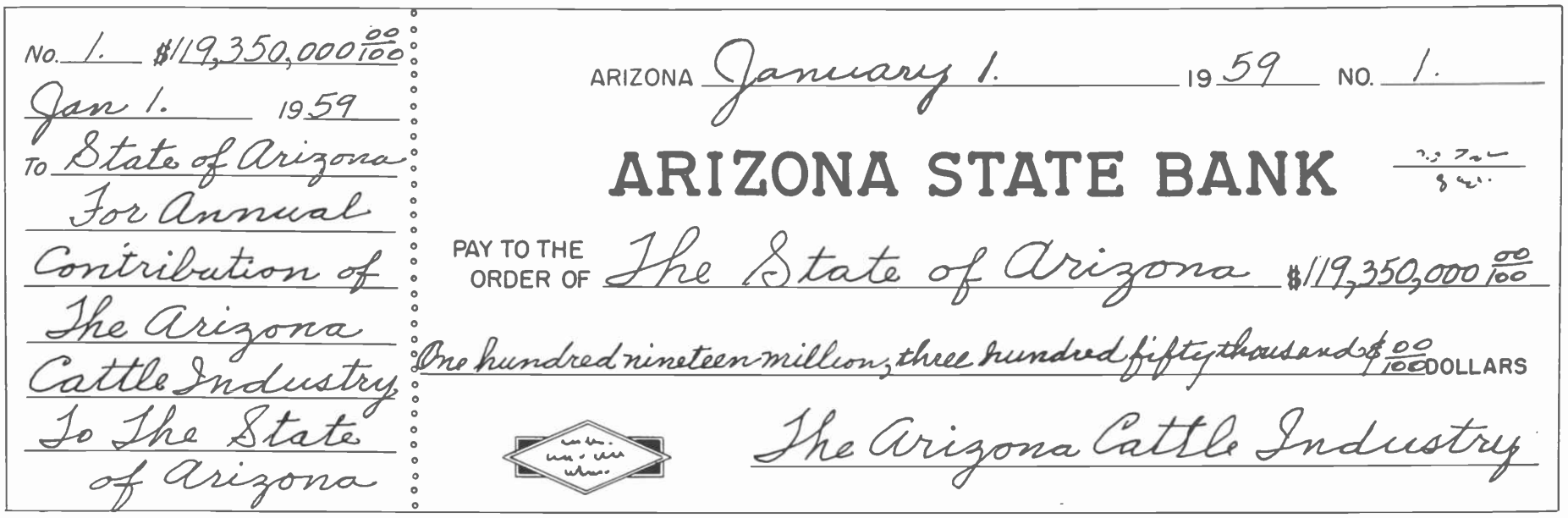
Note: Spareribs should be well done when served. (Recipe from Western Family.)

A CASSEROLE with meat, French bread, tossed salad, fruit and coffee make a complete patio menu.



(Photos by Joseph Kitten)

Beef . . . $120 Million Industry



R. E. Seltzer
Agricultural Economics Department

Beef cattle production is the second most important source of agricultural income in Arizona, second only to cotton. The cash value of cattle and calves produced and fed in Arizona in 1958 reached an all-time high of $101,600,000.

This represents only pounds of beef produced in Arizona. It does not include the original value of stocker and feeder cattle shipped into Arizona for grazing or feeding. For the past 25 years, beef cattle production has averaged 22 per cent of total agricultural income in Arizona.

Income from beef production in Arizona can be divided into three categories: (1) production of stocker-feeder cattle from cow herds in the state, (2) grazing of stocker cattle brought into the state from other areas, and (3) fattening of cattle in feedlots.

Cattle Coming and Going

In 1958 approximately 330,000 head of calves worth $40,000,000 were produced on Arizona ranges. Another $31,000,000 was earned by grazing cattle brought in from outside the state. Included in this group are cattle fed in feedlots, but on a growing ration only. Approximately 410,000 head of cattle, returning $30,500,000, were sold out of Arizona feedlots in 1958. Included in this sum was $900,000 for manure sold out of feedlots.

To this total income from cattle sold — calves produced, out-of-state cattle grazed in the state, and feedlot cattle — must be added $100,000 for beef used on the ranch.

Another source of income to the state cattle industry is federal money paid under the conservation payment program to assist in developing and improving range resources, such as development of stock water, brush control, etc. In recent years this has approximated $350,000 annually in Arizona. These three items, value of cattle produced and fed, value of products used at home, and government conservation payments in 1958 totaled approximately $101.5 million.

Meat Processing Industry

In addition to this, we can add income from value added by Arizona meat-packing operations, wholesaling, jobbing and retailing of locally slaughtered meat and salaries paid by state and federal service and regulatory agencies directly related to the cattle industry.

In 1958 there were 159,100 head of cattle and calves slaughtered and their meat sold wholesale in Arizona. It is estimated that the value added to the income of the state by such meat packing and wholesaling was $3,500,000. The retailing process adds another $13,600,000.

