

Progressive

SEPTEMBER-OCTOBER 1963

Volume XV

Number 5

AGRICULTURE

IN ARIZONA

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



In This
Issue—

Flora of the Catalinas

THE WEST IS IMPORTANT

Our editorial spot in this issue of Progressive Agriculture is allotted to an editorial from Colorado Farm & Home Research, the bi-monthly publication of the Agricultural Experiment Station at Colorado State University. The editors from our sister institution have expressed themselves well; also, what they say is as interesting to us in Arizona as it is in Colorado. The editorial follows:

Future prospects for farmers and ranchers in the West are bright, the U. S. Department of Agriculture's Economic Research Service predicts.

The West is expected to increase cropland by nearly three percent by 1975, going from 70.4 million acres in 1959 to 72.5 million. In contrast, cropland for the nation as a whole is expected to decrease 2.4 percent, the USDA reports.

With steadily improving technology, yields on western acreage by 1975 should be 25 percent or more higher than the 1957-59 levels.

A good part of the success of western agriculture today and in the future, the USDA reports, is spelled out in the figures on irrigated lands. Four-fifths of all irrigated land in the United States is in the West.

The West will have another 4.4 million irrigated acres by 1975. One-half of this acreage will be taken out of dry-land farming areas. The rest will come from raw land.

(EDITOR'S NOTE: No sizable increase in acreage brought into cropland production is expected in Arizona.)

A third of this newly irrigated acreage will be capable of a wide variety of production. It will be land that can be easily shifted from one crop to another, depending upon future needs. Most likely crops, the USDA indicates, are vegetables, fruits and high value field crops.

About half the new land will be a little more restricted, although still fairly versatile. Most of this land will be limited to grains, forages, po-

tatoes, sugar beets, beans, peas and seed crops.

Western farmers and ranchers also are expected to step up output of pasture and rangeland. Clearing of trees and brush, control of insects and rodents, reseeding programs, better application of fertilizer and greater use of rotation grazing will help them reach the expected 80 percent increase in productive capacity by 1975, compared to 1950.

The Western states encompass two-fifths of the nation's land area, but include more wilderness, desert and mountain peaks than productive soil. Altogether, the 11 Western states have only 15 percent of all cropland in the nation.

Westerners, however, have made good use of this acreage. In 1959, farm output was worth \$6.6 billion, or nearly one-fifth of the U. S. total of cash farm receipts.

Today the West yields a big proportion of our major crops — a fourth of the food grains, a fifth of the cotton, nearly half our fruits, vegetables and nuts and about three-quarters of all the seed crops and sugar beets.

The Pacific and Mountain states provide 50 to 100 percent of the nation's lettuce, celery, carrots, artichokes, garlic, cantaloup and honeydew melons.

The West also holds its own in livestock production, too, the USDA continues. Two-fifths of the sheep and lambs sold in 1959 grazed in western meadows and nearly half our wool supply was clipped in the West.

In 1959, ranches and farms from the Rockies to the Pacific sold a fifth of the cattle and calves marketed in the U. S.

Our Cover Picture



That tall youth in the center of our cover picture is Gordon L. Hadden of El Paso, Texas, who received



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Trade names used in this magazine do not endorse products named nor imply criticism of similar ones not mentioned.

the National Agronomy Senior award for 1962-63.

The National Agronomy Senior recognition program recognizes an outstanding senior student in agronomy at all institutions which have active clubs or chapters affiliated with the American Society of Agronomy. Selection of the winner is based on scholarship, leadership, character and student activities.

Gordon, a June graduate, was active all four years of his college life in the Crops & Soils Club in this college, and in his senior year served as president. He is also a member of Alpha Zeta honorary agricultural fraternity, and was the recipient of the Pistor-Stanley scholarship, a highly coveted award.

In the photo, Gordon is receiving his agronomy certificate from Dean of Agriculture Harold E. Myers, right, while at the left is Dr. D. F. McAlister, head of the Agronomy Department and Assistant Director of the Agricultural Experiment Station.

COLLEGE OF AGRICULTURE

CURRICULUM REVISIONS

W. P. Bemis

One of the major responsibilities of any institution of higher learning is to make sure that its curricula keep pace with the ever advancing frontiers of knowledge. Changes made may involve only slight revisions in existing courses or major revisions in which existing courses are deleted and new ones added.

In any revisions, items considered include need to up-date certain subject matter areas, student demand, course duplication, teaching staff available, and others.

For the 1963-64, 1964-65 biennial University of Arizona catalog, the College of Agriculture has revised its curricula by offering 16 new courses and dropping 13.

New Ag. Engineering Courses

The Department of Agricultural Engineering has revised its curriculum for students majoring in that field and has modified its curriculum for majors in farm mechanization. Students majoring in Agricultural Engineering will be offered five new courses designed to present the fundamentals of the application of engineering to agriculture.

Titles of the new courses indicate the broad scope of the course contents. The first course, *Energy in Agriculture*, is based on engineering core curriculum material and is the initial course in the sequence of courses for majors in agricultural engineering. Subsequent courses to be offered are: *Water Control in Agriculture*, *Components and Systems in Agriculture*, *Agricultural Engineering Laboratory*, and *Agricultural Engineering Design*.

The Department of Agricultural Economics has strengthened its program by adding three new courses to be offered exclusively to graduate students. These

Dr. Bemis, a professor of Horticulture, is also chairman of the College of Agriculture curriculum committee.

offer advanced study in *Agricultural Marketing Analysis*, *Economics of Natural Resources*, and *Agricultural Policy Analysis*. In addition, a course in *Wildland Economics* will be offered to undergraduate as well as graduate students.

Animal Path. Has New Course

A new course, *Experimental Surgery*, will be offered by the Department of Animal Pathology to staff members and graduate students in various biological sciences whose research involves some phase of surgical procedure with test animals.

In keeping pace with the expanding graduate college program and the advances in plant physiology research, the Botany Department, in cooperation with staff members from six other departments, is offering a new course, *Advanced Plant Physiology*. This course will cover the basic principles of metabolism, plant-water relations, growth and development, and photosynthesis and energy relations. It will take four consecutive semesters to complete the subject matter offerings of this course.

This cooperative approach combining the efforts of staff members whose basic discipline is plant physiology, and who represent wide areas of experience and training, will greatly strengthen the graduate program in the plant sciences.

The Botany Department also is offering a beginning course, *Fundamentals of Botany*. For this new course, the department has received a National Science Foundation Grant of \$5,610 for scientific equipment.

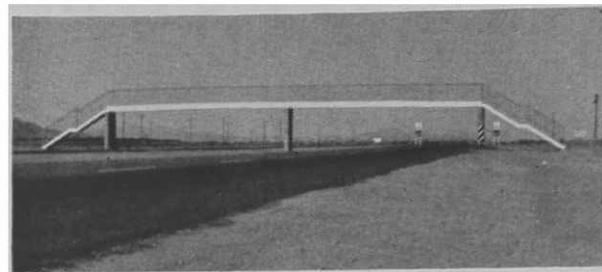
Summer Extension Course

A summer course, *Directed Experience in Extension Education*, will be offered by the Agricultural Education Department. This offers students on-the-job training in the methods, techniques and practices of extension employees.

Insect Physiology-Toxicology Laboratory will be offered by the Entomology Department to provide laboratory experience for students enrolled in two existing courses, *Insect Physiology* and *Insect Toxicology*.

The landscape architecture section of the Horticulture Department has added the new course, *Landscape Construction*, to its curriculum which includes existing

Where Is This Bridge?



You'll either know this picture definitely — or not at all. All we'll tell you is that it is for pedestrian travel, and that it has been installed recently. If you're still curious, turn to Page 15 for the answer.

PROGRESSIVE

AGRICULTURE IN

ARIZONA

Vol. XV

No. 5

September-October, 1963

Published bimonthly by the College of Agriculture, The University of Arizona, Tucson, Arizona, Harold E. Myers, dean.

Entered as second-class matter March 1, 1949, at the post office at Tucson, Arizona, under the act of August 24, 1912.

Reprinting of articles, or use of information in *Progressive Agriculture in Arizona*, by newspapers and magazines is permitted, with credit.

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Es necesario administrar sal al ganado "a discreción" durante todo el tiempo. Esto es que los animales puedan disponer de ella cuando la apetecen. Los otros minerales necesarios deberán suministrarse de acuerdo con las condiciones locales, en cuanto a su ausencia o escasez.—TIERRA

courses in landscape architecture, landscape plant materials and landscape design.

These curriculum changes are indicative of the flexibility which must be maintained in order to train students to meet the constant changes in the fields of science and technology related to agriculture.

Vegetation of the Santa Catalina Mountains

Height Makes Many Climates

On the basis of over 400 such samples, the pattern of plant communities in relation to elevation and different exposures is revealed as belts of vegetation that extend to higher elevations on the warmer drier south slopes and to lower elevations on cooler more moist northern slopes.

Although numerous influences interact to produce this pattern, climatic factors, such as temperature and moisture, are of primary importance. With each 1000 foot rise in elevation one can expect a 3° F. reduction in temperature. However, during the summer the change may be twice this figure, with readings around 100° F. or more at the foot of the mountain in contrast to a comfortable 68° F. near the summit. Rainfall also increases with rise in elevation from 11 inches on the desert floor to 20 to 35 inches at the mountain top.

As a result of climatic differences, various life zones, characterized by distinctive plant and animal life, are encountered as one ascends the mountain. From the base of the mountain there extends a gently sloping valley plain (bajada) continuing west to the Tucson Mountains and east to the Rincons.

Soil Affects It, Too

Due to differences in soil texture, vegetational changes occur from the lower to upper bajada. The vegetational pattern from the base of the mountain, at the junction of Soldiers Trail and Mt. Lemmon Highway, upward to the summit is: desert scrub or spinose desert, characterized by saguaro and palo verde, on the lower mountain slopes; a narrow belt of open desert-grassland; an open oak woodland (above 4500 ft.); a pine-oak woodland extending to 7000 ft.; a pine-oak forest with oak decreasing; and a pine forest extending to the summit on the drier slopes. The fir forest is restricted to north slopes, primarily above 8000 feet to the summit.

