PROGRESSIVE

agriculture in arizona

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

JANUARY – FEBRUARY, 1966 Vol. XVIII No. 1

IN THIS ISSUE - *Native Gourds... Harvesting Water... Barley Production... New Calf Starter... Farm Surpluses*

ALL RACES CONTRIBUTE

With passage by Congress of the new Civil Rights Act, integration of races becomes a matter of national policy. Every sub-unit of government receiving federal funds is covered by this act, including the Land-Grant Colleges of Agriculture in the several states.

As one example of the workings of this new legislation, Experiment Station scientists and Extension Agents may participate only in meetings and activities in which all persons, regardless of race, color or national origin, may attend.

Specifically, the Experiment Station and Extension Service "cannot provide assistance to any organization that excludes any person from membership, or participation in any activities of the organization, or subjects any person to discrimination because of race, color or national origin."

This injunction probably applies less to Arizona than to any other state. The earliest lessons in agriculture in Arizona were taught by Indian and Spanish-American farmers long before the White man arrived. In fact, early works of Forbes and Thornber, issued by this College of Agriculture, tell of lessons learned from Indian and Mexican agriculturists.

Today our Extension meetings and agricultural field days attract Negro, Indian and Mexican visitors, including both Mexican citizens and Mexican-American agriculturists who are U. S. citizens. All of them are most welcome participants. Many of our own people, in turn, attend agricultural field days in the Mexican states of Sonora, Sinaloa, Chihuahua and Coahuila. A lively exchange of research information flows constantly, aiding all participants.

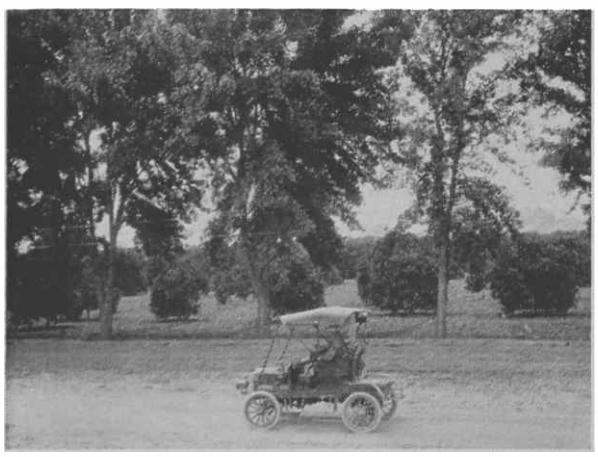
One of the largest and most impressive agricultural research projects in the world involves cooperation between the San Carlos Apache Tribe and The University of Arizona. A key Apache cooperator was pictured on the cover of a recent issue of this magazine. Indian youths are active and able 4-H members in most Arizona counties.

Integration in Arizona? Father Eusebio Kino started that trend in 1700, and it has been an accepted and most acceptable way of life here ever since.

Harold E. Myers

Dean
College of Agriculture
and
School of Home Economics

Cover Picture Shows First Citrus Grove



Too late to accompany Dr. Robert H. Hilgeman's article, in our last issue, on citrus history in Arizona, came the picture appearing on the cover of this issue of *Progressive Agriculture in Arizona.* So readers may construe the picture as a sort of postscript to Bob Hilgeman's informative article.

The picture is from the file of the Salt River Water Users. It shows citrus trees at the Ingleside grove, 11 miles northeast of Phoenix. This was the first commercial citrus planting in Arizona.

Almost as interesting as the citrus trees — and dating the picture — is the automobile in the foreground. Bob Hilgeman writes that "Mr. Talbott, who has been working over all these old pictures, feels that the date (of the picture, as judged by the car) is between 1908 and 1911."

In any case, it is a picture of great historic interest, and we warmly thank the Water Users and our own Citrus Superintendent for this opportunity to publish it.

When an inch of rain falls on a 160-acre farm, it delivers 4,356,000 gallons weighing over 18,000 tons. To transport this amount of water would require 544 tank cars or 4 trains, each over a mile long.

IN THIS ISSUE

PROGRESSIVE AGRICULTURE IN ARIZONA

January-February, 1966
Vol. XVIII No. 1

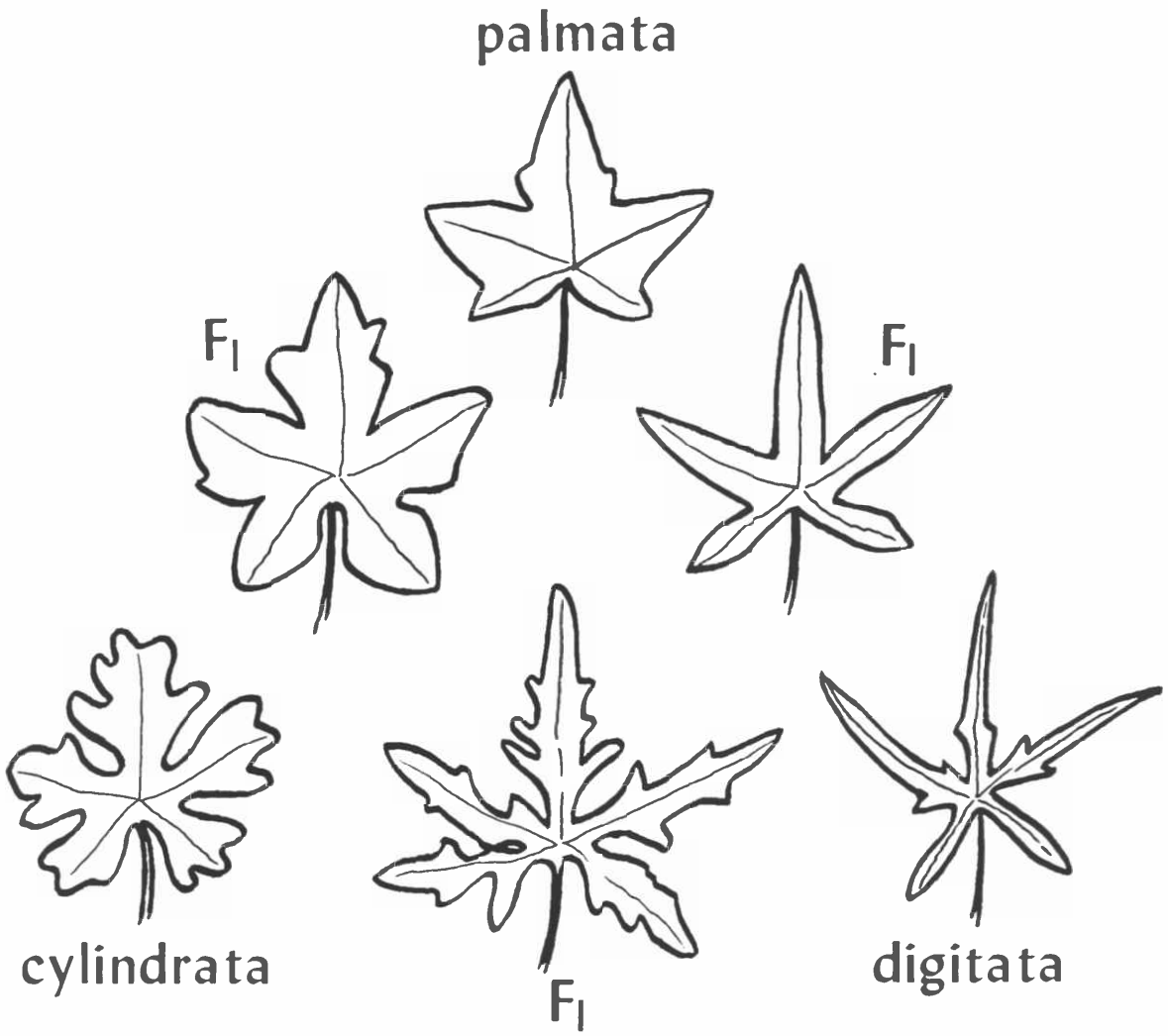
Published bimonthly by the College of Agriculture, The University of Arizona, Tucson, Arizona 85721, Harold E. Myers, dean.

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

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

Editor: John Burnham.

Editorial Board Members: Mildred R. Jensen, J. W. Stull, Norman F. Oebker, William H. Hale and Director George E. Hull, ex-officio.