Regulatory and Service

Various service and regulatory agencies are maintained in Arizona by state and federal governments, and salaries paid to personnel in these jobs provide additional income to the state which must be credited to the cattle industry. This is estimated at $300,000.

Adding these individual items, total value of Arizona income produced by the cattle industry in 1958 is $119,350,000, representing the contribution of the Arizona beef cattle industry to the economy of the state.

Cochise County
Mon. and
Wed., 6:55 a.m.—KAWT, Douglas
Sat., 12:15 p.m.—KAPR, Douglas

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

Graham County
Sat., 9:00 a.m.—KGLU, Safford

Maricopa County
Mon. thru Sat., 5:55 a.m.—
KRUX, Phoenix
Thurs., 12:45 p.m.— KTAR, Phoenix
Sun., 8:45 a.m.—KOY, Phoenix

Pinal County
Mon. thru Fri., 6:45 a.m. & 9:20 a.m.
Also Sun., 8:30 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., Wed., and Fri.,
6:45 a.m.—KNOT, Prescott

Yuma County
Mon. thru Fri., 6:30 a.m.—
KYUM, Yuma
Mon., 11:30 a.m.—
KVOY, 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.

Choosing Your Career

Horticulture Is Interesting

Leland Burkhart
Department of Horticulture

Horticulture includes breeding, selection, growing, protection, harvesting, processing, distribution and selling of fruits, vegetables, flowers and landscaping materials.

Arizona has a wealth of horticultural crops which includes lettuce, melons, citrus, grapes, carrots, potatoes, pecans, peaches and dates. Associated with the rapid urbanization developments of the Southwest, there are expanded needs for flowers, shrubs, landscape trees and turfs. The landscaping industry, commercial vegetable industry, citrus industry, and allied agricultural chemistry industries, food processing industries and citrus associations are all eager for trained horticulturists.

Because We Live Better

The trend towards higher living standards in America, with special reference to better health, home beautification and park developments, emphasizes the increasing importance of horticulture. Urban horticulture is fast taking on a new look. Nearly 90 per cent of our nation's population now lives in towns and cities. This offers a challenge for increasing interests and developments in home landscaping, recreational parks, improved school ground landscaping, and other turf landscape areas for urban use.

Thus, there is a bright future for you in horticulture. If you enjoy working with fruits, vegetables, flowers, or landscape plants, or with products derived from them, your place is in the field of horticulture. Although amateur gardening plays a very important role in our way of life, the horticulture of today is much more than this.

Horticulture is a science, a business, a profession, an art, an industry! There are as many jobs and careers in horticulture in the city as there are on the farm.

A Variety of Jobs

Production. You can operate your own enterprise or manage orchards, vegetable farms, greenhouses, flower shops, nurseries, landscaping services, and processing firms.

Marketing. Selling fresh or processed fruits and vegetables, seed, cut flowers, floral arrangements and nursery stock, wholesale or retail, is another interesting type of work for horticultural graduates. Or, you can buy these items for chain stores, government institutions, hospitals, and wholesale distributors.

Research. Horticultural scientists are constantly seeking new and better ways to improve the yield and quality of fruits, vegetables, flowers and landscape plants, and to develop improved methods of handling, processing and marketing them. You may specialize in plant breeding, plant nutrition, canning and freezing techniques, growth regulating substances, and many other fascinating projects for colleges, the federal government, or for private companies.

Teaching. We need many more qualified teachers in high schools and universities, as well as county agricultural agents and extension specialists to encourage producers and processors to adopt improved practices.

Big Field In Industry

Industries serving horticultural producers. Field representatives and management personnel for canning and freezing companies, seed firms, and for manufacturers of fertilizers, spray materials and farm equipment perform a wide variety of services in research, technical service and sales work.

Inspection. Many men are employed as inspectors of fresh and processed horticultural crops for government or private agencies.

Communications. Writing for farm and garden magazines, advertising agencies, newspapers, television and radio is another new and rewarding field for men and women trained in horticulture. A fast-moving industry promises you an exciting career. Note these revolutionary developments in recent years:

New Developments

Vacuum cooling of vegetables; controlled blooming of flower crops; hormones to prevent fruit drop; hybrid varieties; mist propagation and greenhouse cooling; chemical weed control; concentrated fruit juices; controlled atmosphere storage; plastic packaging; faster transport; mechanically refrigerated carriers — these are the recent innovations in horticulture.

At the University of Arizona you have the opportunity of training for a career in fruit and vegetable technology, landscaping and nursery management, or in the floral industry. You can contact the Horticulture Department, University of Arizona, for information as to the curriculum of courses appropriate for training in your field of specialization.