The Sonoran Desert

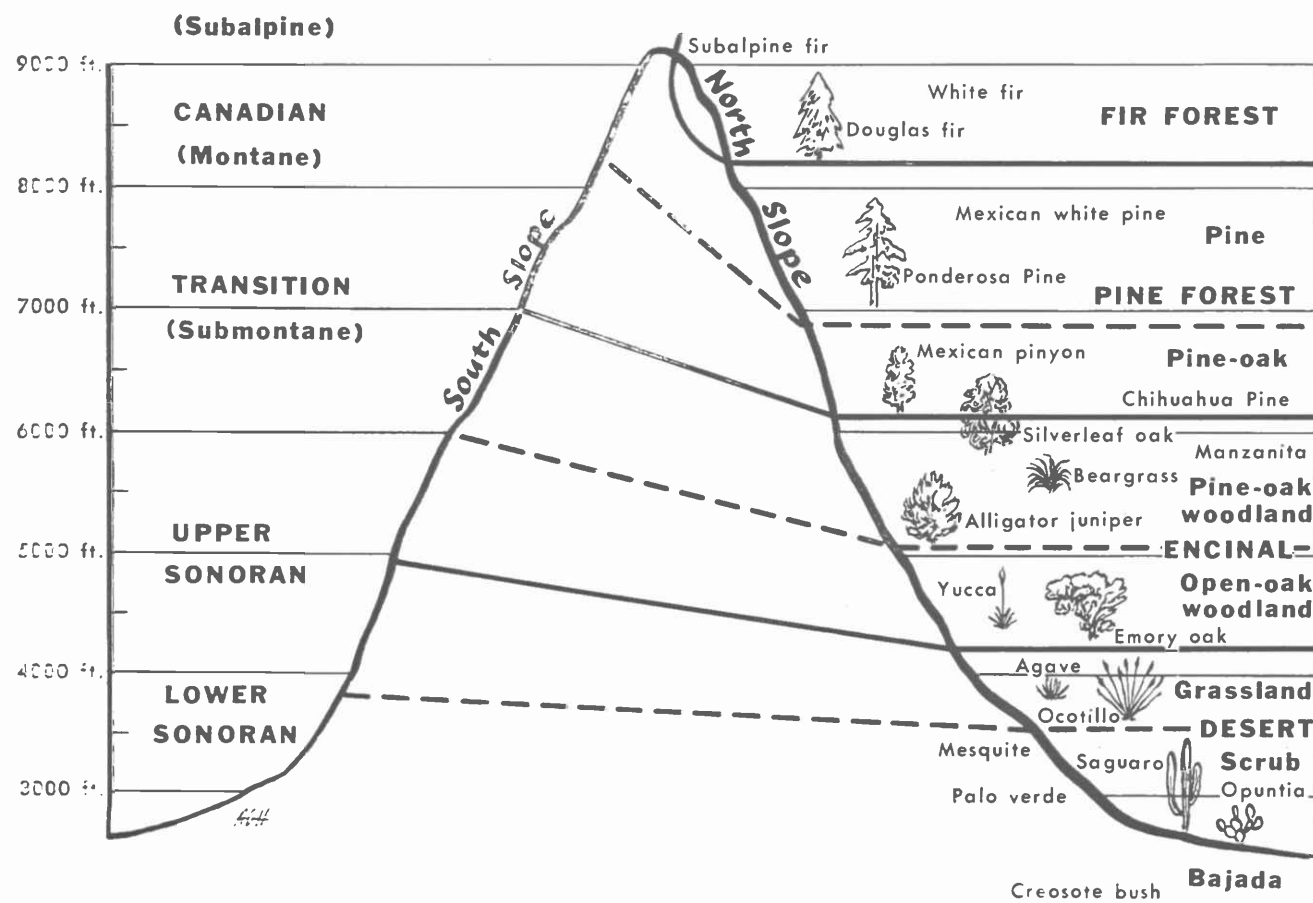
BAJADA

On the lower bajada around Tucson, creosote bush desert predominates on the fine-textured soils, which are often underlain by caliche, a cemented calcareous layer. The shrubs are scattered, their density presumably being limited by competition for

(Continued on Next Page)

Life Zones

Vegetation Types



William A. Niering and Robert H. Whittaker

In the summer of 1962 the authors initiated a three-year study of Southwestern mountain vegetation under National Science Foundation support. The study is centered in the Santa Catalinas, although comparative data will be obtained on the vegetational pattern of other ranges, including the San Jacinto Mountains of California.

The work will seek an understanding of the relations of the plant populations to environment, productivity of plant communities, disturbance and successional changes, and the broader geographic and historic relationships of plant communities.

Have Much to Offer

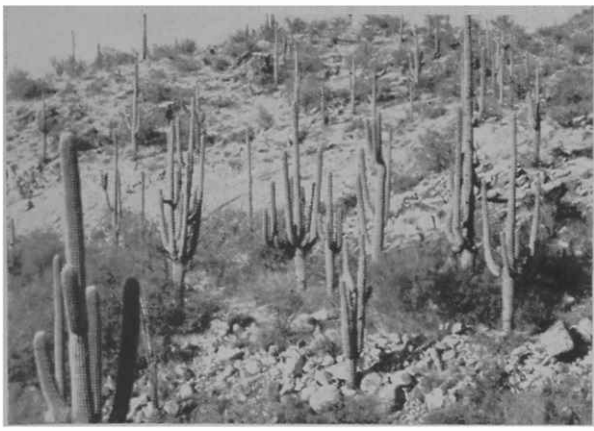
The Catalinas were selected for intensive study since they offered relatively uniform geology, wide range of vegetation types, ease of access, and the proximity of excellent herbarium and research facilities at the University of Arizona.

The authors are Associate Professor of Botany, Connecticut College, New London, and Associate Professor of Biology, Brooklyn College, respectively, both on leave during their Southwest vegetation studies.

In addition, the pioneer work of the late Forrest Shreve,¹ who was associated with the Desert Laboratory on Tumamoc Hill on the west edge of Tucson, would serve as an invaluable reference for more intensive studies.

The vegetation of the south side of the Catalinas has been sampled along the Mt. Lemmon Highway from Tucson (2500 feet) to the summit (9000 feet). Trees, shrubs and herbaceous plants were counted and measured in quadrants on various slopes and sites from the driest ridges to the moist ravines.

¹ The vegetation of a desert mountain range as conditioned by climatic factors. Carnegie Inst., Washington, 1915.



ON THE UPPER BAJADA THERE is the desert shrub, conspicuous with saguaro and palo verde trees on rocky slopes, and mesquite associated in the canyon, in foreground. This photo was taken at 2850 feet, just above Soldiers Trail, looking westward across the highway.

(Continued from Previous Page)

moisture. Along the largest washes, such as Tanque Verde Creek, a mesquite bosque ("woodland") occurs with widely scattered taller cottonwood, willow or sycamore along the banks.

In the late 1800's "lush" vegetation, good fishing and occasional beaver dams occurred along certain of these washes. But, as pointed out by the early botanists at the University of Arizona Agricultural Experiment Station, heavy grazing in the late 1800's, accompanied by drought, resulted in a reduction in protective plant cover and an increase in run-off. This caused more severe erosion and eventually the cutting of channels, such as one observes today.

Farther up the bajada, palo verde and saguaro increase while creosote decreases. On the upper bajada, as one approaches the base of the mountain (2850 ft.) mesquite and jumping cholla increase, with scattered palo verde and large saguaro. Here at the mouth of Soldier's Canyon increased moisture, finer textured soils and grazing have modified the typical pattern from upper to lower bajada, *i. e.*, creosote bush on the finer textured lower bajada, and palo verde-bur sage type with saguaro on the more stony soils of the upper bajada.

Lower Mountain Slopes

DESERT SCRUB

As one starts up the mountain, the giant saguaro cactus and the green-barked foothill palo verde, along with ocotillo and various species of cacti, cover the steep rocky slopes. Low shrubs such as brittle bush, fairy duster, and many spring annuals, add to the extremely rich assemblage of desert species.

Adaptations to the desert environment are numerous: the reduction of leaves to spines to decrease water loss, the green barked stems which aid in photosynthesis, succulent habit of cacti for water storage and the semi-shrub habit—dying back during dry periods and quickly leafing out following the rains.

In addition, the many annuals are able to complete their life cycle rapidly during favorable periods. Saguaro, the giant cactus which typifies the Sonoran Desert, is reproducing under the protective cover of palo verde or other "nurse" plants and is in no danger of disappearing, as is the case on many parts of the bajada where grazing, combined with rodents, tends to limit reproduction.

Some Saguaro Frozen in '62

The many large dead saguaro evident on the slopes were killed by the January, 1962, freeze. Smaller plants were less adversely affected, and our studies indicate that the population will recover the loss. Saguaro decreases around 4000 feet, its upper limit apparently being determined by low temperatures.

DESERT-GRASSLAND

The desert scrub gives way to a narrow belt of desert-grassland (4000 feet) where a low agave, called amole, and grasses cover the slopes. This zone is a meeting place for ocotillo, which extends upward from the previous zone, and rose wood and blue oak, low evergreen trees which extend downward from the next zone, the encinal. When amole is burned, grasses and other forage plants tend

to increase. The Forest Service is therefore using controlled burning to increase forage in parts of the range open to grazing.

The Encinal

The encinal (Spanish word meaning a grove of evergreen oaks) is a belt characterized by a variety of low, rounded evergreen oaks.

OPEN OAK WOODLAND

As the oaks appear they dot the slopes, forming an open grass woodland, but these trees increase in density on the north slopes as compared to the drier more open south slopes (Molino Basin, 4300 feet). Amole and grasses comprise the conspicuous ground cover under the various oaks—Blue, Emory and Arizona—appearing in this order up the mountain.