Shall We Domesticate Our Native Gourds?

By W. P. Bemis and J. S. Folkner

There are three species of wild gourds native to the desert regions of southwestern United States and northwestern Mexico. Two of these species, *Cucurbita digitata* and *C. palmata* are found growing wild in Arizona. The third species *C. cylindrata* is found mainly in Baja California, Mexico. These three species differ primarily in leaf pattern but are quite similar in other respects and hybridize readily with one another.

One of the unique features of these desert gourds is their attractive and delicate-appearing leaves. They are, however, true desert plants and can withstand high temperatures and prolonged periods of drought. The vine growth, which may reach 20 feet or more during a good growing season, normally trails over the ground but will act as a climbing vine when trained.

The drawing at the top of this page shows the leaf patterns of the three species and the F1 hybrids between the species. The leaves of palmata and cylindrata have a velvet like texture while those of digitata are course. The leaves are green with a silver mottled area around the leaf veins. The leaves remain green until killed by frost in the late fall.

Flowers are Short-Lived

Individual flowers are borne singly on the vines and remain in full bloom for a relatively short period from dawn until nine or ten a.m., when they shrivel and usually drop from the flower stem by nightfall. However, a single vine will continue to produce flowers throughout most of the growing season.

The flower petal color is orange and the flowers are about three inches in diameter.

The fruit or gourds are spherical, about two and one-half to three inches in diameter, with stems from three to six inches long. They are mottle green with longitudinal stripes. The gourds on *palmata* and *digitata* turn yellow when mature while those of *cylindrata* remain green. Once mature, the gourds will remain hard for many months.

These gourds may have upwards of 600 seeds in each gourd. *Cylindrata* is characteristic in having the smallest seed, about 950 seeds per ounce, while *palmata* has about 575 seeds per ounce and *digitata* about 475 seeds per ounce.

Roots Source of Strength

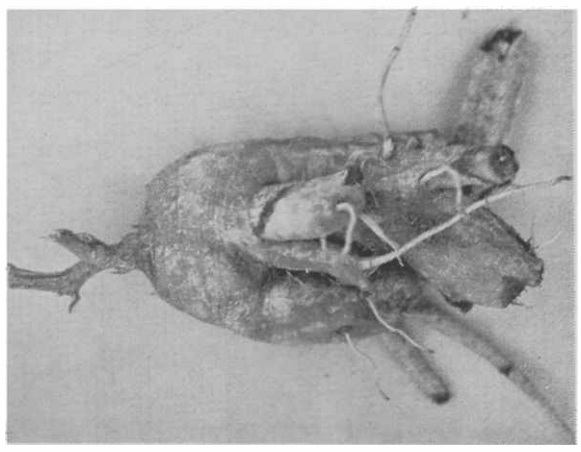
One factor contributing to the ability of these plants to survive under desert conditions is their root system. The roots are tuberous and often reach weights in excess of five pounds during a single growing season. These tuberous roots have two desirable characteristics. First they are able to survive the winter freezes and are able to produce new vine growth every summer, making these plants perennial.

Secondly, under periods of extreme drought the roots become impermeable to moisture loss and remain in a dormant condition until moisture is once more available. The vine growth may die back under these extreme droughts, but will initiate new growth when moisture is available.

These species of native gourds may be started from seed or by transplanting the tuberous roots. Seed germination is often low and requires temperatures around 90°F for maximum germination. Under natural growing conditions these species tend to form

(Continued on Next Page)

LARGE TUBEROUS ROOT of the desert gourd, viewed from the side. This tremendous storage capacity helps the plant survive in a harsh desert environment.



The authors are members of the Department of Horticulture.

VINES OF HYBRID wild gourd cascade up and over the patio wall in an ideal Tucson setting, contributing both beauty and native hardiness to the garden.

(Continued from Previous Page)

colonies of plants by adventitious rooting at the nodes of the vines during periods of high soil moisture. A single colony may after a few years consist of several hundred individual plants, each having its own tuberous storage root.

Have Landscaping Use

The native gourds have been observed in various gardens of fanciers of native plants. They are not widely known by the public or even landscape specialists, limiting their use.

The landscape use of these vines is varied. In a desert garden, particularly a hillside or bank that requires a ground cover, these are excellent, inasmuch as they require no irrigation, which is difficult on a slope.

Trained over a fence or wall or in a tree the attractive foliage as well as the gourd itself is displayed. The fruit may be used as are all other gourds in decorative table arrangement.

These native gourds have the ability to grow under adverse conditions, and to survive as a dormant tuberous root under prolonged periods of drought, but also they will thrive under cultivation and irrigation. The wide range of conditions for growth merits consideration of the native gourds as landscape subjects.

---

17 Today, New Topcoat Birthday Gift for P.A.

We hope you admire our new cover design.

With this issue, *Progressive Agriculture in Arizona* celebrates its 17th birthday. Like any teen-ager, it likes to be dressed well, so we went to a top designer to get the new winter "topcoat."

Designer of this new cover is Douglas Peck, award-winning artist in The University of Arizona Press. We think he did an excellent job.

Our only concern now is that the quality of content of the magazine will live up to its bright new cover.

Cochise County

KAWT, Douglas—6:15 a.m. Mon. through Fri.
KHIL, Willcox — Mon. thru Fri., 6 a.m.

Coconino County

KCLS, Flagstaff—Tues. and Thurs., 8:20 a.m.
KCLS, Flagstaff (Home Agent) — Wed., 9:45 a.m.
KPGE, Page — Fri., 2:30 p.m.

Gila County

KIKO, Globe-Miami
Monday, 12:45 p.m.

Graham County

KATO, Safford — Sat., 9:30 a.m.
Mon. thru Fri., 12:45 p.m. (daily)

Maricopa County

KTAR, Phoenix — Mon. thru Fri., 5:55 a.m.
KOY, Phoenix — Tues. thru Sat., 5:40 a.m.
KOY, Phoenix — Sunday Garden Club of The Air, 8:35 a.m.
KPHO, Phoenix — Mon., Cotton Report, 12:40 p.m.
KPHO, Phoenix — Thurs., Dairy and Livestock Report, 12:40 p.m.
KUPD, Phoenix — Mon. thru Fri., 5:30 a.m. and 12:30 p.m.

Mohave County

KAAA, Kingman—Mon., 1:15 p.m. (Extension Home Economist)

Navajo County

KDJI, Holbrook — Tues., 12:45 to 1 p.m.
KINO, Winslow — Sat., 9:45-10:00 a.m.