Horticultural graduates are placed in the following positions:

Fruit and Vegetable Industry

Grower
Shipper
Sales Service
Quality Inspector
Cooperative Manager
Refrigeration Specialist
Packaging Specialist
Wholesaler
Farm and Ranch Manager
Business and Equipment Manager
Agricultural Chemicals Service
Plant Breeder
Teaching Your Profession
Scientific Research & Extension
Certification of Plants
Civil Service

Landscaping and Nursery

Landscape Architect
Landscape Nurseryman
Turf Management
Park Superintendent
Arboretum Director
Plant Propagation
Wholesale Nurseryman
Equipment Sales
Lawn and Garden Supplies
Golf Greens Supervisor

Floral Industry

Greenhouse Flower Grower
Wholesale Florist
Retail Florist

AT LEFT, two University of Arizona graduates in horticulture admire flora typical of this area; left, Joseph Thompson, director, Boyce Thompson Arboretum, Superior, Ariz.; right, Steve Fazio of the UA horticulture department.

Consumer Study Asks

Which Milk Tastes Best?

J. W. Stull
Department of Dairy Science

J. S. Hillman
Department of Agricultural Economics

Two University of Arizona departments, in cooperation with the American Dairy Association, are taking a look at peoples' likes and dislikes in the milk they drink.

Working on the assumptions that standards for milk products can always be improved and that so-called "sacred cows" should not exist in the American dairy industry, research is testing consumers' preference for milk beverages with varying levels of fat and nonfat solids. Main objective of the experiment is to improve the palatability, flavor and food value of milk beverages as well as to help farmers utilize their milk supply in the most economic manner.

Started On the Home Folks

The first phase of the work consisted of selecting a small panel from the faculty and staff of the University of Arizona to taste selected combinations of milk which varied in fat and nonfat solids content. This determined the taste differences that people could detect in milk beverages. At this time, many milk beverage combinations were eliminated as not practical for further study.

On the basis of the results obtained with the taste panel, beverages of three classes — whole, low-fat, and nonfat milk — are now being subjected to preference observations in larger groups of people in retail food markets, in schools and in public gatherings in Arizona. Participants are asked to drink two samples of milk and then indicate their preference.

Currently six different pairs of samples are being tested and the response and cooperation received have been excellent. Plans call for sampling preferences of consumers at all levels of income. Over five thousand people have already participated, and indications are that between 15,000 and 20,000 respondents will be obtained during the study.

Like Extra Nonfat Solids

The table indicates that people like a milk which is fortified with additional amounts of nonfat solids. In all except one of the six pairs of samples used, consumers preferred the milk with higher nonfat solids content.

SHOPPERS in Tucson supermarkets sampled the milk, gave their opinions.

COMPOSITION OF MILK BEVERAGES USED AND CONSUMER PREFERENCES IN EXPERIMENT

Pair Number		*Fat (%)*	*SNF (%)*	*Total Solids (%)*	*Number Preferring*	*Per Cent of Total*
I.	A	3.5	8.5	12.0	512	38
	B	3.5	9.5	13.0	846	62
II.	A	2.0	9.0	11.0	577	46
	B	2.0	10.0	12.0	664	54
III.	A	0.1	9.0	9.0	298	42
	B	0.1	10.0	10.0	412	58
IV.	A	3.5	8.5	12.0	385	47
	B	2.0	10.0	12.0	432	53
V.	A	1.5	8.5	10.0	370	53
	B	0.1	10.0	10.1	327	47
VI.	A	4.0	8.5	12.5	201	48
	B	3.5	9.0	12.5	219	52

This is true for beverages having the same total solids content but with varying amounts of fat. In one instance (Sample Pair V.) where the lower nonfat solids content was preferred, the milk in the other sample was a skim or nonfat type.

Will Make Market Tests

These results are preliminary and before the research is completed, actual market tests will be conducted either in retail stores or in homes. These tests will offer a limited range of milk beverages of varying contents of fat and nonfat solids for sale on a retail basis. With the cooperation of local milk distributors, milk will be sold under controlled conditions to get the desired experimental data.

ENTHUSIASTIC school children were part of the mass sampling of milk with various fat and nonfat solids content.

Preservatives Lengthen Life of Wood Fence Posts

K. R. Frost

Agricultural Engineering Department

Which fence post should I use, steel, concrete or wood?

This question may be foremost in the minds of farmers or ranchers planning to confine livestock or to protect crops. Appearance, serviceability, life and cost are primary considerations when choosing the kind of post for the fence line.

Light service requirements around buildings and along roads will require the installation of a post with moderate strength, cost and durability. Value of property is generally enhanced by the appearance of fences, and hence the post selected depends on the individual. Corrals will require more strength and a higher fence cost for good service and long life.

Preservatives Needed

Protective coatings and/or preservative materials are required for posts even under dry atmospheric conditions. Steel posts rust readily unless painted with appropriate materials. For below-surface protection, asphalt dipping of the steel or reinforced concrete post is unquestionably the best protection. The extra cost of reinforced concrete posts is usually not warranted unless used where appearance is an important factor. They should not be used around livestock and must always be protected with a coating to prevent rusting of the reinforcing rod.

Wood posts have proven satisfactory under most conditions, if properly treated. It has been found that *on the farm treatments* can increase the post life from four to six times at a cost of 20 to 30 cents per post, a low investment for the service rendered. Several preservatives are now being used, namely pentachlorophenol, coal-tar creosote and zinc chloride. Most woods can be treated satisfactorily with these preservatives by one of several methods.