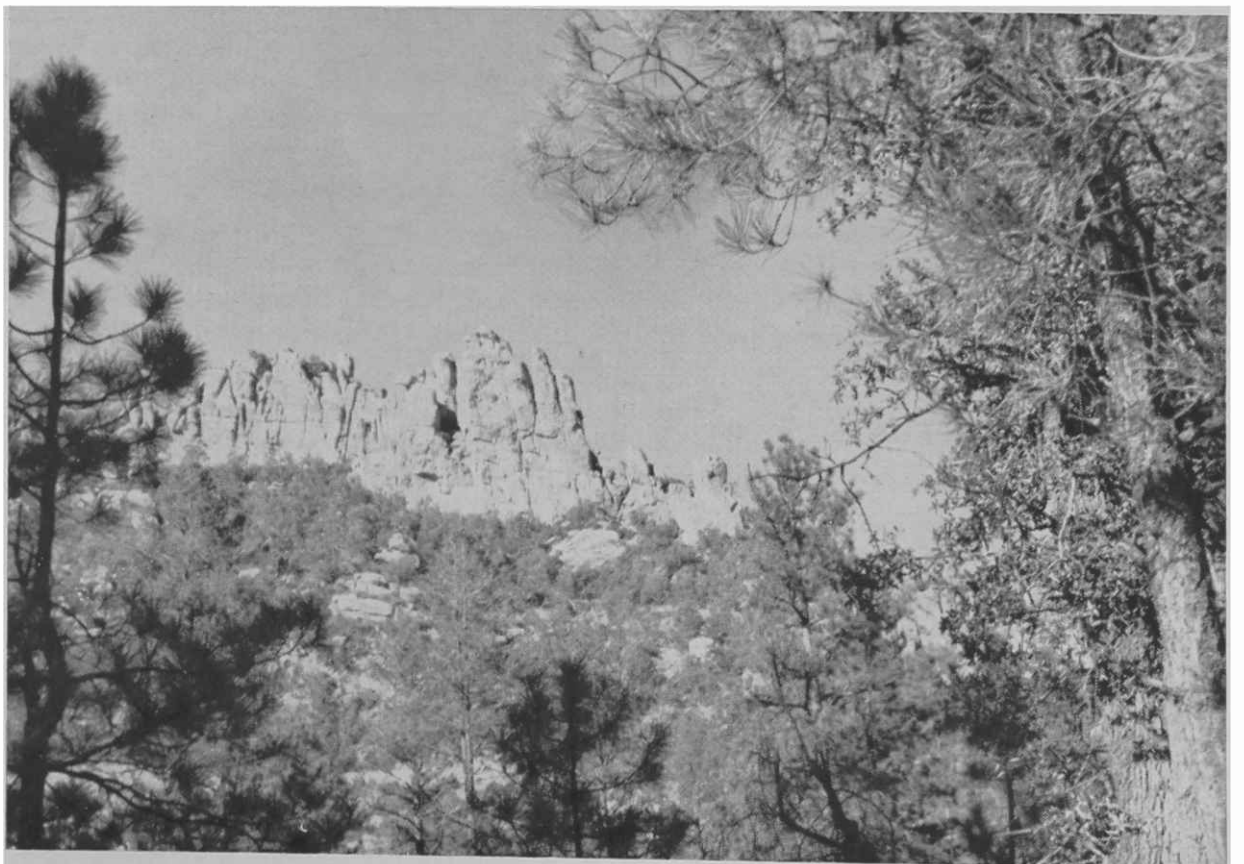
On certain slopes the low fine-leaved evergreen turpentine bush and sotol are conspicuous. The shrubby red-stemmed manzanita also appears at Molino Basin. Upward alligator juniper, followed by pinyon pine and increasing oak cover, form the pine-oak woodland or upper encinal.

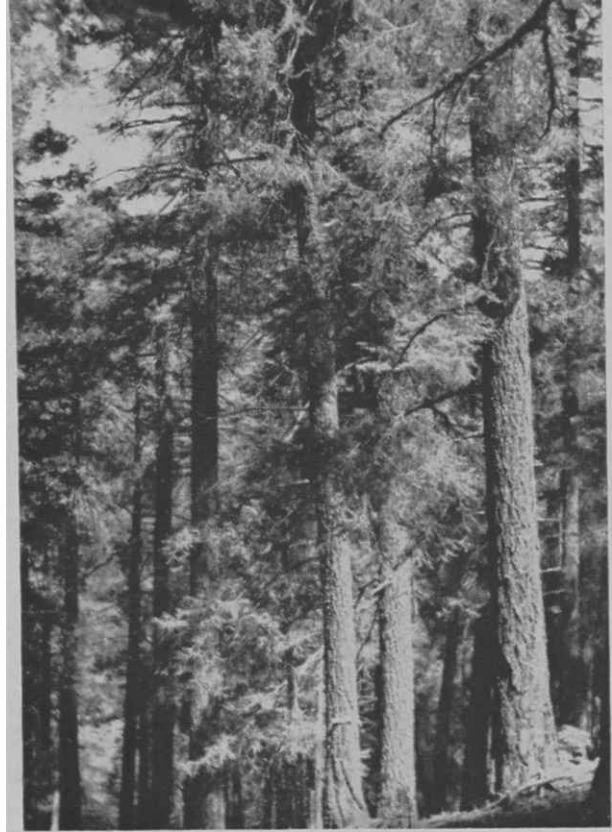
PINE-OAK WOODLAND

This belt in its various phases extends from below Bear Canyon on the north slopes (5000 feet) to above Windy Point (7000 feet). It is interrupted by Bear Canyon, where a beautiful stand of large Arizona cypress occurs in the deep ravine just below (west of) the picnic area. Although typically a deep canyon species, young trees are becoming estab-

(Continued on Next Page)

BELOW WE SEE a view from the 5800 foot level. Here is pine-oak woodland on rocky slopes, as seen from the Bear Canyon picnic area. Framing the picture, on either side in the foreground, are ponderosa pine.





HIGH AND COOL is the view from the ← 8700 foot level of Upper Sabino Canyon. The photo shows a glimpse of the fir forest at that level.

veloped under a natural regime of periodic lightning-caused fires that thinned the trees naturally.

Now, with fire protection currently an irreversible policy, the actual fire hazard is increased. This is because an accumulation of pine needles and the clumps of unthinned young pines and understory oaks could easily carry a fire into the crowns of the larger pines. The next generation pine forest will, therefore, develop under a new regime — a process which will be of interest to both the forester and lumberman. Ponderosa pine continues to the summit on the warmer south slopes, and Mexican white pine increases with elevation.

At Top the Fir Forest

The magnificent Douglas fir forest, with trees ranging up to from four to five feet in diameter and several hundred years old, is restricted to the north slopes, mostly above 8000 feet (Ski Lodge), but farther downward on protected slopes and into ravines.

White fir, an associate, increases in the draws. Due to the dense shade there is little or no undergrowth. Scattered stands of trembling aspen, appearing as lighter green areas, occur where lightning fires have presumably opened the fir canopy.

In uppermost Sabino Canyon (above Ski Lodge) a localized stand of subalpine fir has been bisected by the road to the summit. Engelmann spruce, frequently associated with this



SEPTEMBER

- 16-20—State 4-H Advisory Committee Meeting — U of A Campus
- 23—Meeting of State Advisory Committee for Town and Country Life Conference — Phoenix
- 24—Meeting of Executive Board of Arizona Homemakers' Council, Phoenix

Americans on the average will eat about a pound more this year than the estimated 162.5 pounds of red meats we ate during 1962.

fir, is absent in the Catalinas but present in the Pinalenos and Chiricahuas.

National Forest Protection

The Forest Service is to be commended for designating the south slope of the range as a recreation and watershed area, which means cutting and grazing are excluded. Vegetationally, this range is a classic in the Southwest where within an hour's time one can pass from the Sonoran Desert, with its spectacular cacti and species diversity, to a forest of towering fir trees hundreds of years old.

It is the responsibility of the Forest Service and the public in general to preserve such an area as this — this is Arizona's heritage.

Common and scientific names of Santa Catalina Mountain plants mentioned in text

Agave — <i>Agave palmeri</i>	Mexican white pine — <i>Pinus strobiformis</i>
Alligator juniper — <i>Juniperus deppeana</i>	Ocotillo — <i>Fouquieria splendens</i>
Amole — <i>Agave schottii</i>	Palo verde — <i>Cercidium microphyllum</i>
Arizona cypress — <i>Cupressus arizonica</i>	Ponderosa pine — <i>Pinus ponderosa var. arizonica</i>
Arizona oak — <i>Quercus arizonica</i>	Rosewood — <i>Vauquelinia californica</i>
Bear grass — <i>Nolina microcarpa</i>	Saguaro — <i>Carnegiea gigantea</i>
Blue oak — <i>Quercus oblongifolia</i>	Silverleaf oak — <i>Quercus hypoleucoides</i>
Brittle bush — <i>Encelia farinosa</i>	Sotol — <i>Dasylirion wheeleri</i>
Bur sage — <i>Franseria deltoidea</i>	Subalpine fir — <i>Abies lasiocarpa</i>
Chihuahuan pine — <i>Pinus chihuahuana</i>	Sycamore — <i>Platanus wrightii</i>
Cottonwood — <i>Populus fremontii</i>	Trembling aspen — <i>Populus tremuloides</i>
Creosote — <i>Larrea tridentata</i>	Turpentine bush — <i>Haplopappus laricifolius</i>
Douglas fir — <i>Pseudotsuga menziesii</i>	White fir — <i>Abies concolor</i>
Emory oak — <i>Quercus emoryi</i>	Willow — <i>Salix spp.</i>
Fairy duster — <i>Calliandra eriophylla</i>	Yucca — <i>Yucca schottii</i>
Jumping cholla — <i>Opuntia fulgida</i>	
Manzanita — <i>Arctostaphylos spp.</i>	
Mesquite — <i>Prosopis juliflora</i>	
Mexican pinyon pine — <i>Pinus cembroides</i>	

(Continued from Previous Page)

lished on the adjacent north slopes as a result of fire protection.

At the Bear Canyon picnic ground (5800 feet) one enters a ponderosa pine-oak forest with silver leaf oak appearing over 1000 feet below its continuous range. On the adjacent slopes, which are more moist, a phase of the pine-oak woodland can be recognized with scattered chihuahuan pine, identified by its shorter needles and persistent cones. This extends above a more continuous canopy of evergreen oak.

From Bear Canyon up to Windy Point (6500 feet) the very rocky slopes are covered with a more scrubby phase in which manzanita is most conspicuous, together with Arizona and silver leaf oak and scattered pinyon pine and juniper. The extreme rockiness and past fires have tended to reduce pine and juniper and favor manzanita and oaks, which have the ability to resprout following fire. Scattered throughout the open oak and pine-oak woodland are four large conspicuous monocots — bear grass, sotol, yucca and a large agave. As one leaves the open rocky area above Windy Point, there is a rapid transition into the Pine Forest (7000 feet).