Pinal County

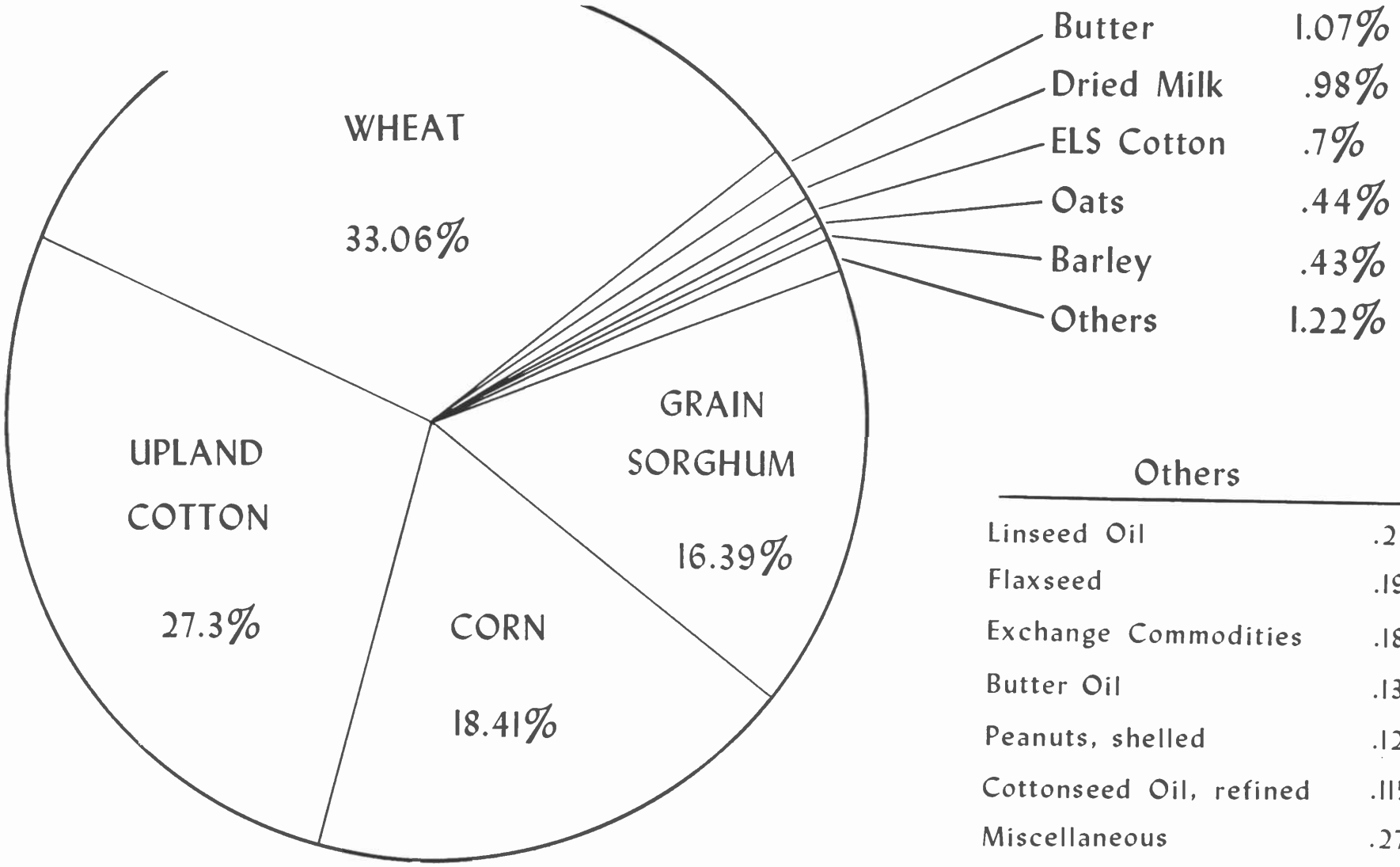
KPIN, Casa Grande — Mon. thru Sat., 6:55 a.m.; Mon. and Fri., 9:30 a.m.; Tues., Thurs. and Sat., 12:20 p.m.

Yavapai County

KYCA, Prescott — Mon., Wed., Thurs. and Fri., 4:15 p.m.
KNOT, Prescott — Mon., Wed and Fri., 6:25 a.m.

Yuma County

KVOY, Yuma — Mon. thru Fri., 5:45 a.m.
KYUM, Yuma — Mon. thru Fri., 6:25 a.m.
10:05 a.m., Sat.



Others	
Linseed Oil	.23%
Flaxseed	.19%
Exchange Commodities	.18%
Butter Oil	.13%
Peanuts, shelled	.12%
Cottonseed Oil, refined	.115%
Miscellaneous	.27%

GRAPH ABOVE SHOWS Commodity Credit Corporation holdings as of last May 1. Arizona contributes slightly over one percent to the cotton holdings, practically nothing to other surpluses held by government.

Agricultural Surpluses? Arizona's Share is Small

By Jimmye S. Hillman and Raymond O. P. Farrish

Arizona farmers and ranchers produce predominantly for the market, not for storage. Of the large variety of field crops, horticultural and specialty crops and livestock products which are produced in Arizona, a very small percentage finds its way into government warehouses. Many other regions of the United States are not so fortunate. These are the areas which have been responsible for producing the large accumulation of agricultural stocks during the post-World War II era.

Arizona's Position Shown

A substantial amount of money has been spent by the Commodity Credit Corporation (CCC) since World War II in stabilizing agricultural prices. Much of this went toward purchasing products for storage. Table one indicates Arizona's relatively small contributions to CCC acquisitions of loan collateral surplus crops during recent years, and the small proportion of the current CCC surplus inventory that can be attributed to Arizona agriculture.

Although Arizona has provided the nation with approximately 1.51 per cent of its total crops by value during the past three years, it is responsible for less than an estimated 0.20 per cent of the CCC investment in surplus inventories as of June 30, 1964.

Six major national surplus crops are involved in the pattern of Arizona agriculture: wheat, corn, grain sorghum, flaxseed, barley and cotton. In only one year of the last half decade has wheat from Arizona been delivered to CCC ownership from loan collateral. Corn never has. Barley has not been delivered in the past five years, neither has flaxseed. Relatively minor amounts of grain sorghum have been delivered over the same period.

By far the largest Arizona contribution to the CCC inventory has been in the form of cotton. This might be regarded as Arizona's principal surplus crop. Even here, however, it should be noted that Arizona produces 6 per cent of the national total, by value, while contributing only 1.2 per cent of the surplus. The pattern of agriculture in Arizona generates far less surplus than the national average, in relation to the value of its contribution to production.

Surpluses for Export

Table 2 shows recent trends of CCC inventory value and turnover. Special export programs have accounted for substantial proportions of dispositions in recent years. Were it not for these programs, the current inventory investment and its expenses would be somewhat greater.

Any national policy to support agriculture cannot avoid a three-pronged choice: (1) cut production, (2) build up increasingly burdensome inventories, or (3) find worthwhile and effective means of utilizing our increasing agricultural productivity. These are not mutually exclusive choices. In fact, all three can happen at once. One or two may be emphasized in government policy in order to reduce pressure on the others.

(Continued on Next Page)

Dr. Hillman is head of the department and Dr. Farrish is extension marketing specialist, both in the Department of Agricultural Economics.

(Continued from Previous Page)

Food For Peace

The current "Food for Peace" effort is an attempt to emphasize utilization in order to reduce the pressure on the other two choices. It is not likely, however, that it can eliminate the pressure of surpluses entirely. Production cuts for certain crops still will be necessary to avoid intolerable inventory build-up.

A principal problem facing "Food for Peace" utilization is the commodity composition of our surplus. Our graph shows this composition as of April 30, 1965. Our surplus consists largely of cotton and a few different grains. We need to adjust our agricultural production to generate a more varied surplus geared to foreign food and fiber needs.

Finally, simply feeding people in foreign lands will not be very effective by itself in achieving U. S. foreign policy aims. We must be willing to continue with substantial aid in other resources, educational and industrial. Trying to use food by itself would be something like trying to build a car without tools. We may have a great opportunity to use food and fiber to help build strong, free nations abroad, but we must intelligently use other resources along with it to make it effective.

And we must, in all fairness to agriculture, point out to U. S. citizens in our cities that a vast portion of our effort to "make friends and influence people" throughout this troubled world is being met with gifts and subsidized sales of U. S. farm products.

This humane assistance to needy peoples of four continents has been charged against the much-criticized "farm program." A substantial part should be charged to the military and foreign aid programs.

TABLE 1. CCC Acquisitions from Loan Collateral, Percent from Arizona Loans and Estimated Share of Current CCC Inventory Investment Attributable to Arizona Crops[1]

Production Year	*CCC Acquisitions Total*	*Arizona*	*Per Cent From Arizona*	*CCC Cost*	*Arizona's Est'd Share*
			COTTON		
	(bales)	(bales)	(per cent)	($ million)	($ million)
1959	8,677,202	342,948	3.95	1,432.6	56.6
1960	7,790,541	126,105	1.62	1,219.6	19.8
1961	3,244,781	107,994	3.33	566.1	18.9
1962	4,740,055	150,766	3.18	760.2	24.2
1963	5,718,518	66,511	1.16	952.6	11.1
1964					
			GRAIN SORGHUM		
	(million bu.)	(million bu.)	(per cent)	(dollars)	(dollars)
1959	103.9	0.4	0.38	82,479,904	313,424
1960	174.8	0.3	0.17	158,574,714	269,577
1961	191.5	1.5	0.78	224,390,052	1,750,242
1962	207.0	1.2	0.58	248,736,376	1,442,671
1963	117.8	0.2	0.17	121,986,643	207,377
1964	62.8			70,427,553	
			WHEAT		
	(million bu.)	(bushels)	(per cent)	(dollars)	(dollars)
1959	173.6	0	0	312,299,161	0
1960	254.9	0	0	461,809,238	0
1961	117.0	0	0	227,265,339	0
1962	226.0	0	0	514,925,409	0
1963	68.5	4,501	0.007	139,714,830	9,780
1964	47.8			69,118,502	
			BARLEY		
	(thousand bu.)			(dollars)	
1959	6,229.3	0		4,368,609	0
1960	11,187.5	0		8,325,034	0
1961	13,993.0	0		14,092,011	0
1962	20,135.1	0		17,699,933	0
1963	3,160.0	0		2,366,045	0
1964					
	(bushels)			(dollars)	
1959	1,575	0		3,592	0
1960	7,588	0		17,767	0
1961	440	0		1,283	0
1962	5,853,478	0		17,355,420	0
1963	11,218,529	0		33,222,811	0
1964					

Total investment cost of national CCC inventory, June 30, 1964 - $4,338,275,000
Estimated cost attributable to Arizona crops - - - - - - - - - $ 11,300,000
Proportionate share attributable to Arizona crops - - - - - - - 0.26%

[1]Sources: See Table 2.