Generally, a mixture of 50% coal-tar creosote and 50% crankcase oil makes an effective preservative. A mixture made up of 5% pentachlorophenol and 95% crankcase oil will provide the same protection. Twenty to 50% solution of zinc chloride in water has given good results when steeping posts for periods long enough to provide retention of a pound of salt per cubic foot of post.

Treatment Methods

Soaking in oil solutions (coal-tar creosote and pentachlorophenol) or steeping in water-borne solutions (zinc chloride) for 24 to 48 hours gives good results with most wood posts. The heartwood of some trees is difficult to penetrate with any preservative. Pressure-treatment by commercial firms is the only means that such posts can be wholly treated. Pressure-treatments give up to 40 years of useful life, though surfaces cannot be readily painted and costs are several times that of the home grown and home treated post.

Some wood species have been found to absorb oils or water solutions very readily by placing two or three feet of post in the liquid for a period of time. Tamarisk trees which grow rapidly to post size in a few years under Arizona climatic conditions are of this kind.

Sound for 24 Years

A project was started in 1935 by the Agricultural Engineering Department to obtain information on fence post treatment, preservatives and expected life of treated tamarisk posts. Some posts were treated green and some dry by standing them in tanks of the preservatives exposing 28 to 30 inches of length for 12 hours. After 24 years in a fence line surrounding an irrigated field near Coolidge, 50% of the posts are in good condition. About half the posts were treated green and half dry, with coal-tar creosote and an equal number of each treatment has failed.

A comparison of green and dry-treated tamarisk posts with coal-tar creosote, wood-tar creosote, pentachlorophenol, and zinc chloride was begun in 1942 by setting out 101 posts on the Page Ranch (north of the Santa Catalina Mountains) and at the UA Campbell Avenue Farm (irrigated) near Tucson.

Four posts remain on the irrigated area, of which three are coal-tar creosote treated green and one treated dry. An expected life with these treatments would be 12 to 14 years under these conditions compared to three or four years for untreated posts. Most of the posts set on the unirrigated desert soil are still in good condition except for the wood-tar creosoted ones. The failures to date (of eight set) have been five wood-tar creosote treated green and five dry, one pentachlorophenol treated green and one dry, and two coal-tar creosote treated green and one dry.

Untreated Posts Nearly Gone

There have been no failures to date of the zinc chloride treated posts. Only one out of six untreated posts set in 1950 remains standing. The expected life for posts in desert areas and treated with pentachlorophenol, coal-tar creosote or zinc chloride is at least 18 years and possibly 20 to 25 years.

Wood-tar creosote is not recommended as a preservative because of the relatively short life of the posts treated with this preservative.

FENCE POSTS at the Page Ranch sampling area. Note even break on end of posts, showing apparent strength at time of failure, with only surface half inch affected with fungi, as indicated by V-notch at arrow.

Nematodes Killed; Tomatoes Survive

Robert B. Marlatt
Ross M. Allen
Plant Pathology Department

Limited commercial plantings of fresh market tomatoes have been grown on the sandy Yuma Mesa during the cool season. These have shown that the winter and spring crop can be profitable if the hazards of frost and root knot can be avoided. Root knot is caused by nematodes which live in the soil.

Because root-knot resistant varieties adapted for Arizona have not yet been proven, attempts are being made to control the nematode problem by soil fumigation. To be satisfactory for the Yuma Mesa, a fumigant must control nematodes in almost pure sand at exceptionally high temperatures for about nine months. For this reason higher than average rates of fumigants are being used.

Fumigants Injected In Alfalfa

The site of the 1955 experiment had contained Ranger alfalfa. The crop showed a moderate amount of nematode infection. Dr. Harold W. Reynolds, nematologist at the University of Arizona's Cotton Research Center, has shown that Ranger is more susceptible to root knot than the African variety.

Planting tomatoes following Ranger alfalfa was more likely to result in a root-knot problem than if the field had contained African. Dr. Reynolds generously helped with these experiments.

The alfalfa was plowed and allowed to decay before fumigation. This permitted the fumigant to kill nematodes that might be inside large roots. Each fumigant was injected 8 inches into the sand behind shanks which were 12 inches apart.