The Pine Forest Area

In this forest ponderosa pine, with its long needles, forms an upper canopy with scattered silver leaf oak beneath the pine. However, as one proceeds upward to 8000 feet (above the Palisades Ranger Station) the oaks are replaced by young stands of ponderosa and scattered, shorter-needled, Mexican white pine. This excellent regeneration is a response to fire protection, although the larger pines de-

From Stone Age to Moon Shot Era

COUNTY AGENTS GO A-VISITING

James W. Little

Central Utah was being blessed with a gentle drizzle last June as 11 county agricultural agents, representing 11 western states, packed their bags for a 4,000 mile study tour. Most of the expenses of the trek were borne by the Dow Chemical Company. Agents' pockets and local interests met the rest of the tab.

From Salt Lake City the route lay southwest through Utah and touched the northwest corner of Arizona's "strip" on its way to Las Vegas, Nevada. The second leg of the trip was southeast to Casa Grande, Arizona. A week later the tour turned north from Roswell, New Mexico, toward Colorado Springs. The final stretch looped to the south and ended in Grand Junction, Colorado.

No Cow-Sheep War

Features along the way ranged from the antiquities at the Casa Grande and Ildefonso Pueblos to a Hawk firing at White Sands Proving Ground and artificial insemination and pregnancy testing of range cattle. An old myth was exploded when one rancher described his ranching operation of 15,000 sheep and 900 cows. All were getting along together happily — especially the rancher, who listened to the sweet sounds of coins clinking in his Levi's.

Wheat referendum results made strong conversation. One banker dismissed further farm loans to wheat farmers as an economic impossibility. Watershed development displayed a showpiece in the project recently completed on the Virgin River watering the Mesquite, Nevada, area. Some 1,600 acres are served with sand traps and concrete ditches.

R.A.D. and its companion, A.R.A., met mixed acceptance. Areas blighted with mining and industrial unemploy-

ment problems saw salvation in the programs. Areas of healthier agriculture were very scornful of "more government" and cheered the Congressional action nixing A.R.A. funds.

Water Is Top Topic

Water was a continuous war cry. The T O Ranch (Raton, New Mexico) foreman allowed "It rained on the just and the unjust alike — if you were in JUST THE RIGHT PLACE." Ranges of northwestern New Mexico and southeastern Colorado resembled the valley floor ranges in southern Arizona. Utah farmers explained their water allotment as "three acre feet of water per acre of irrigable land whether under pump or gravity flow." Roswell, New Mexico, civic leaders pointed to their "Aqualantes" with pride. These are men dedicated to conserving the state's vital water resources and insisting upon strict compliance with New Mexico's four foot allotment regulations.

North central New Mexico is looking forward to San Juan waters being raised and diverted into the Rio Grande Valley. It reminded one of the Central Arizona water plans.

At one stop in Utah a rancher explained the decline of his ranching operation at the hands of the U. S. Forest Service. He had purchased a ranching operation with allotments to allow a herd of 150 mother cows. Next year he would be allowed to graze 35 head. "Not worth fooling with," was his summary of the situation. Other

ranchers in Utah and New Mexico told of rushing to buy state and federal lands to ward off grazing fee increases and outside management.

Beets, Good or Bad

Sugar beets — pot of gold at rainbow's end, a steady resource or a curse — it depends on how you look at them. For small farms with poor rotation the beets apparently mean headaches, as we saw the operation near Salt Lake City. Some hope was held in the Roswell, New Mexico, area that beets would make a solid contribution as sheep feed, sheep harvested, whether the sugar processing plant came or not. The tour passed gigantic monuments to a defunct industry — abandoned sugar plants in Glendale, Arizona, and near Springer, New Mexico. The New Mexico venture folded when gravity-flow irrigation systems silted up.

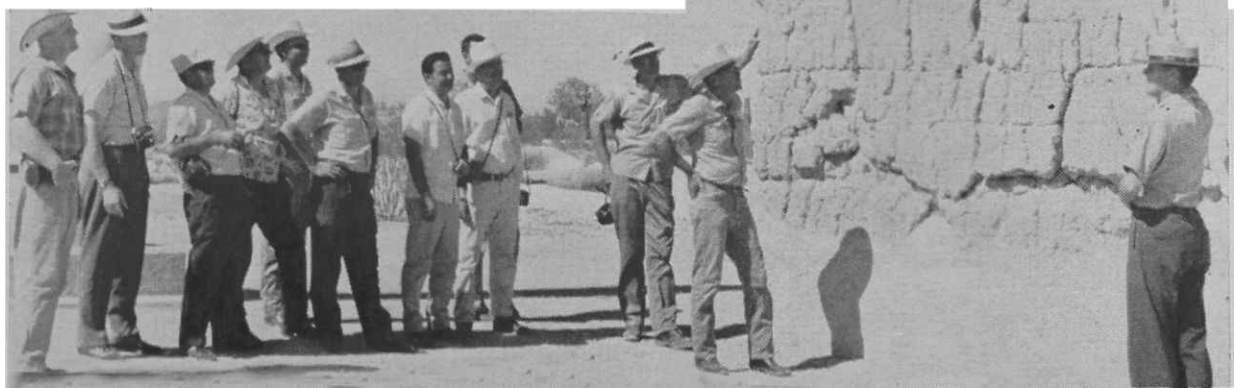
The number one bargain for the participant? Close contact with members of the Extension Service from other states. How they met their problems, who their people are, how is the pay, what do they do with federal programs and how the fishing is.

It was a rich experience. If you can accept a man's story and listen you will both learn. Imagine a dairy herd that hasn't netted its owner a cent in years and yet has made him thousands (both dollars and friends). City kids bring their customer parents by the score to squeeze a few drops of milk or pat a calf. Milk orders rolled in. Meat conversion ratio of 1.2 lbs. of feed per pound of trout. A city bonding itself to induce a factory to move from Indiana.

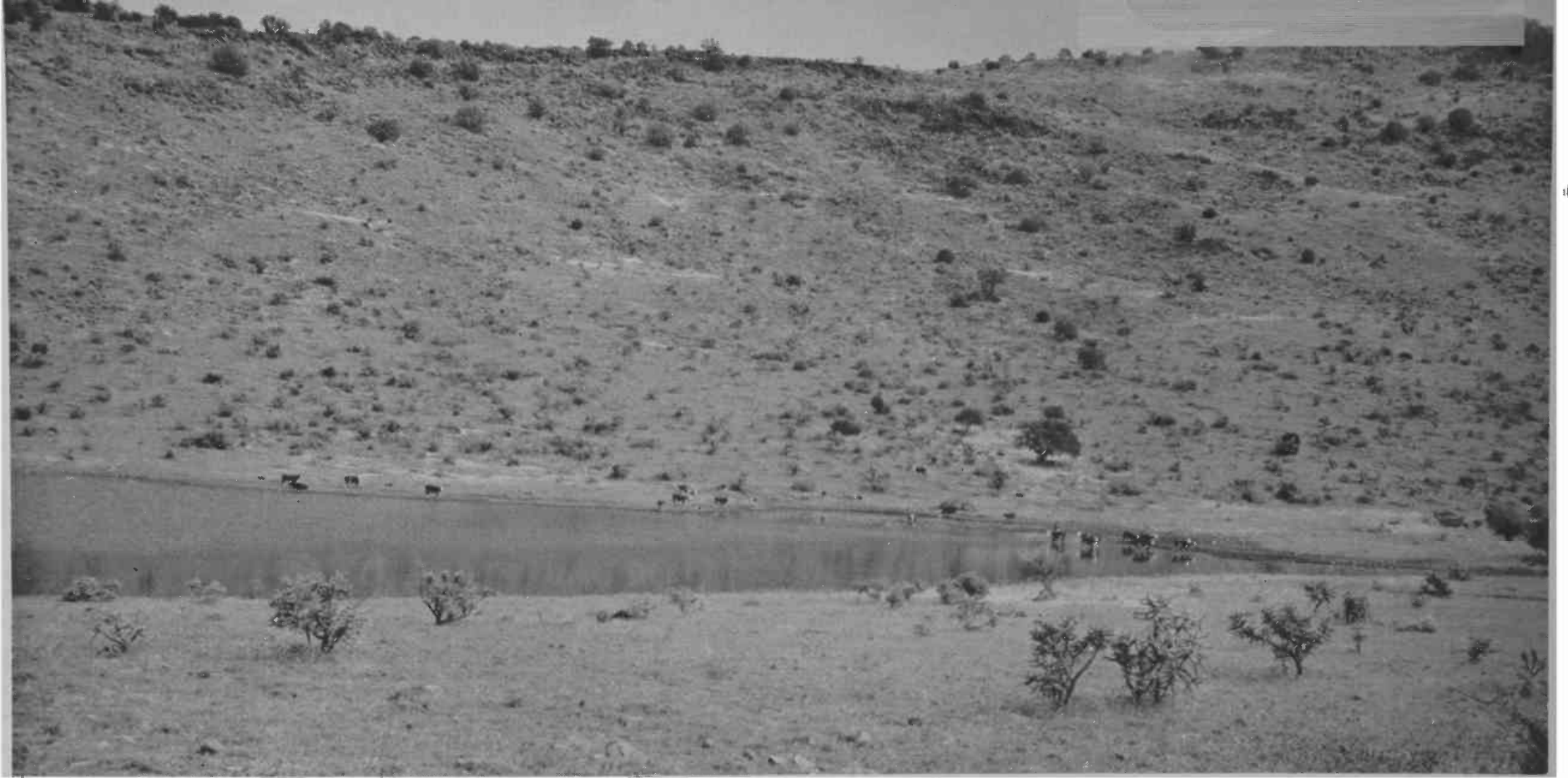
All of these stories, and more, were told by people who made each of these ventures pay richly in money as well as satisfaction.

WESTERN COUNTY AGENTS studying stone hoe agriculture at the Casa Grande Ruins, in Pinal County, are (left to right) Vern Carter, Colorado; Bob Hassell, Utah; Gene Sears, Texas; Nels Anderson, Oregon; Jim Gilstrap, New Mexico; Rollie Weaver, Nevada; Joe Morris, Montana; Don Tippets, Wyoming; almost hidden is Jack Blalock, Hawaii; Bob McKay, Washington; Jim Little, Arizona, and at extreme right, David Hannah, National Park Service guide at the Casa Grande National Monument.

—Coolidge Examiner Photo.



Jim Little is a County Agricultural Agent in Pinal County, and this year's Arizona member of the Dow tour.



WHAT, AFTER ALL, IS THIRST?