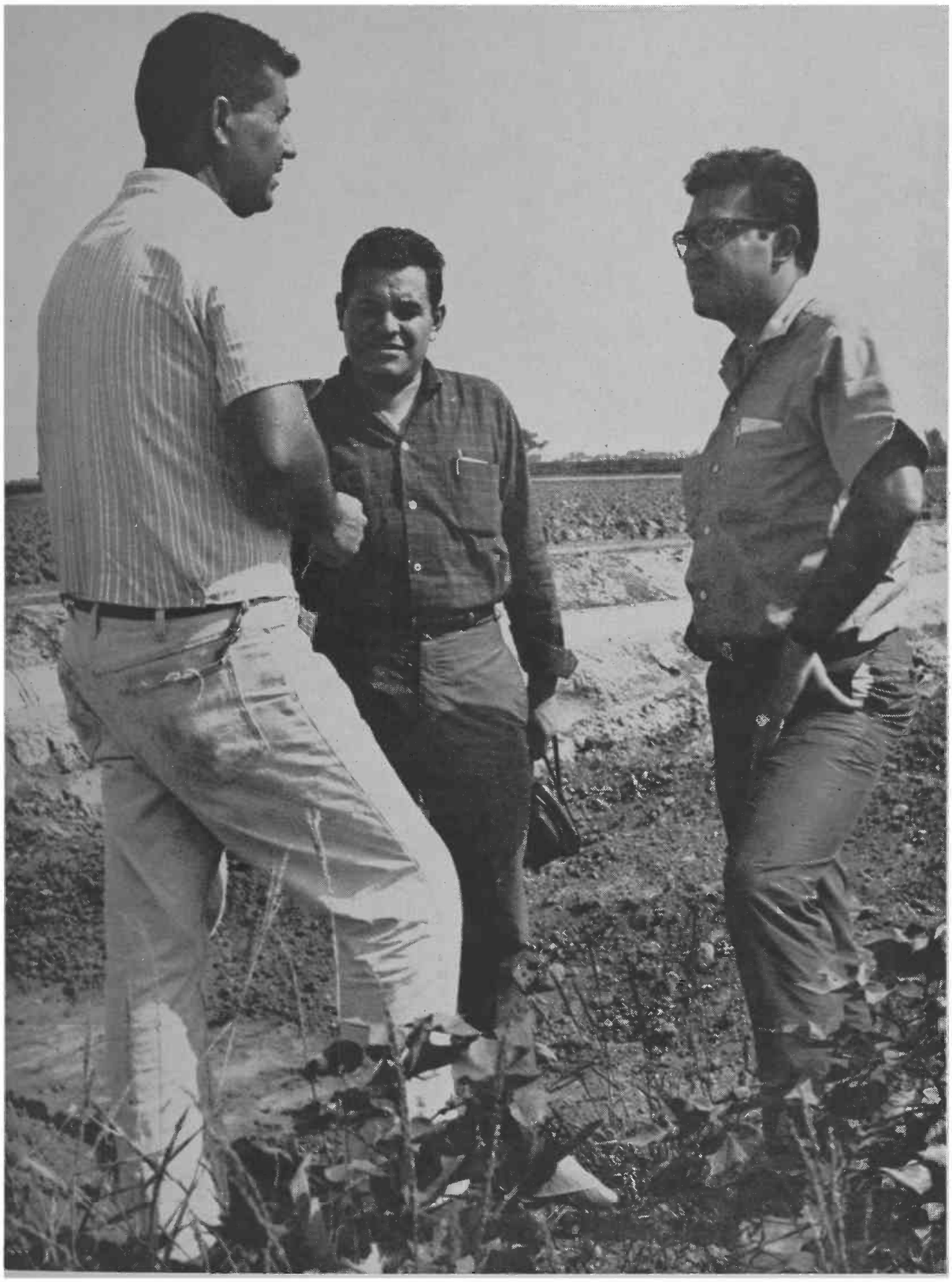
TABLE 2. CCC National Inventory Turnover, 1962-1965[1] (millions of dollars)

Fiscal Year	*Inventory July 1*	*Purchase & Loan Acquisitions*	*Total Availability*	*Dispositions*				
				Domestic		*Export Special*		
				Sales	*Donations*	*Sales*	*Programs*	*Total*
1962	5,563,333	2,138	7,701	1,744	493	212	778	3,227
1963	4,474,358	2,868	7,343	1,218	405	311	683	2,617
1964	4,725,923	2,346	7,072	432	334	1,070	897	2,734
1965*	4,338,275	1,738	6,076	967	263	283	356	1,869

*Through April 30, 1965
Inventory April 30, 1965 = $4,206,751,672.42

[1]Sources: CCC Monthly Report of Financial Condition, Arizona Agricultural Stabilization and Conservation Committee. The per cent and dollar estimates are the responsibility of the author. Proportionate Arizona shares estimates are based on first-in-first-out assumed inventory control. Figures are not always strictly comparable, due to rounding errors.

When Our Neighbors Come to Visit With Us



It is flattering to us that research and extension methods used in Arizona attract favorable attention from visitors coming from other states and nations.

Here, at the UA Cotton Research Center, Phoenix, the Center's foreman, Fidel Castorena (left), describes cotton field trials with Juan Canizales (center) and Cesar Soto (right).

Ing. Canizales, coming from Toluca, Mexico, is in charge of agricultural information for the State of Mexico. Ing. Soto is information director of CIANO (Centro de Investigaciones Agriculturas del Noroeste) at Cd. Obregon, in Sonora, Mexico.

New Book Describes Recent Social Changes In Arizona's Farming

"Farmers, Workers and Machines" is the title of a recent book published by the University of Arizona Press. Authors are Harland Padfield, assistant director of the U of A Bureau of Ethnic Research and assistant professor of anthropology, and Dr. William E. Martin, associate professor of agricultural economics, both of the U of A faculty.

Their book contains the first comprehensive description of the Arizona migratory farm laborer in each of the four social groups in which he is found, and in relation to three major crop industries — cotton, lettuce and citrus — and their labor pools.

The study includes careful consideration of cultural background as a relevant factor in the farm labor problem. It is complete with both historical summaries and case studies.

The book is of particular immediate interest because of the discontinuance of the Mexican bracero program. Thus its subject affects not only farm industry and farm labor, but also Arizona communities in farming areas, political leaders and the general public.

The book grants that if the bracero law were still in effect, use of Mexican nationals as farm labor in the Southwest would decrease rapidly, because of technological and economic pressures already being felt.

The authors were aided in their work by a U. S. Department of Labor research grant of $30,000. The book is for sale for $7.50 by the University of Arizona Press or from any bookstore.