Different Applications Used

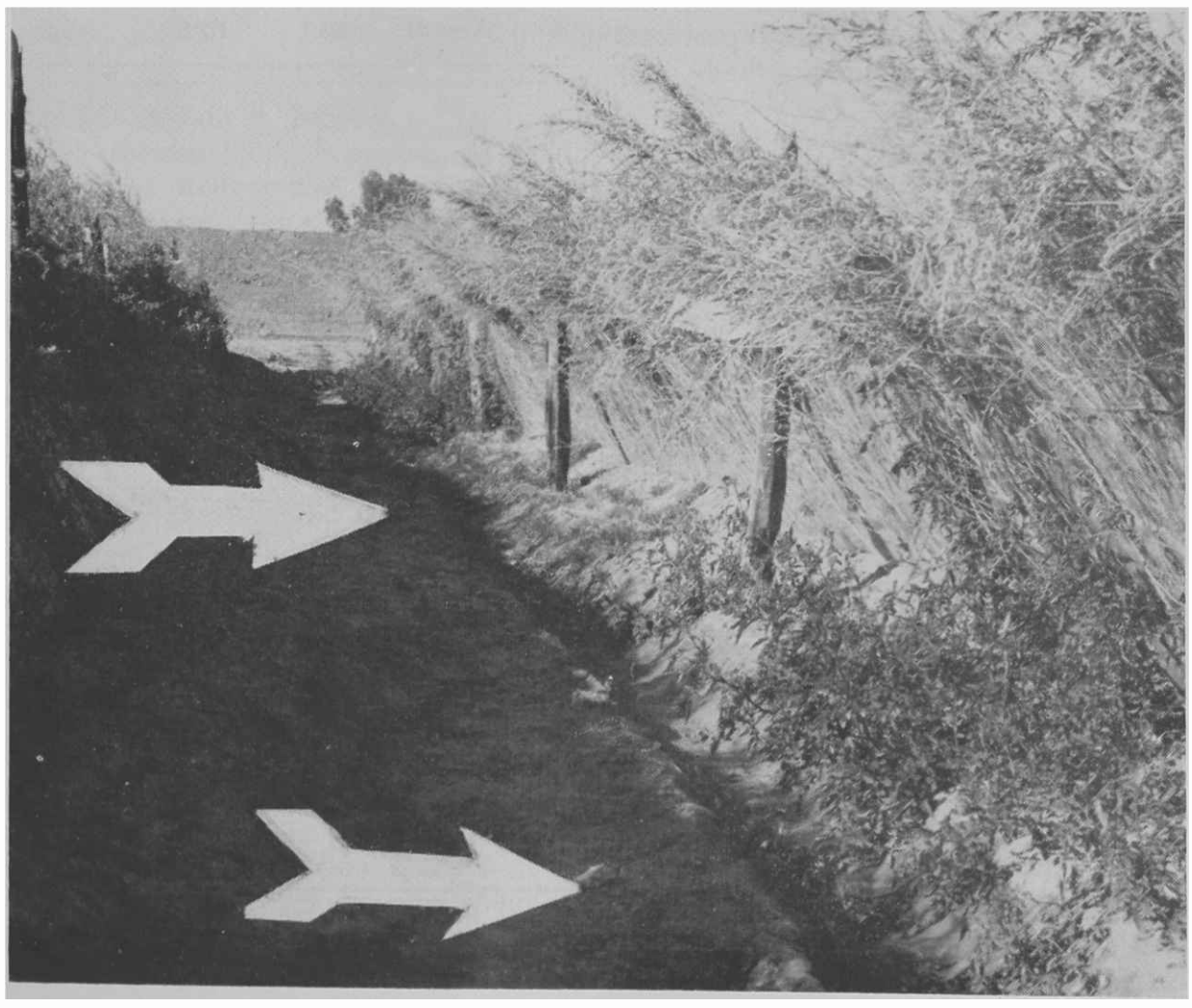
Materials used were ethylene dibromide (EDB)—7.3 and 14.6 gallons per acre (gpa) of the 83 per cent concentration and dibromochloropropane (DBCP)—1.5, 2.1, and 4.4 gpa of the 97 per cent strength. A wider selection of fumigants was used in 1957: EDB—10.3 gpa of 83 per cent, "Dorlone"—10 gpa, "Telone"—33 gpa, "D-D"—31 gpa and DBCP—10 gpa. Control plots were not fumigated.

Clean tomato plants were transplanted to the fumigated plots 17 days after the fumigants had been injected. None of the transplants seemed to be hurt by chemical residues.

Fruits were harvested as they ripened from late December to May. The tomatoes were graded to three sizes, 5x6, 6x7 and 7x8, which refer to the number of fruits in each of two layers of a 30-pound lug. All of the soil treatments increased yields above those of the controls. No one fumigant increased the yields more than the rest. However, there were differences in the amounts of root knot in the plots.

EDB Proves Best

In the 1955 experiment, tomatoes growing in sand fumigated with EDB had less nematode injury than vines in the DBCP-treated plots. EDB also performed best in the 1957 experiment. Tomatoes in EDB, Telone and D-D plots had less root knot than the controls. EDB controlled nematodes better than DBCP or Dorlone and Telone was more effective than Dorlone. More experiments are going to be made on the Yuma Mesa. It now looks like 7 to 10 gallons of 83 per cent EDB will control nematodes in sandy soil sufficiently to provide a satisfactory yield of tomatoes.



ALL TOMATOES were killed by nematodes in a plot which received no fumigant (top arrow), while tomato plants were living in fumigated plot (bottom arrow).

Feed Additives May Help

Maintain Egg Output Despite Summer's Heat

Allen A. Kurnick
Poultry Science Department

Control of the laying house environment has been recommended as the most effective means of coping with the declining performance of laying hens during the summer.