Laboratory Rats May Lead Way To More Efficient Range Cattle

Carl B. Roubicek

You see it as you drive past Arizona's semi-desert cattle ranges. At one point, on a hot summer afternoon, you'll see an earth tank with a little water still in it. Near by, resting in the shade, or perhaps standing knee deep in the water, will be a number of cows and calves. (See photo above.)

Scattered in a half-mile radius will be other animals, grazing the sparse range plants but staying close to water.

Two miles away from the water supply will be better range, but it is scarcely grazed in the warm months of the year, except by wild animals.

It was 25 years ago that Professor E. B. Stanley of our Animal Science

Department first pointed out the importance of adequate water for Arizona range cattle. He found that from a quarter mile to half a mile from water the range forage would be 50 percent utilized. From there up to a mile only 25 percent would be eaten by the cattle, and beyond two miles from water there was only 15 percent utilization of forage.

Water Is Limiting Factor

In other words, distance to water is a definite limit on range utilization. Professor Stanley also learned the extreme seasonal differences in water uptake by cattle. On Southern Arizona desert ranges around 2½ gallons of water per day will do in the cool winter season, but in summer that jumps to 11½ gallons per day — four and a half times as much!

Millions of words have been written about the need for more water for Arizona, but let's turn that argument around and look at it from a new direction. Can we develop economic animals and plants that can get along with less water?

Can we develop a cotton which

IN WARM SUMMER months, range cattle tend to stay in, close by, or within easy walking distance of water. Range grass distant from water is not, therefore, fully utilized.

needs less irrigation water? Or a cow which will use less water, and therefore will graze those ranges two and three or four miles from the water tank?

University of Arizona scientists are working on these things, both with plants and with animals. If we can't bring the mountain of water to Mohammed, perhaps we can develop a camel-like cow which will go to the mountain, and a desert-adapted cotton with a cactus thirst.

It all begins with cages and cages of laboratory rats, carefully watched, watered and weighed.

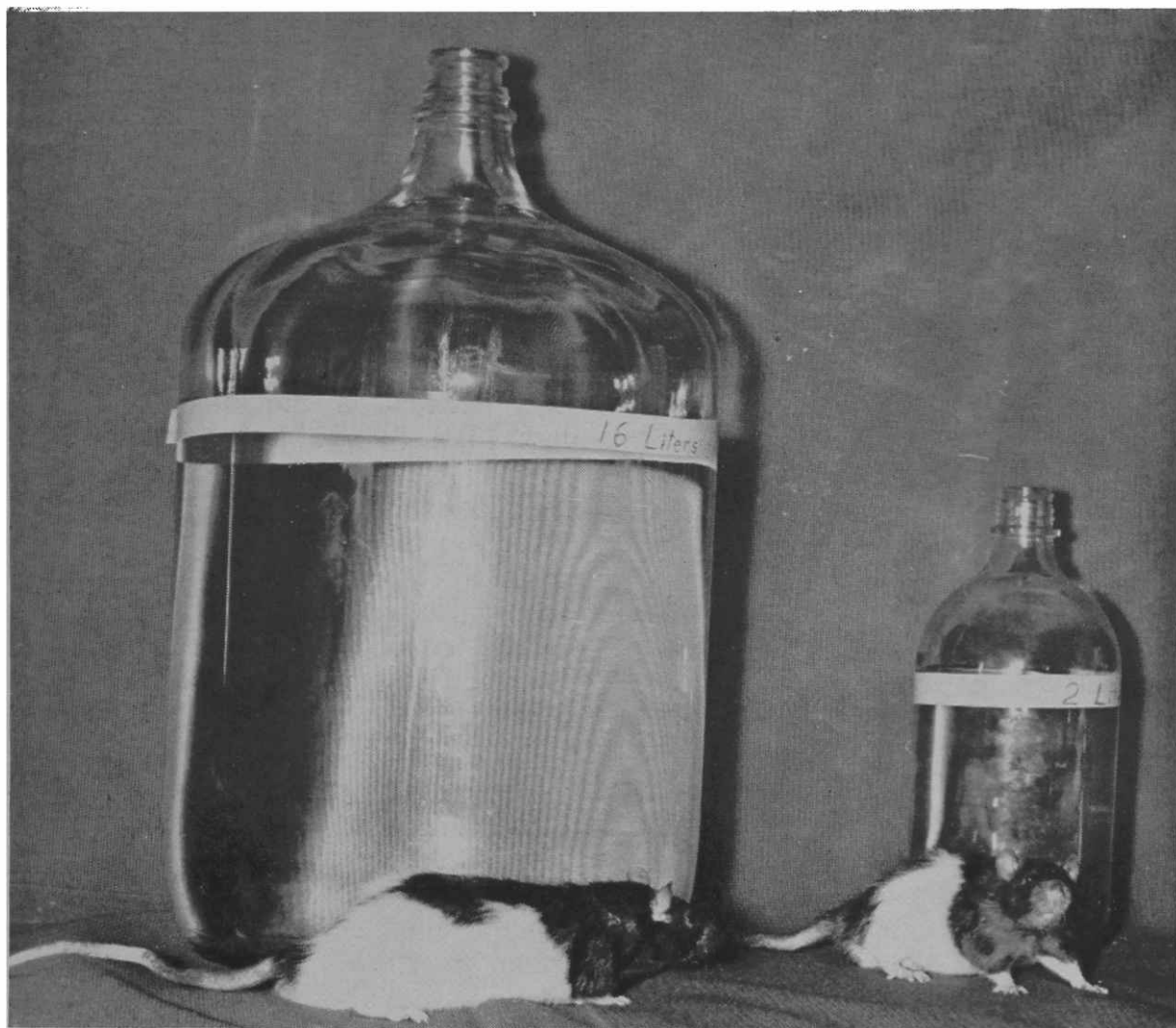
Temperature and Thirst

First of all, of course, we need to know something about thirst, about the need for water, which plant and animal life share. We know that each species of plant and animal thrives at certain temperatures. (The grasses which cattle graze in Alberta and Saskatchewan wouldn't last a single summer in Arizona, and our grasses would die in their first winter in that climate.)

Humans, as any anxious mother with a thermometer in her hand can tell you, have a normal body temperature.

(Continued on Next Page)

The author is a Professor of Animal Science. This investigation was supported in part by a Public Health Service research grant from the National Institute of Health.



LABORATORY EXPERIMENTS by Dr. Roubicek, using over 2,000 rats, indicate the possibility of breeding strains of animals which can thrive and make normal gains with much less water than other ← ones. Animal at left, in photo at left, drank 16 liters of water in 13 week test, while rat at right drank two liters in the same period. Translated to commercial animals, this hints at possibility of range cattle which can get along with less water, range farther from the water holes.

own kitchen, an eight-ounce tumbler of water is about 228 grams.)

Mother Nature's evaporative cooler in man is much more efficient than the one on your roof. In fact, the heat loads handled by sweat glands and cutaneous blood vessels in man are very impressive. Sweating pours out water at the rate of more than two gallons a day. This increased movement of water from the body is equivalent in activity to moving more than an additional two tons of blood circulated through the skin each 24 hours.

Must Replace Lost Water

Let's go back to that evaporative cooler on your roof. When the little water pump becomes clogged, the fans circulate hot air through the house, the house warms up, people begin to grumble and Dad has to get out the ladder and make repairs, so those cooling pads will be water-drenched again. Likewise, in the human body, water lost by evaporation must be replaced. When it's hot you sweat, and when you sweat a while you get thirsty. Blood volume and the water volume in your tissues must be maintained in order for other body functions to perform properly.

When animals are not completely adapted to hot weather, thirst is a lagging guide to water requirements. At such times, and under natural conditions, water intake is not adequate for water requirements. This, in turn, results in partial dehydration, which can be an important factor in affecting heat tolerance, because the rise in body temperature is in direct proportion to the water deficit.

Even under conditions of negative water balance, when water intake is inadequate, sweat secretion continues to be active. This, in turn, aggravates the already troublesome condition of an inadequate water supply in the body tissues. Thus, it is important that the thirst process be brought

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perature and any great departure from that temperature means danger to life. When the thermometer says 98.6 we assume the youngsters are well, but when it says 102 we call the doctor.

But we must cling rather closely to that 98.6 whether it is 10 below zero outside or 110 degrees in July. The ability of a person — or of any animal — to survive or to become adapted to high environmental temperatures depends upon his ability to maintain this normal body temperature.

Water Helps Regulate Heat

Since we recognize that an increase of just a few degrees in body temperature is fatal, from that safe 98.6 to 106, for example, we know that

excess body heat must be disposed of in some way. This is true of all warm-blooded animals, and it is a pressing factor when environmental temperature exceeds body temperature.

One of the important means of cooling the body is by sweating or panting, which really is the original evaporative cooler, developed by Mother Nature. This loss of heat by evaporation depends on the fact that a certain amount of heat is required to change water to water vapor at the same temperature.

We can measure this in a laboratory. In the case of a human body, *each gram of water evaporated from the skin at room temperature results in a heat loss of 500 calories.* (To convert that to measurements in your

Table 1. Average Water Consumption (cc.) for 13-Week Test Period at 95° F. and 72° F. Environmental Temperatures

Selected Group	Environmental Temperature			
	95° F.		72° F.	
	Males	Females	Males	Females
High water consumption	7430	6915	4933	4907
Low water consumption	2865	2565	2783	2261
Controls	4604	4358	3607	3127

(Continued from Previous Page)

into balance with water requirements as soon as possible.

"Control Tower" in the Brain

The physiological basis of thirst is not at all clearly understood. It is considered that the brain has a specific area which functions as a complicated computer. This area is connected to various nerves that form a system which samples the effective osmotic pressure of the body tissue, blood volume, and temperature receptors located at various parts of the body. It then transfers this information into appropriate actions for regulation of kidney activity and water consumption behavior. This specialized regulating center appears to be located in the hypothalamus, a small "control tower" located at the floor of the brain.

A research project has been under way the past two years to provide information which would give us a better understanding of the genetic and physiological basis of thirst and water requirements. For this research, the laboratory rat was used as the experimental animal. At the start, parental stock was obtained from a large number of different sources to provide a wide genetic base. The resulting litters (there are 10 to 14 in a litter) were weaned when they were 21 days old and immediately placed on test.