JANUARY

4-8—Arizona National Livestock Show, Phoenix

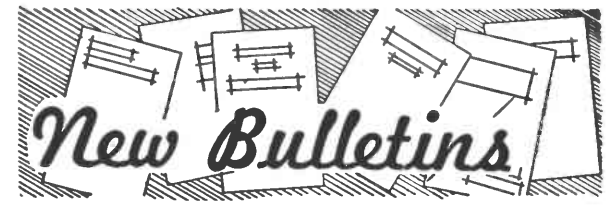
FEBRUARY

9-10—Soil Fertility, Fertilizer and Insect Control Conference, U of A Campus, Tucson

MARCH

3—Annual Bull Sale, Arizona Beef Cattle Improvement Station, River Road Farm, Tucson

19—FFA Field Day, U of A Campus, Tucson



Circular 274—The Pink Bollworm in Arizona (Revision)

Circular 289—Drying Foods at Home

Folder 110—Growing Sugar Beets in Arizona

Folder 111—Sugar Beets: Estimated Costs and Returns

Bulletin A-43—Water, Soil, and Crop Management Principles to Control Salt

Bulletin A-6—Lawns for Arizona (Revision)

It All Started Many Years Ago With the Eaves Trough and the Rain Barrel

HARVESTING WATER

Remember, years ago, the eaves trough which led rain water from the roof down to the "rain barrel" at a corner of the house? Mother used to count on that supply of "soft" water for doing the laundry, back in the day of yellow laundry soap and the copper bottom boiler of hot water, heated on the wood-burning kitchen stove.

Today that same concept has renewed but far wider application. How about saving the rain runoff from all the "roof" of Tucson's streets and paved parking lots? Or from an entire mountainside? The quantity of water thus "harvested" would be tremendous.

Martin Fogel, acting head of the Institute of Water Utilization in this college, discusses the possibilities.

By Martin Fogel

Water harvesting systems, a means for collecting and storing rainfall — and treatment, if necessary — is nothing new to many of the farmers and ranchers of the Great Plains and Midwestern areas of the United States. With the farmhouse roof as the catchment area and the cistern as a storage facility, many a farm family used this "harvested" water for washing and, to a lesser extent, for drinking. The "treatment" in these systems was a butterfly valve in the downspout which, after the first few minutes of a rainstorm, diverted the relatively clean water into the cistern.

Water harvesting systems are nothing new to Arizona. A few ranchers are using highways as catchment areas, while others are using butyl rubber catchments and storage bags. The fish and game people have used paved catchments and storage structures to provide water for wildlife. The Kitt Peak National Observatory uses a paved catchment area for its source of water.

New Methods and Materials

What is new then? For one, new materials and techniques are being constantly developed. Secondly, Arizonans must continue to demonstrate that they are doing everything possible to live within their own resources if they stand a chance of importing additional water, water which everyone agrees is urgently needed.

As is the case with other systems, it is necessary to look at the total operation rather than at each of the various components that make up the system. The systems approach appears to be the logical way to produce the most economical product, water in this instance. Minimizing the size of the components, and using the best combination of materials that is available, will be required to produce water that will compete with other alternatives. The size of these components, interrelated as they are, will depend on such factors as water requirement, unit cost and expected life of the materials, the amount and probability of rainfall and the efficiency with which the catchment sheds rainfall.

To the livestock rancher who has to haul water at a cost of several dollars per thousand gallons, the cost of water is secondary to survival. But hauling is by far the most expensive means for obtaining a necessary supply of water. Contrast this with the city-dweller, who has only to open his tap for a usually unending supply of clean water under pressure, for a very nominal charge of some 30 cents a thousand gallons.

The author is professor and acting head of the Institute of Water Utilization.

Costs Decreasing

Where are we now on the cost scale with water harvesting systems? Fortunately, we are in the area between what the rancher has to pay for hauling water and what the people living in cities have to pay. Thus, there is a place now for water harvesting systems based on currently-available materials and techniques.

In a cooperative effort with the U. S. Water Conservation Laboratory of the Agricultural Research Service and suppliers of materials, the Institute of Water Utilization has planned and will shortly install a water harvesting system consisting of a 1-acre catchment area and a 100,000 gallon below ground storage tank.

The basic materials for this system include pea gravel-covered plastic sheets for the catchment area and a plastic liner and butyl rubber cover for the storage tank. Butyl rubber, while the most expensive material in this system, does serve several important functions. It prevents water loss by evaporation, provides added catchment area through the use of valves which allow rainfall which falls directly on the cover to go into the tank and, lastly, it protects the inexpensive plastic liner from deterioration. Expected installation cost for such a system is approximately $2,500.

Assuming what is believed to be reasonable life expectancies for the above materials and a realistic runoff efficiency for the catchment, the cost per 1,000 gallons of water will be about $1.25 in 12-inch rainfall areas and around $1 in areas where normal annual precipitation is 16 inches. Where a storage facility is already provided, water could be produced at a cost of 40 to 50 cents per thousand gallons.

Expect Further Decreases

Since the largest single cost factor is for materials, the hope for obtaining water at a lower cost rests with the development of cheaper, longer lasting, more impervious materials.

The use of silicones for water-proofing areas is currently being investigated and so is common table salt. It has always been thought that salts are detrimental to agriculture. They are, to plant growth. However, at a penny a pound they also provide a possible inexpensive mechanism for sealing soils and thereby inducing runoff. Researchers at both the Colorado State University and The University of Arizona are pursuing this line of endeavor. Test plots aid in determining

(Continued on Next Page)

National Group Honors 3 Arizona County Agents

Underwood Sears Jones

Arizona County Extension agents received top attention at the annual convention of the National Association of County Agricultural Agents last fall in Pittsburgh.

County Agent John L. Sears, Safford (Graham County), is the 1966 NACAA national chairman of the association's Public Information Committee. Keith Jones, a Pinal County Agent at Casa Grande, is the 1966 regional vice-director for the Western Region.

The NACAA, with membership of 5,500 County Extension Agents from all 50 states, gave a 1965 distinguished service award to Amos H. Underwood, Navajo County Agent located at Holbrook, Ariz.

Arizona representatives on NACAA standing committees for 1966, in addition to Sears, include:

State's Relations — Garrett E. Blackwell, Tucson, Pima County;

Professional Training — William M. Brechan, Flagstaff, Coconino County;

Public Relations — Robert G. "Pat" Gray, Globe, Gila County;

Public Information — Robert L. Halvorson, Phoenix, Maricopa County;

Extension Programs — Paul E. Lineberry, Yuma, Yuma County;

4-H Committee — Eldon E. Moore, Phoenix, Maricopa County;

Recognition & Awards — Alvin Allen, Prescott, Yavapai County.

The NACAA 1966 convention next fall will be in Hawaii.

(Continued from Previous Page)

the feasibility of using newly-developed materials for catchment areas. Life expectancy and runoff efficiency of these new materials are learned from these test plots.

Up to now, little has been said about the treatment phase of the system. Fortunately, water for livestock requires little or no treatment with the types of water harvesting systems in existence or being planned. This may not be the case where water will be used for other purposes.