Mechanical cooling devices are frequently used in the Southwest to provide the flock with an environmental temperature that is lower than that of the hen's body. Under such conditions the hen may dissipate its body heat more rapidly, thereby attaining some degree of cooling.

Under farm conditions, mechanical cooling has been found to reduce summer mortality. In areas where high temperatures persist for shorter periods than they do in the Southwest, those birds that survived the heat had a slight decline in the level of egg production. Egg weight and shell quality, however, declined rapidly.

Cost Is Excessive

Experimentally, a "cooled" environment has been shown to maintain egg production as well as egg quality. However, the costs of cooling a commercial poultry house in the summer to temperatures that are most conducive for egg production (75°) are uneconomical. Mechanical cooling also presents problems of air movement, humidity and odor control.

The trend for some type of climate control in laying houses seems well established. However, it is not to be regarded as the sole practice for managing a flock in the summer. The successful application of climate control depends on:

a. **Continued attention to management of shade, ground covers, water supply, ventilating, feed intake and general sanitation.**
b. **Successful adaptation of birds to high temperatures by means of management and breeding.**
c. **The understanding of the manner by which nutrients contribute to heat production in the animal body.**
d. **The reevaluation of nutrient requirements of birds exposed to "stress" conditions.**

At present we have only meager data on the relationship between the environment and specific nutritional requirements. Consequently the last two points may be considered as the objectives of current research efforts.

Heat Control Via Diet

In the accompanying table are summarized results of a study conducted at the University of Arizona Poultry Research Center during the period of October 1957 to August 1958. Furazolidone (nf-180) and arsanilic acid were fed at the indicated levels to floor and cage-housed White Leghorns. Supplements were added to the university farm laying diet containing two grams of procaine penicillin per ton.

Among floor-housed birds, the lot receiving the combined furazolidone and arsanilic acid additives had the highest level of egg production during both winter and summer. Lots fed either furazolidone or arsanilic acid, did not show an increase in the level of production above that observed in Lot 1. However, while production levels in Lots 3 and 4 were lower than that of Lot 1 during the winter they did not decline as sharply during the summer.

None of the supplements benefited the production levels of cage-housed birds. If anything, the additives had a depressing effect on egg production. It should be noted, however, that the birds had a winter "pause" that undoubtedly was partially responsible for their low performance. This phase of the study is currently being repeated in its entirety.

Feed Used For Fuel

Low producing layers consume more feed per dozen eggs than their high producing sisters. This would explain only

(Cont. on next page)

Effect of Furazolidone and Arsanilic Acid on Egg Production and Feed Conversion of S. C. White Leghorn Pullets During Winter and Summer Months

Lot No.	Supplement (gm/ton)	Avg. % Production W[2]	Avg. % Production S[3]	Avg. % Production Season Differential	Avg. % Production Total for 11 Months	Feed Conversion (lbs. feed/doz. eggs) W	Feed Conversion (lbs. feed/doz. eggs) S	Feed Conversion (lbs. feed/doz. eggs) Season Differential	Feed Conversion (lbs. feed/doz. eggs) Total for 11 Months
FLOOR PENS (40 birds/lot)									
1	None	68.1	58.6	−9.5	64.6	4.47	4.52	+.05	4.49
2	15 Furazolidone[1]	64.3	54.7	−9.5	60.8	4.72	4.43	−.29	4.63
3	25 Furazolidone	65.0	61.2	−4.8	63.6	4.61	4.38	−.23	4.54
4	90 Arsanilic Acid	65.1	62.6	−2.5	64.2	4.65	4.57	−.08	4.62
5	15 Furazolidone 90 Arsanilic Acid	70.2	64.1	−6.1	68.0	4.31	4.09	−.22	4.23
CAGES (30 birds/lot)									
1	None	66.1	62.2	− 3.9	64.7	4.68	4.47	−.21	4.61
2	15 Furazolidone[1]	60.3	48.1	−12.2	55.9	4.80	4.79	−.01	4.80
3	25 Furazolidone	62.0	51.6	−10.4	58.2	5.04	4.81	−.23	4.97
4	90 Arsanilic Acid	54.7	47.3	− 7.4	52.0	5.26	5.26	——	4.97
5	15 Furazolidone 90 Arsanilic Acid	58.7	51.9	− 6.8	56.4	5.41	5.29	−.12	5.37

[1]nf-180, Hess & Clark, Inc., Ashland, Ohio.
[2]W = winter.
[3]S = summer.