Tests were conducted in two environmental chambers. Chamber 1 was maintained at a constant temperature of 72° F. with 50% relative humidity. Chamber 2 was kept at a constant temperature of 95° F. with 35% relative humidity. Immediately after weaning, each litter was divided, with half of the animals maintained in each environment. They are numbered and kept in individual cages for a 13-week period. During this entire test period, daily water consumption was measured for each animal.

Measure Water Intake

This can be done accurately, since the water is provided in a glass bottle hung on the outside of the cage. The bottle has a small bent tube inserted through a rubber stopper, and the rat obtains water by licking the end of the bent tube. Thus, there is no water loss by evaporation or spilling. The rat is early maturing and reaches sexual maturity by 10 weeks of age. Thus, the 13-week test period takes the rat from weaning to approximately mature body size. Since 102° F. is the lethal tem-

PARKER VALLEY'S RECLAIMED LANDS YIELD BIG CROPS

Bumper crops are being harvested from some 2,000 acres of reclaimed land in the Parker Valley of Arizona — the nation's oldest irrigation project.

Irrigation came to this section of the Colorado River Indian Reservation in Yuma County in 1867. But much of the land had to be abandoned because of a rising water table which allowed salts to accumulate in the root zones.

Faulty drainage prevented the excessive water, and salts, from being carried off.

Then in 1955, a soils and drainage study by the Bureau of Indian Affairs led to the reclaiming of 2,000 acres with indirect benefits spreading to an adjacent 1,400 acres.

Bureau engineers cut a 16-foot drainage canal $2\frac{3}{4}$ miles long through the abandoned or marginal lands. It was then flooded with water for 60 days.

The results were shown in salt surveys of 1956 and 1961. In 1956, the survey showed salt deposits of 100,000 tons. Five years later, the salt was reduced to 7,000 tons.

Elwin Hanna of E & M Farms leases about 600 acres of the land. His first wheat crops in 1956 yielded three-fourths of a ton per acre. He rotated his crops and last year the yield went as high as two tons an acre.

Dixie Ranches produced an excellent cantaloup crop this year as well as premium alfalfa hay on some 1,460 acres. Also doing well are cotton and grains.

Tim Dye, land operations officer, says a close watch on the water table continues and that further reclamation work will be done as funds are available.

perature for the rat, this test period at 95° F. is about the same as a person remaining at a constant 105° F. temperature from 4 years of age until 18 years of age.

The rat has few, if any, functional sweat glands in the skin. He does, however, have sweat glands on the foot pad, as does the dog. However, there is still water loss through the skin, probably by a process of diffusion rather than secretion.

At the completion of the 13-week test period, selections were made on the basis of their water consumption. At each environmental temperature,

selection of males and females was made for both high and low water consumption. Their progeny, in turn, followed the same test procedure as was done previously. Random-mated control animals were also included in the testing to provide a base for comparing the effectiveness of this selection procedure.

The animals adjusted to the high temperatures very well. By the second generation the death loss was less than 5%, about equal to that of the 72° F. animals. In fact, animals transferred from 95° to 72° F. after the test period appeared rather uncomfortable for several days. We have also found that fertility does not appear to be appreciably affected by the long residence at the high temperature.

The selection for high and low water consumption at the two environmental temperatures has been effective. Averages of the 13-week water consumption for the selected groups and the control group are given in Table 1. Although the average values show marked differences among the groups, there is still considerable variation within each group.

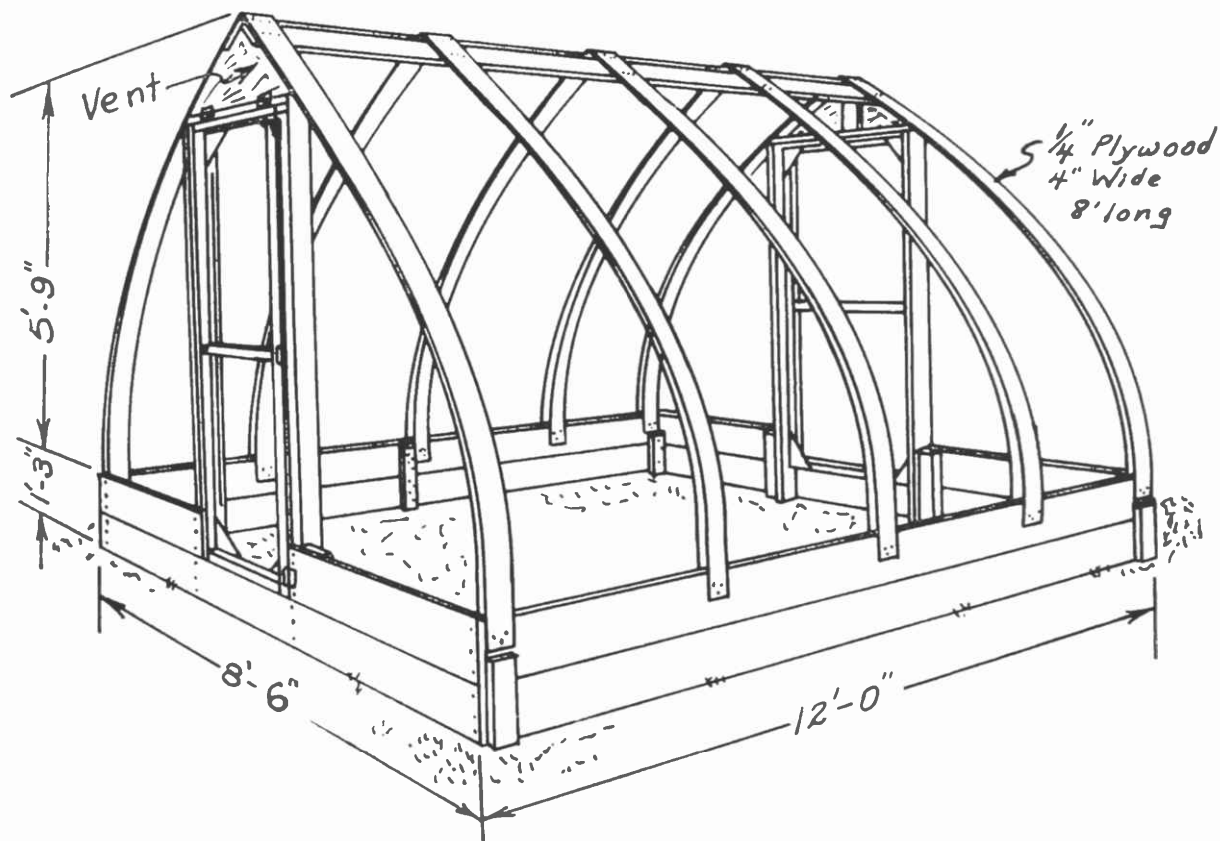
Great Range of Intake

In the high water consumption group there were some individual animals that consumed more than 10,000 cc. of water during the test. In fact, during the first few weeks, some animals actually drank more than their own weight in water every day. Other animals under the same conditions drank only one-tenth of this amount.

It was also noted that litters in the high water consumption group at 95° F. were not generally in the high consumption group at 72° F. Those that consumed the least water at 95° F. had litter mates which were also in the low group at 72° F.

Certainly, adequate water consumption is necessary for the greatest animal gain. Still, the gain in weight for these selected test animals is not at all in proportion to their relative water consumption, especially with the high water consumption group.

Blood samples have been obtained from the test animals for laboratory analysis. These data will be used to determine what effect the relative water consumption has on various blood constituents. This work will continue for at least two more generations, in order to provide adequate numbers of animals of each performance group for more detailed physiological and biochemical studies.



PERSPECTIVE OF GREENHOUSE, Plan 5946, shows how baseboards are installed, also plywood arches and ridge-board. For actual working drawings, apply at your local County Agent's office.

be an advantage to using two layers of film for added insulation. This insulation could reduce the amount of heating needed during the winter.

Provides Air Space

When using two layers, apply the first layer, then place ropes over the plastic extending from one baseboard over the ridge to the other baseboard. This rope should be placed midway between the plywood arches. The second sheet is applied over the ropes and is then fastened with batten strips and screws to the plywood arches and baseboard. Tightening the rope will sag the inside plastic sheet and give the necessary air space for insulation.

A number of modifications could be placed on this greenhouse to give better temperature and humidity controls. A fan with thermostat and humidistat controls will help keep temperatures and humidity at the desired range.

If the greenhouse is used in the early fall or late spring, it will be necessary to add some type of cooling. An evaporative cooler mounted on one end probably will be the most satisfactory.

Can Be Heated in Winter

It also will probably be necessary to add some form of winter supplemental heat. Commercial greenhouses try to keep the temperature somewhere near 60°. Most home owners will probably find that an electric heater with blower will keep plants from freezing and this should be satisfactory.

Our Biggest Industry

Despite a continuing reduction in the number of farms and farmers, agriculture is the nation's biggest business. As the number of farms and farmers have gone down, production from these farms has continued to climb and, today one farm worker produces food and fiber for himself and 26 others.

Today, four out of every 10 jobs in private employment are related to agriculture. Ten million people have jobs storing, transporting, processing, and merchandising the products of agriculture. Some six million people have jobs providing the supplies farmers use. When we note that "only 8.6 per cent of our labor force in 1960 was in agriculture" we refer to the on-the-farm people. Actually the figure for 1962 is 7.7 per cent. When the broader definition of agriculture is used, it is nearer 40 per cent.

Simple and Economical Backyard Greenhouse

W. E. Larsen

The plan for this backyard plastic greenhouse was originally developed in Oregon and has since been constructed and tested by the U. S. Department of Agriculture. The greenhouse shown (Plan 5946) is a small structure eight and one-half feet wide and twelve feet long. The length can be increased or decreased in multiples of three feet. Each 12-foot length should have a frame built in the interior to give stability to the ridge board and arches.

The secret to obtaining a good-looking building that is easy to build is in the construction of the proper ridge board. Rip a one foot by 10 foot board at a 30° angle, smooth the edge with a plane and nail the boards together firmly to form a 120° angle for the ridge. These two boards, fastened in this manner, give a strong

ridge and at the same time give the proper angle for the plywood when it is fastened securely to the ridge board.

Use Plywood Arches

One piece of quarter inch exterior plywood, 8 feet long and 4 inches wide, is bent and fastened inside of the baseboard. Another piece of quarter inch by 8 foot plywood is put on top and fastened to the outside of the baseboard. This split in the arches gives more strength to the arches and gives a firm fastening at the base. Screws will have to be placed in the two strips of plywood to make them act as a unit.