For City Use, Too

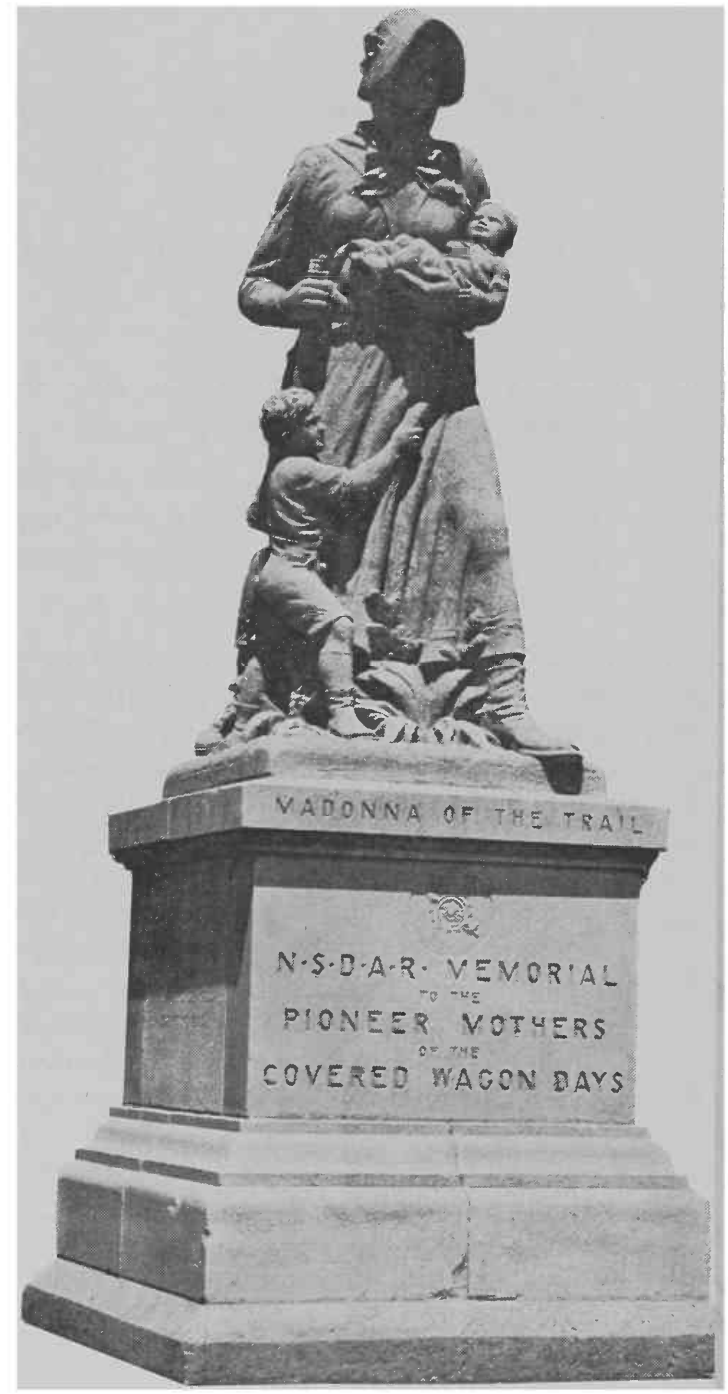
In the past, agriculture has been the prime mover in the development of water resources in the west. Agriculture once again may lead the way in development of water harvesting systems which may also be used to provide water for municipal and industrial, as well as for agricultural, purposes.

After all, if we could capture and store all the rainfall that annually falls on the impervious areas of a city such as Tucson, it would be possible to supply each person with up to 50 gallons of water per day.

UN MUNDO CURIOSO

Antes del triunfo reconocido de los antibióticos, la población blanca del delta del Mississipi sufría casi continuamente de anginas, mientras que la población negra de la misma región, aunque trabajaba laboriosamente, se protegía con eficacia contra este mal . . . por medio de amuletos. Cada negro llevaba colgado del cuello un saquito llena de "tierra mágica"; de vez en cuando estos negros echaban en su boca un bocadito de tierra y lo iban mascando "para alejar el mal espíritu". Pues bien, después se ha descubierto que aquella tierra mágica de los amuletos es muy rica en mohos, de la clase que se utiliza ahora para preparar los antibióticos.

OUR MYSTERY PICTURE



Our "Mystery Pictures" seem to be getting less mysterious all the time — but still they are interesting views of the state we love.

This statue, of course, is widely known by northern Arizonans. It stands at the juncture of two main highways, at a main business corner of the city of Springerville, in northeastern Arizona.

It is a wonderfully nice tribute to the pioneer mothers of covered wagon days, in those days when Indian raiding parties were more frequent than supermarkets, drought-borne hunger more often a companion than a self-defrosting refrigerator, and packaged foods came solely on the hoof.

BARLEY PRODUCTION

Under Different Nitrogen And Moisture Levels

By Chauncy O. Stanberry and Mark Lowrey

In a desert Arizona soil, barley yields may be increased by increasing one or more yield components (plants per acre, tillering or heads per plant, seeds per head, and weight per seed). Plants per acre and weight per seed weren't affected much, but heads per plant and seeds per head were almost doubled by nitrogen (N) fertilization.

Much of this was accomplished with the first 60 pounds per acre applied. Most of the resulting yield increase was from 120 pounds of nitrogen, although a maximum of 240 pounds of nitrogen per acre were applied. (Figure 1) Nitrogen application itself increased barley yields about sixfold above no nitrogen application.

The "wetter" moisture level, actually irrigated oftener than a farmer customarily does, increased yields only about one-third (36%) above the "drier" moisture level, slightly less than farmers' customary irrigation schedules. However, when adequate nitrogen fertilizer and the "wetter" moisture level were both applied together, barley yields increased almost eighteenfold, showing the value of wisely managing fertilization and irrigation together.

This is a joint contribution from the Southwest Branch, Soil and Water Conservation Research Division, Agricultural Research Service, USDA, and the College of Agriculture, University of Arizona. The co-authors are Research Soil Scientist and Professor, Agricultural Chemistry and Soils, University of Arizona; and Physical Science Aid (deceased), USDA, respectively.

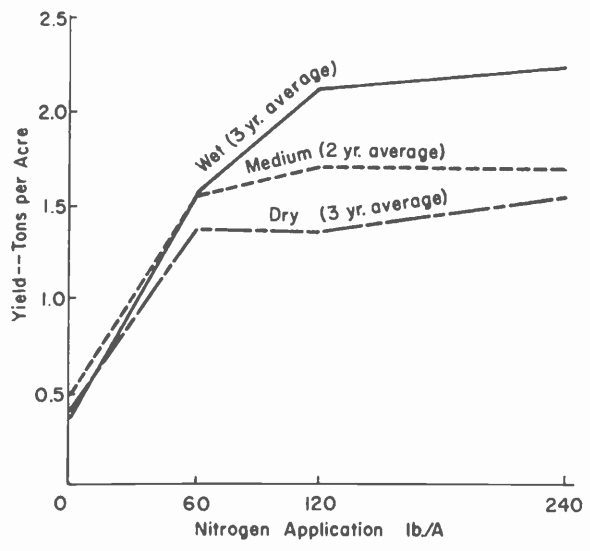


FIGURE 1 — Yield of barley grain for the dry, medium and wet irrigation treatments as affected by the rate of supplemental nitrogen application.

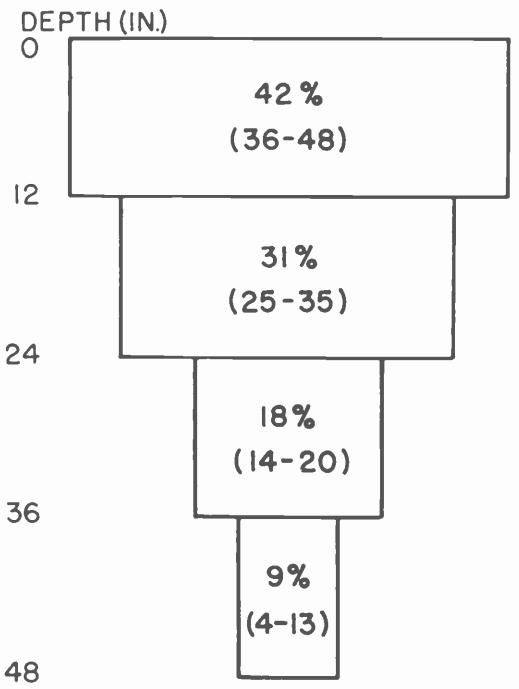


FIGURE 2 — Zone of moisture extraction by barley roots from the surface four feet of Superstition soil. Values for different moisture (irrigation) levels, nitrogen sources, years and varieties were averaged. Values given on chart are mean and extremes of the percentage of total moisture obtained from each vertical quarter of the rooting zone.

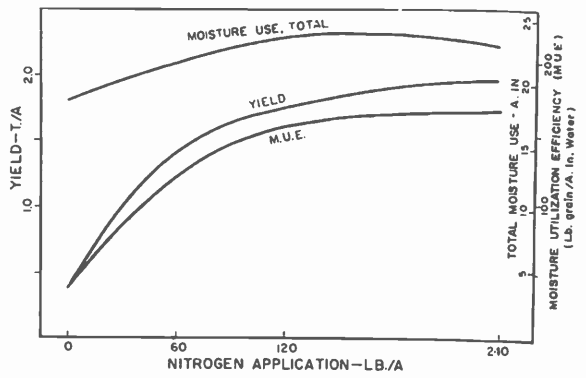


FIGURE 3 — Barley grain yield, moisture use and M. U. E. as affected by the rate of supplemental nitrogen application.

Where Do Roots Feed?

During the three-year barley study, several thousand soil samples were obtained to reveal where barley roots actually obtained moisture needed. Formerly D. R. Shockley found that if a plant's rooting depth was divided into quarters, the plant obtained 40, 30, 20, and 10 percent of its needs from the surface quarter, second quarter, third quarter, and bottom quarter, respectively.