Breeding Alfalfa To Have

More Resistance To Parasites

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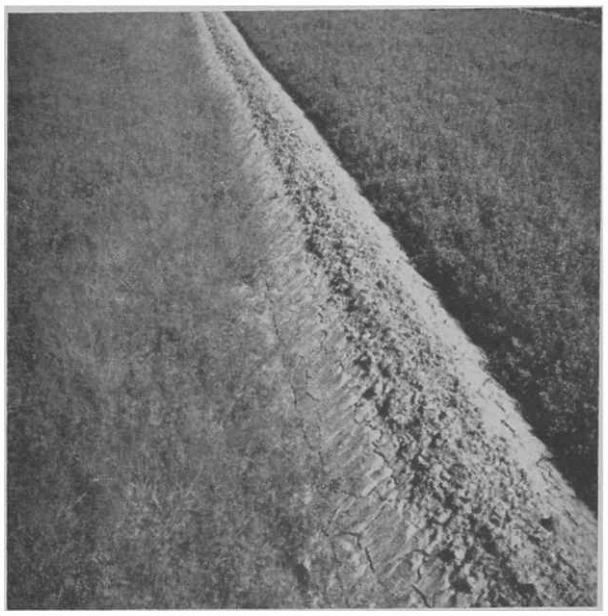


BORDER SIZE plots of resistant and non-resistant alfalfas. Note that plot at left shows heavy growth of weeds and grass, where non-resistant alfalfa was grown. Contrast is lusty alfalfa growth in plot of resistant variety, at right.

The joint release in 1957 of the alfalfa variety, Moapa, by several state and federal agencies inaugurated a new method of insect control on alfalfa in Arizona —that of plant resistance. Plant resistance can express itself in three ways:

1. Non-preference — having any quality which tends to discourage or repel an insect from feeding, resting or laying eggs on a plant.

2. Tolerance — having the ability to sustain insect infestations without apparent or serious damage.

3. Antibiosis — having the ability to prevent or hinder normal insect development and reproduction.

Many Strains Aphid-Tested

Initial resistance work in Arizona was begun in 1956 on the spotted alfalfa aphid, since at that time it was by far the most destructive of the alfalfa insect pests. During 1956 and 1957 many varieties and strains of alfalfa were evaluated for performance under heavy aphid populations. Five of these varieties had considerably fewer aphids, and were damaged less than all other entries.

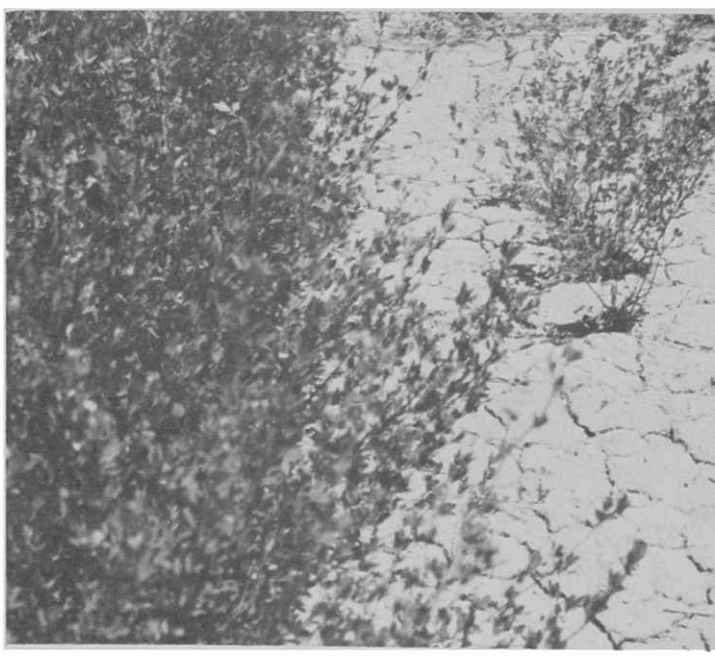
Three of these varieties have been released to growers. One of these is Moapa, which has been recommended for southern Arizona and California; Lahontan for northern Arizona and California, Utah and Nevada; and Zia for New Mexico.

More recently research efforts have been directed toward obtaining new and better sources of resistance to the spotted alfalfa aphid. Large scale plantings have been made of adapted southwestern varieties such as African, followed by exposure of seedlings to heavy populations of the spotted alfalfa aphid. Frequently under such conditions less than one in a thousand seedlings survives. These survivors are subjected to further individual tests with caged aphids. Only the plants on which aphids are unable to develop and reproduce are saved for further evaluation.

Seek Further Resistance

This year preliminary studies are being conducted at the Yuma and Mesa branch stations to find sources of resistance to some other important alfalfa pests, such as the pea aphid, leafhopper, the three-cornered alfalfa hopper, lygus bug, stinkbug and the clover seed chalcid. Results to date have shown that resistance to these insects will be much more difficult to find.

However, there is some evidence that certain varieties and strains of alfalfa have some degree of resistance to one or more of these insects. It is the ultimate goal of this cooperative effort between state and federal agencies to develop an alfalfa highly tolerant or resistant to most of these insect pests.



ROW AT LEFT, in this nursery plot, is aphid-resistant alfalfa, while at right a few puny plants are all that is left of a row of non-resistant alfalfa.

Eggs and Summer Heat

(Cont. from preceding page)

partially, the reason for poorer feed utilization among caged birds. However, the added factor to be considered here is the inability of the cage bird to find protection against cold weather. During the cold months the caged flock will use much of the feed energy to maintain body temperature.