Treated foundation boards and treated stakes, galvanized screws or brass screws, and all other measures to resist corrosion will be found quite helpful in preserving the frame, so that it may be used over several years with new plastic covers being installed as the old plastic becomes damaged.

The plastic film for covering this greenhouse should probably be 4 mil ultraviolet inhibited polyethylene. This film probably will last a year. However, the owner should expect to replace the film each fall. There may

Mr. Larsen is an Agricultural Engineering Specialist in the Extension Service.

CROWN BLIGHT OF CANTALOUPE

Robert E. Foster

Crown blight, the spoiler, is still around! This cantaloupe disease, characterized by premature injury and death of crown leaves, exposure of maturing fruit to sunburn, and general yield reduction, hit many plantings in the Yuma area this season.

Some fields showed only minor losses, while others could be picked only a few times and the most heavily diseased were abandoned completely. Losses may have reached 25 percent.

The crown blight disease became very important in Arizona about 10 years ago and reduced yields of cantaloupes severely for several years. This problem, along with insect troubles, forced Maricopa County to give up the crop and severely taxed the resources and patience of Yuma growers.

Summon Aid of Research

During this time, many research programs were started by California and Arizona scientists on factors which might logically affect the disease. While a few important facts were learned, no control measures could be devised and gradually the experiments were dropped — all except breeding for disease resistance.

In all of the early tests, the most consistent factor to be noted was the reaction of certain cantaloupe varieties to the disease. No matter how much or how little crown blight developed in the field, or what cultural practices or special treatments were used, Netted Gem and PMR 6 always showed the most crown blight, PMR 45 was intermediate, while Rio Sweet and certain breeding lines always had less crown blight damage. This was the lead and inspiration for an extensive breeding program aimed at producing disease resistant muskmelons.

A quick survey of known facts applying to crown blight may be interesting and may help reduce the

Dr. Foster is Horticulturist in the U. of A. Agricultural Experiment Station. The work of many colleagues has been drawn upon in the preparation of this article and is hereby gratefully acknowledged.

effects of the disease until usable resistance is available. Some of the well-known symptoms of crown blight (one-sided effects on leaves, petioles and stems, alternate leaf killing, etc.) seem to point to the vascular system or the roots as the place where trouble begins.

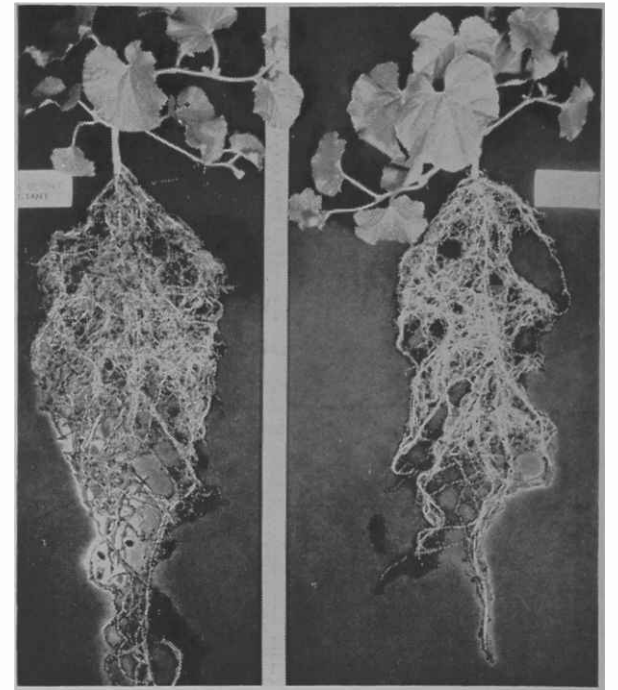
Related to Root Growth

Cantaloupe entomologists are pleased to report that there are no definite relationships between insects and crown blight except as vectors for viruses that may be involved. Crown blight symptoms can be duplicated in the greenhouse by mechanically restricting root development. The onset of these symptoms coincides exactly with the time roots become "pot-bound." Improper soil drainage and aeration — too much (sand boils or streaks) or too little (hardpan, high water table, etc.) — will produce early crown blight spots in a field.

Plant pathologists have ruled out all the above-ground pathogens except perhaps the viruses. Powdery mildew, a serious disease in itself, when present in a crown-blighted field reduces marketable yield even further, but is not the cause of crown blight. Soil-borne organisms can attack cantaloupe roots under certain conditions and bring about crown blight effects.

Drought will duplicate some of the symptoms, and in many cases a reduction of crown blight losses can be associated with ideal irrigation practices. Reducing plant and root stress by removing fruit, shading plants from bright sun or reducing plant water loss has resulted in less crown blight. A recent study in our laboratories has shown that cantaloupes develop roots poorly at low temperatures (early season), reach a maximum root growth rate at 90° F., and then at higher soil temperatures

ROOT SYSTEMS make the difference. Plant at left, below, is from a resistant strain; plant at right is susceptible to crown blight.



(late season) drop off again in new root growth. This has special significance when it is realized that, for any plant, only a *growing* root is an *efficient* root.

A Problem of Management

What conclusions can be drawn from the above? Certainly an implication is apparent: Crown blight seems to be a root problem! If crown blight symptoms are the result of root troubles it must be remembered that many factors, alone or in combination, may be at fault in any cantaloupe field. And the primary causes at work in one field may be different from those responsible for poor root function in another field.

It seems logical to recommend, then, that any land preparation, any fertilization program, any irrigation schedule, or any other cultural practice that will permit or stimulate good early root development, root health, and continued root growth should be used to reduce crown blight losses.

Much has been said about the cantaloupe viruses in relation to crown blight. Whether they are primary causes of crown blight or not, it is certainly evident that they can bring about serious losses which, to say the least, add to crown blight troubles. Stunting and distortion due to viruses can be seen readily in the above-ground portions of infected plants. It would be foolish to as-

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Dr. Wm. J. Van Arsdell

Dr. William J. Van Arsdell, Professor of Animal Science, died July 1, 1963, of a heart attack while vacationing with his family in Tulsa, Oklahoma. He was 38 years old.

Widely known in Arizona as coach of the U. of A.'s livestock judging team and advisor to the Rodeo and Block and Bridle clubs, he was named Professor of the Year for 1962-63 by the U. of A. Agricultural Council.

Known to University students as well as 4H and FFA youth as "Dr. Van," he was held in high esteem by both students and faculty. He had a rare combination of wisdom and patience in counselling students that stimulated them to do their very best in all things.

Dr. Van Arsdell joined the U. of A. faculty in 1958 after having served as head of the livestock section of the Samuel Roberts Noble Foundation of Ardmore, Oklahoma, and as Assistant Professor of Animal Husbandry at Michigan State University. He served with the 99th Division of the U. S. Infantry during World War II.

He was author of a dozen scientific publications, including an article on live animal liver biopsy techniques for vitamin A studies. He held membership in the American Society of Animal Science, Sigma Xi, Alpha Zeta, and the Farm House Fraternity.

He was married to Jeanne Carolyn David in 1950 and is survived by his wife and daughters Debra and Susan of 7409 Calle Kenyon, Tucson.



YOU MAY NOT spot them easily, but in the upper photo of a crown blight resistant cantaloup there are, well shaded by healthy crown leaves, five cantaloup fruit. The susceptible PMR45 cantaloup plant, below, was grown under the same conditions in the same plot. But note the dead crown leaves and exposed fruit.

(Continued from Previous Page)

sume that there were no similar adverse effects on the root system.

The Answer — Better Roots

Where does crown blight resistance fit into the picture? The only morphological difference apparent be-

tween young resistant and susceptible cantaloup plants is in root growth. The resistant plants develop a larger, faster growing root system.

Efforts of research scientists to reduce crown blight are showing significant results. In this university's Horticultural Department a breeding program has produced plants with very good resistance to crown blight.

The fruit quality of these plants with blight resistance is not high, but further selection can correct this situation.

We also have a cantaloup strain with a marked degree of tolerance or resistance to watermelon mosaic virus. Certain U. S. Department of Agriculture cantaloup selections have excellent resistance to powdery mildew.

Muskmelons from foreign countries are being used in a breeding program which aims at resistance to cucumber mosaic virus and watermelon mosaic virus.

The team approach of horticulturists on both state and federal staffs, combining their talents and sharing information of their findings, promises that continued work will produce melons with good market quality and resistance to crown blight and the various viruses which harm varieties currently grown.

Bernhard Secretary Of Crop Improvement Assn.

New head of the Arizona Crop Improvement Association is Charles F. Bernhard, who on July 1 succeeded Harold Jacka, who has directed the association's activities for the past dozen years. Jacka will continue with the association the balance of this year as a consultant.

Mr. Bernhard has lived in Tucson most of his life, has bachelor's and master's degrees in agronomy from the University of Arizona, and has had considerable experience which will be helpful to him in his new position.

For five years he was on the staff of the University of Nevada, in the Department of Agronomy and Range Management, and since then he spent five years as an agricultural technician in Africa, working for the International Development Corporation, a private company.

The Arizona Crop Improvement Assn. is certifying agency for field seeds, including cotton, small grains, alfalfas and grasses, sorghums and safflower. It also encourages development and distribution of new and improved varieties of field crops.