We determined in an open Superstition fine sand that barley obtained nearly all of its water from the surface four feet of soil. After each irrigation the wet soil was sampled by 12-inch depths to 48 inches, to see how much moisture was held by the soil. Then, just before the following irrigation, the soil was again sampled to learn how much had been used. Shockley's claims were supported by our work as shown in Figure 2.

Moisture utilization efficiency (M.U.E. — pounds of grain per acre inch of water) was highest for the limited water application, "dry." However, this resulted in reduced grain yields. Except for limited water applications, however, cultural treatments increasing barley yields increased M.U.E. proportionally.

Use Water Efficiently

Barley producing less than 500 pounds per acre required almost as much moisture for evapotranspiration as that producing 4,000 pounds per acre. This favors good cultural treatments, resulting in high yields for efficient water use. The relationship between moisture, yield, and M.U.E. may be seen in Figure 3.

Calorie Levels per Capita and Percentage of Calories From Food Groups by Subregion in Ascending Order of Percent of Calories from High Carbohydrate Foods, Average 1959-61

Subregion	Calorie level	High carbohydrate foods	Wheat	Rice	Other grains	Other starchy crops	Pulses and nuts	Sugar	Vegetables and fruits	Fats and oils	Meat fish and eggs	Milk products
	Number						Percent					
United States	3,190	40	17.4	0.9	2.5	3.1	3.3	15.7	6.2	20.5	16.9	13.5
Canada	3,100	42	18.8	0.6	1.9	4.5	1.9	16.3	4.8	15.1	22.0	14.1
Oceania	3,260	43	25.2	0.6	1.3	2.7	1.3	13.4	4.7	14.3	24.8	11.7
Northern Europe	3,060	48	23.4	0.6	4.0	6.9	1.7	13.4	4.5	17.8	16.4	11.3
River Plate	3,200	56	33.2	1.7	2.3	6.0	1.0	12.4	3.3	12.5	21.0	6.6
Southern Europe	2,720	60	40.1	2.4	3.8	6.0	4.4	7.6	7.4	15.6	6.9	5.8
Eastern Europe	3,000	66	32.1	1.0	16.5	7.8	1.3	8.5	2.9	11.4	11.9	6.6
Central America and Caribbean	2,240	69	8.8	9.4	23.0	12.7	5.9	15.0	4.2	8.6	7.4	5.0
Mexico	2,580	70	11.1	1.6	42.2	1.8	8.0	13.0	2.8	8.1	6.1	5.3
Other South America	2,260	70	16.9	5.9	16.0	15.5	3.9	15.9	3.9	7.5	9.0	5.5
Brazil	2,710	71	8.6	14.5	11.2	20.9	8.9	15.4	2.3	5.9	8.4	3.9
Southern Africa	2,670	72	14.0	1.1	41.6	1.1	1.7	14.0	2.4	5.3	12.4	6.4
West Asia	2,350	72	48.0	4.2	8.8	1.6	4.1	9.8	7.6	8.1	4.0	4.2
USSR	3,040	73	35.7	0.8	16.9	9.9	1.4	9.8	1.9	8.9	8.1	6.6
North Africa	2,210	73	26.4	3.1	36.2	1.3	5.7	6.1	6.1	6.0	4.3	4.8
India	2,060	74	11.3	33.1	19.0	2.6	13.2	8.2	2.0	4.2	0.9	5.5
Japan	2,360	78	11.7	46.9	4.6	7.7	5.9	6.7	4.2	5.0	5.9	1.4
Other East Asia	2,150	78	1.8	50.1	7.7	12.7	6.6	5.2	5.4	5.7	4.1	0.7
Other South Asia	2,120	79	19.4	47.1	4.9	1.0	5.9	6.7	3.6	4.0	3.0	4.4
West Central Africa	2,460	81	1.2	5.7	27.2	45.3	6.5	1.5	1.0	9.0	2.0	0.6
East Africa	2,390	83	2.3	8.4	55.9	12.4	6.5	4.3	0.8	3.4	3.6	2.4
Communist Asia	1,790	87	12.2	44.3	18.1	11.1	5.9	1.2	1.7	3.1	2.3	0.1

The Perilous Problems of World Agriculture

By George Campbell and John Burnham

EDITOR'S NOTE: This is second and concluding portion of an article which began in the November-December 1965 issue of Progressive Agriculture in Arizona.

Actually, the size of the world population is less of a food problem than its uneven distribution. Communist Asia, for example, accounts for a fourth of the world population — more than all of Europe, including the USSR, and exceeding the combined population of the Western Hemisphere, Africa and West Asia. India's population represents 14 percent of the world total while, at the other extreme, Oceania, Canada, Central America and Caribbean, River Plate and Southern Africa each has less than one percent.

The authors are extension economist and experiment station editor, respectively.

Despite the pressure generated by limited food supplies and burgeoning populations, efforts to control population have been few and ineffective. By contrast, mortality rates have been reduced sharply, adding to the world problem.

Japan Controls Births

Among countries with a pressing population problem, Japan alone has faced the grim necessity of rebuilding its economy. Since World War II, Japan has faced the hard fact of limited land resources and a large prospective population growth. Thus, the government took the lead in educating the nation in family planning. By the late 1950's the population increase had dropped below one percent per year.

Efforts have been started in other population-burdened nations, but none has so far been materially effective. India has launched an ambitious program, but in India a large family means economic security for the parents in their old age, an historic fact which has almost closed the door to effective family planning.

Thus we view a world where two-thirds of the people face shortages of food, where diet-deficiencies reflect the low level of living in general. While generous nations can alleviate this condition as a short time emergency effort, the desirable solution is a rapid increase in productivity of the peoples affected.

The rapid growth of population in the poorer countries, the wide gap between the rich and poor countries, creates a world environment in which war, revolution, and acceptance of dangerous political ideologies is endemic. Thus special efforts must be made in economic and social development in general.

Since the underdeveloped countries have 60 to 80 percent of their labor force engaged in agriculture, strenuous efforts toward agricultural development are called for. Handicaps of an illiterate labor force, lack of capital, and lack of technical and managerial skills, must be faced. Insufficient food of itself causes impaired health, inertia, low stamina.

Some of these countries have unexploited land resources, where it is possible to increase productivity faster than the growth of population. These areas can meet their problems with development of more tillable land. But most people in diet-deficient lands are in countries where expansion of the cultivated area has not kept pace with the accelerating population in the past quarter century. In those countries there must be, simultaneously, successful development of new arable lands and increase in labor and land productivity of lands already being cultivated. Here the lack of capital and managerial skill shows up.

Uncle Sam, a beneficent neighbor with a surplus of food, has given vast amounts of foods to needy peoples throughout the globe. Such food aid has made important contributions to the direct improvement of diets as well as to economic development. But

(Continued on Next Page)

Reports UA People in Brazil Doing Excellent Job

The 10-man team of agricultural scientists from this College of Agriculture now working in Brazil is doing an excellent job, and their relations with the host country and its people are excellent.

So reported Dr. Antonio Martins Filho, rector of the University of Ceará, visiting college and University of Arizona administrators recently. The UA team of agriculturists is attached to the University of Ceará, in the city of Fortaleza, in northern Brazil. The team has been on the job for nearly two years.

Shown above, left to right, Dr. Harold E. Myers of the UA College of Agriculture; Dr. Martins; Dr. Darrel S. Metcalfe, director of resident instruction in the college here, and at extreme right, Dr. Porto, professor of English at the University of Ceará.

(Continued from Previous Page)

the potentialities of such aid in directly improving diets are sharply limited.

An Impossible Sum

The cost of filling the world deficit in 1970 would total $6.8 billion ($2.5 billion excluding Communist Asia) while the level of exports projected for 1970 under the U. S. Food for Peace Program is less than $1.8 billion. This program currently accounts for over 90 percent of the total food aid extended by all nations and international agencies. Uncle Sam has carried the lion's share of the burden — but that cannot meet the need.