The relationship between feed utilization and environmental temperatures can best be seen by comparing the winter and summer feed conversion differences. With one exception the amount of feed required to produce a dozen eggs declined in the summer. Yet, this occurred in the face of declining egg production, which, as stated earlier, is contrary to the usual pattern.

Calls for Special Diets

Lowered feed intake in the summer does not explain it, because we are comparing the number of pounds of feed required to produce one dozen eggs. The data again indicate that relatively less feed energy is used for body temperature maintenance during the summer. The practical application of this observation is the feasability of formulating a diet for winter egg production furnishing feed energy at a lower cost. The reverse would apply for the summer period.

In summary: (a) Certain chemotherapeutic agents may find use for maintaining summer production; (b) Such additives may be more useful when fed on an intermittent basis; (c) High levels of such supplements should not be administered without professional advice; (d) Different additives may be required for floor and cage-housed birds; (e) There is room to speculate that seasonal productivity can be overcome by environmental control, breeding and changes in the relationships of nutrients.

ABOVE, grape leaves and stems with 2,4-D injury.

Weed Killers are Plant Killers

R. B. Streets
Alice M. Boyle
Plant Pathology Department

While many of the samples of ailing plants examined by the plant pathology laboratory for diagnosis are suffering from attacks by parasitic fungi, bacteria, or nematodes, in almost an equal number of cases no organism is involved.

Each disease has its distinctive symptom, and the diagnosis can be verified by examination of the organism directly from the tissues or from isolations on culture media. Where no organism is involved, diagnosis is more difficult. Often there are no clear cut and distinctive symptoms and the malady is the result of too much or too little of such environmental factors as water, salts, fertilizers, heat, cold, wind, sunlight and the various sprays and dusts administered by man.

When 2,4-D Wanders

A case in point is the great variety of plants coming to our laboratory in increasing numbers where damage from weed killing chemicals is indicated. One of the first chemicals used was 2,4-D which in the volatile ester formulation affected distant plants like a plant-twisting blight. This chemical causes distinctive distortions of the new growth of cotton, grapes, trumpet vine and zinnias. The amine salt of 2,4-D now used is much less volatile and much safer.

In most cases, however, the chemical is applied to weeds growing within the root zone of trees and shrubs, is leached into the soil by watering and is picked up by tree and shrub roots. The average garden owner or garden worker is not aware that the roots of large or long established trees and shrubs are widespread in lawn areas, flower gardens, pathways and driveways.

Selective weed killers applied to lawns have been picked up by tree roots and have caused serious damage. Care must be taken to apply selective chemicals at the recommended dosage as they are selective only when sufficiently dilute.

Killers On the Loose

The so-called "permanent" weed killers such as arsenate and borate mixtures being used so freely now present problems as serious as those caused by the selective weed killers.

Weed killers applied to driveways, gutters, alleys and to soil under brick or tile terrace and patio pavements are intended to sterilize the soil permanently or for a long time. On that account dosage is usually heavy to "do a good job." Any roots so unfortunate as to be reached by rain or irrigation water percolating through treated soil are injured and the toxic chemical is carried to the growing shoots where symptoms may appear.

Symptoms Reveal Cause

While the symptoms of injury from different weed killers and on different hosts vary, those produced by 2,4-D formulations are typical. New leaves and shoots developing after the application of chemical to kill weeds in lawns or plant beds are first to show injury. Weed killer applied in the fall, after new growth on trees and shrubs has ceased, will cause no visible injury in the fall but may strongly distort the new foliage the next spring. Umbrella trees have developed a very lacy foliage following fall application of 2,4-D.

The mildest form of injury is a downward rolling of the new leaves, developing within a few weeks after weed killer has been applied. In more severe injury the leaves are stunted and yellow and often fall.

Another form of injury occurs when the chemical acts on the very tiny primordia leaves. In this case the leaf blade is greatly reduced, the leaf becoming very narrow and almost grass-like. Flowers and fruits are often shed. In most severe injury and in very sensitive plants like the olive, the twigs become defoliated and die and branches several inches in diameter become dry and cracks develop in bark and wood. When weed killers are applied to the soil surface and are leached into the root zone, the cortex of the root tips becomes swollen and elongation stops. The roots may die unless the dosage is very small.

These Are Most Sensitive

Among the more sensitive shade trees and ornamentals are olive, umbrella tree, pines, privets, trumpet vine, roses, grapes, and zinnias. No doubt many other kinds of plants are injured but have not come to our attention.

Owners are concerned with saving their injured trees but there is no quick cure at present. If drainage is good, heavy watering to leach out as much of the toxic chemical as possible is advisable. A light to moderate watering may only move more chemical down into the main root zone and cause further injury. The injured tree should be considered "in the hospital" and watered regularly and fertilized moderately in March and July to stimulate additional root growth. Some trees have died, others which looked just as sick have survived and in one to three years appear to have fully recovered.

In yards and ornamental plantings where root systems intermingle everywhere, chemical weed killers should be used with great caution — if at all. Applied to soil or plant growth within fifteen feet of valuable trees or shrubs, they often cause serious injury.

BELOW, privet showing injury due to soil application of a "permanent" weed killer.