Arizona Egg Output Up But Prices Decline

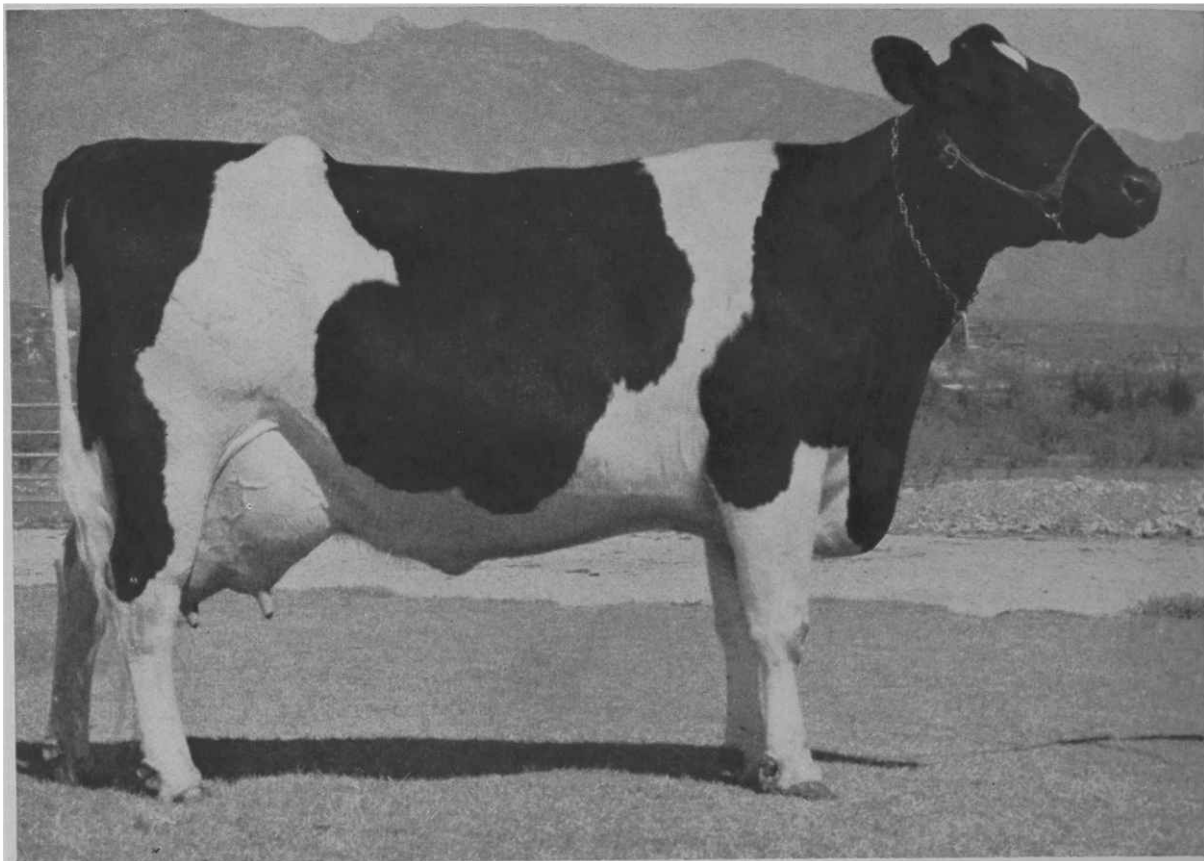
Total sales of poultry and eggs in Arizona during 1962 amounted to \$7.5 million compared to \$7 million in 1961. Eggs were the major source of income, producing \$5.2 million, up from \$5 million in 1961.

The average number of laying hens and the number of eggs produced per hen increased. Egg prices, however, fell from 45.2 cents in 1961 to 38.2 in 1962. Total eggs produced in the state increased from 145 million in 1961 to 167 million in 1962 as a result of a larger number of hens and a higher rate of lay.

Farm prices of eggs in Arizona were about 7 cents lower than in 1961. Changes in demand appear to have played an important role in establishing 1962 egg prices in Arizona and the nation.

Consumers used slightly fewer eggs per capita in 1962, even though prices were lower. The decline in demand for eggs since World War II appears to be continuing, say U of A agricultural economists.

University Holstein Sets State Record



Producing more than a ton of milk per month, a Holstein cow in The University of Arizona dairy herd has set a new state record in the senior three-year-old division.

Lavacres Dusty Jo Crystal produced 23,441 pounds of milk and 911 pounds of butterfat (3.9%) in a herd improvement registry test, establishing the new record.

To translate this in terms comprehensible to the housewife, this means the cow averaged 73½ pounds of milk a day — over 31 quarts daily. In other words, if your family used a quart of milk per day, this cow in one average day would furnish you a month's supply.

Lavacres Crystal, who first made an excellent two-year-old record, is now on test as a four-year old. Currently she is producing over 100 pounds (almost 50 quarts) of 4% milk daily.

Incidentally — and it certainly is not incidental to a dairy physiologist — for each pound of milk this cow produces she must run 400 pounds of blood through her udder — over 20 tons of blood per day for a cow producing 100 pounds of milk!

That placid cow, chewing her cud in the corral, is one of the most marvelous machines in nature, far more amazing than any machine ever designed by man.



Cochise County

KAWT, Douglas—Check local listings.

KHIL, Willcox — Mon. thru Fri., 7:45 a.m.

Coconino County

KCLS, Flagstaff—Tues. and Thurs., 8:20 a.m.

KGLS, Flagstaff (Home Agent) — Thurs., 9:45 a.m.

KPGE, Page — Fri., 2:30 p.m.

Graham County

KATO, Safford — Sat., 9:30 a.m.

Maricopa County

KTAR, Phoenix — Mon. thru Sat., 5:30 a.m.

KUPD, Phoenix — Mon. thru Sat., 5:30 a.m. and 12:25 p.m.

KPHO, Phoenix — Mon. (cotton report) 12:40 p.m.; Thurs. (dairy and livestock report) 12:40 p.m.

Navajo County

KDJI, Holbrook — Tues., 1:00 to 1:15 p.m.

Pinal County

KPIN, Casa Grande — Mon. thru Sat., 6:55 a.m.; Mon. and Fri., 9:30 a.m.; Tues., Thurs. and Sat., 12:20 p.m.

Santa Cruz County

KNOG, Nogales — Mon., 6:30 a.m.

Yavapai County

KYCO, Prescott — Mon., Wed. and Fri., 5:55 p.m.

KNOT, Prescott — Mon., Wed. and Fri., 5:35 a.m.

Yuma County

KVOY, Yuma — Mon. thru Fri., 5:45 a.m.

KYUM, Yuma — Mon. thru Fri., 6:25 a.m.

COTTON ACREAGE IN STATE, NATION DOWN THIS YEAR

Together with other Southwestern states, Arizona's planted cotton acreage this year is down slightly from last year's acreage. Figures from the U. S. Department of Agriculture are reported in a recent Associated Press story. Nationally, this year's planted cotton acreage totaled 14,856,000 acres, down 9 per cent from last year.

This reduction was made in compliance with a federal control program designed to keep a cotton surplus from becoming larger.

The department made no forecast on production. But should the yield per planted acre be as good as last year, the crop would be about 13,073,000 bales of 500 pounds gross weight. The 1962 crop was 14,867,000 bales.

Because of a slump in exports and domestic usage, the department set mandatory controls at 16.3 million acres or two million less than in 1962. In recent years, the planted acreage has fallen short of the allotment because some growers do not use their full shares.

The 1963 planted acreage, the percentage such acreage represents of last year's acreage, and the 1957-61 average acreage, respectively, by states included:

ARIZONA 394,000; 95.6 and 395,000.

CALIFORNIA 739,000; 89.5 and 835,000.

NEVADA 3,600; 100 and 3,300.

OKLAHOMA 625,000; 92.6 and 606,000.

TEXAS 6,250,000; 90.3 and 6,518,000.

NEW MEXICO 201,000; 94.8 and 201,000.

The indicated acreage of American-Egyptian cotton, the percentage such acreage represents of last year's plantings, and the five-year average acreage, respectively, by states included:

Arizona 63,000; 151.1 and 30,600.

California 1,000; 151.5 and 500.

Texas 52,000 acres this year; 151.2 percent of last year and 25,800 acres for the five-year average.

New Mexico 29,500; 151.3 and 14,500.

Las raciones servidas en pesebres separados a los que sólo tengan acceso los corderos pueden ser un buen medio para que éstos ganen peso cuando aún son muy tiernos y en lactancia. En esas condiciones ganan peso muy rápida y económicamente.—TIERRA

Cutting Reclamation Is Poor Economy

To attempt to balance agricultural production with market needs by eliminating sound reclamation and irrigation projects would be tantamount to deliberately promoting inefficient use of agricultural resources.

We feel that reclamation and irrigation have a highly necessary role to play in the wise present and future use of national land and water resources for the economic growth of the Nation. — ORVILLE L. FREEMAN, U. S. Secretary of Agriculture.

Diane Ulmer, Glendale, State Dairy Princess



Representing Arizona at the American Dairy Princess contest this September at Miami Beach, Fla., will be Miss Diane Ulmer, daughter of Mr. and Mrs. Irlin Ulmer of Glendale.

Diane is 19, a junior in the school of nursing at Arizona State University. Her brother, Don Ulmer, enters the College of Agriculture at the University of Arizona this fall.

The Arizona dairy princess is no phony, in wearing that title, for she has lived 10 years on a dairy farm, knows how to run the milking machines, and can even milk by hand if necessary.

As a "dairy saleslady" Diane prefers milk to coffee, tea or soft drinks, attributing much of her vibrant health to the health-giving components of the dairy industry's original health food.

MYSTERY PICTURE

If you travel between Casa Grande and Yuma, you certainly recognize this high metal foot bridge over the elaborate two-way Highway 80, at Aztec.

In this small community midway between Yuma and Gila Bend the new foot bridge makes it possible for pedestrians — especially children going to and from school — to cross this busy highway without danger.

GOOD BREAKFAST IS A GOOD HABIT FOR ALL GOOD CHILDREN

Mothers who serve their families a good breakfast each morning are forming good habits for their children as well as contributing to the good health of the family.

Such good habits are likely to be remembered throughout the children's lives, says Miss June Gibbs, extension nutritionist with The University of Arizona.

Nutritionists feel that the best way to help children learn to eat a good breakfast is to serve them a good breakfast each morning.

Miss Gibbs advises mothers to make fruit or juice a regular part of their menu along with milk. Add breakfast favorites such as cereal, toast, bacon, eggs or other foods they like.

After a while a good breakfast will become a habit. And when your youngsters grow older and go out on their own, they're apt to keep right on eating a well-balanced breakfast, she says.

Cash income from the sale of sheep and wool in Arizona during 1962 was estimated at \$6.1 million — \$4.8 million from the sale of sheep and lambs, and \$1.3 million from the sale of wool. This is \$1,000,000 more than the total cash receipts for sheep and wool in 1961. The number of lambs produced in the state during 1962 was estimated at 291,000 head, down 2 per cent from 297,000 in 1961.

This summer has been a busy round of public appearances before civic groups and for radio and television, including an appearance at an open house at the U of A Dairy Research Center in Tucson.

Diane was chosen at the annual contest in June, and will serve until she crowns her successor in June, 1964.

Soon It's County Fair Time



ALL OVER ARIZONA this summer, 4-H boys and girls are busy grooming and feeding their animals, teaching calves, and sheep to lead, in preparation for upcoming fairs. These views were taken last year at the Santa Cruz County Fair, at Sonoita.