Expansion of commercial food imports into diet-deficient countries is difficult, simply because those nations do not have the buying power for such purchases. Such imports, projected to 1970, would amount to $4.6 billion for all the diet-deficit subregions. Export earnings of most developing countries depend heavily on only a few commodities frequently subject to problems of oversupply, or low and sharply fluctuating prices, resulting in unstable export earnings from year to year. Coffee, rubber, cocoa, oil, bananas are typical of such exports.

Thus, many of these countries face persistent unfavorable balance-of-payment problems. With limited foreign exchange reserves and many high priority demands for imports, food is generally not given a high priority, except in emergencies. Thus, caught between the upper and nether millstones — a nutritional gap and chronic balance-of-payment problems — the food lack in most of the undeveloped countries must be met largely by increased production within those countries themselves. This is a terrific problem.

Vast Changes in the U. S.

To look for a moment at the U. S., which has met its own food needs and — as said above — has been the provider for vast tonnages of foods for needy nations, imaginative techniques and new knowledge have brought vast changes. *In fact, the techniques of agriculture in America have changed more in the past three decades than in the three preceding centuries!*

To list a few:

Hybrid corn has not only vastly increased production of that crop but placed the ears in position ideal for machine harvesting. The hybrid plant also has a sturdier root system, to hold the plant upright.

Artificial insemination of dairy cattle has removed the hazardous herd bull from most Midwest dairy farms, at the same time giving each dairyman opportunity to select sperm from sires carrying genes for tremendous dairy production.

The slow-flying, highly maneuverable crop dusting plane, which applies insecticide on fields in all areas of the United States, now has broadened its chores to include rapid, even broadcast sowing of such small-seed crops as alfalfa, rice and wheat.

In the Southwest new Rube Goldburg machines march down a lettuce row, mechanical "hands" feel each head for firmness, signalling knives to cut marketable heads, which go into a conveyor belt on the machine, thence to a platform where workers pack and seal cartons right on the machine, as it travels down the field.

Irrigated areas of America routinely use devices which measure moisture penetration, moisture depth and need, as a guide to irrigation needs.

New Era of Hybrids

Hybrid sorghum has followed hybrid corn into prominence, and work on hybrid barley, wheat and cotton is under way in the research laboratories, greenhouses and fields of the nation's agricultural colleges.

A multi-million dollar chemical industry disciplines plants and insects, selectively attacking harmful insects, increasing leaf growth of crops when that is desired, or defoliating before the crop is to be harvested. Separate chemicals are designed for distinct types of weeds.

A vast new knowledge of chemical fertilizers and their placement has made such plant nutrients vastly more efficient. The potato grower, for example, knows exactly what kind of fertilizer to use, at what depth, how close to the plant's root system, what time is best, and in what amounts.

Crops which a few years ago could not be contemplated as machine-harvested — grapes, tomatoes, nuts, fruit — are now being gathered by new kinds of machines. New types of packing and shipping, too, bring them to market in tip-top condition.

The citrus grower, in an office in his orchard, can look at a panel and see exactly what the temperature is next to each tree on the ground and at fruit height, so that frost hazards can be met with operation of wind machines, smudge pots and other devices.

Larger Animal Units

Feedlot operators with 10,000 animals in their pens, poultrymen with a 50,000 bird flock, dairymen milking 500 cows daily, all now have an interest in computer card systems which measure feed use and efficiency, animal output, economical level of meat

(Continued on Next Page)

Can We Guide Honey Bees?

Attract them for pollination?
Repel them from insecticides?

Developing methods to protect beneficial insects and help them help man is an important part of the research entomologist's job. A search for materials that attract or repel honey bees is a case in point.

As part of continuing studies of insect repellents and attractants, ARS and Arizona scientists have tested 195 formulations for the effect their vapors have on honey bees. They found four formulations that rate weak to moderate as attractants and 18 that rate moderate to strong as repellents.

Although the screening program is providing fundamental information about honey bee behavior, the researchers are looking toward the day when formulas might be used to attract honey bees for pollination purposes. They also say that a repellent added to an insecticide might someday keep bees away from areas in which toxic materials have been used. Repellent materials might even be used to keep bees away from the family picnic.

The experiments were conducted by ARS entomologist A. W. Woodrow and chemist Nathan Green, both of ARS, statistician Henry Tucker of The University of Arizona, and agronomists M. H. Schonhorst and K. C. Hamilton of the Arizona Agricultural Experiment Station.

The researchers noted the reactions of bees when vapors of various natural and synthetic compounds were wafted over them. The tests were conducted in a specially constructed modified olfactometer, an instrument used to determine whether insects are affected by an odor.

If bees moved toward the vapors, the material was rated as an attractant; if they moved away from the vapors, it was rated as a repellent.

(Continued from Previous Page)

gain, egg laying or milk production. Computer arithmetic is helping to make many of the decisions of the "big operators" in American agriculture.

Even the farm watering pond now has a chemical spread onto its surface to inhibit evaporation. On Southwestern cattle ranches, where water is scarce and evaporation can total as much as 12 feet of water depth annually, that is important.

More and more, too, are products devised, selected and produced for specific market needs. The cantaloup's planting date in the Yuma Valley of Arizona is carefully calculated to get fresh fruit on the eastern market early, when prices are best. The same with bell peppers, lettuce, tomatoes, cucumbers and other produce. New cottons are grown to meet specific fabric needs.

The beef cow's figure is being remoulded, not with an eye for beauty or sturdiness, but to get the carcass size most desired by the supermarket butcher and his customer. Hens are selected to lay eggs of a size and color the customer prefers. The market support for whole milk products, and away from butter, has made the Holstein the nation's dominant breed of dairy cattle.

A marvellous new world of ingenious machines and chemicals, vast new knowledge about electronics, chemistry, cytogenetics, physiology and pathology of both plants and animals, and about packaging, shipping and marketing, have changed the face of U. S. agriculture.

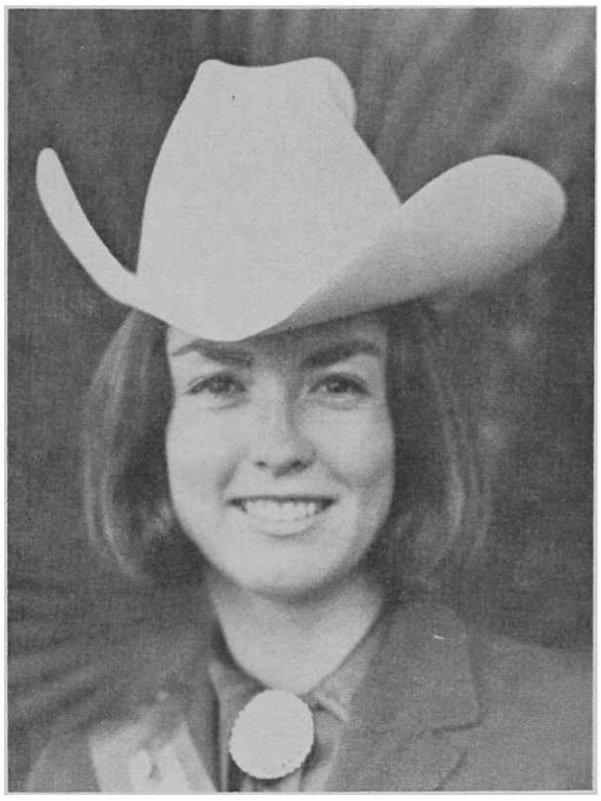
Grandpa Wouldn't Know It

The farmer of the 1920's would scarcely recognize the machinery on a farm today. The horse-drawn implements and hand tools are mostly gone. The planting, tilling and harvesting of crops, and the feeding and care of livestock, are machine operations, some of them automatic. In fact, the American farmer today uses more petroleum products than does any other industry, and his use of electric power has made private utilities and the Rural Electric Cooperatives scramble to meet his needs.

America's commercial farm today is no longer a small operation, a family operation with small investment, heavy on sentiment and weak on income. Today it is a business, though often a family business, but a business with a six-figure investment and thousands of dollars expended each year for seeds, fertilizers, fuel and machinery upkeep.

Whether America can convey this new learning and efficiency to other nations — through the Peace Corps, through the Agency for International Development (AID), through the teams of agricultural extension workers and research scientists from American colleges now working in scores of lands on four or five continents — this may be more important to the future peace, welfare and political sanity of the world than any military or diplomatic effort.

U of A RODEO QUEEN



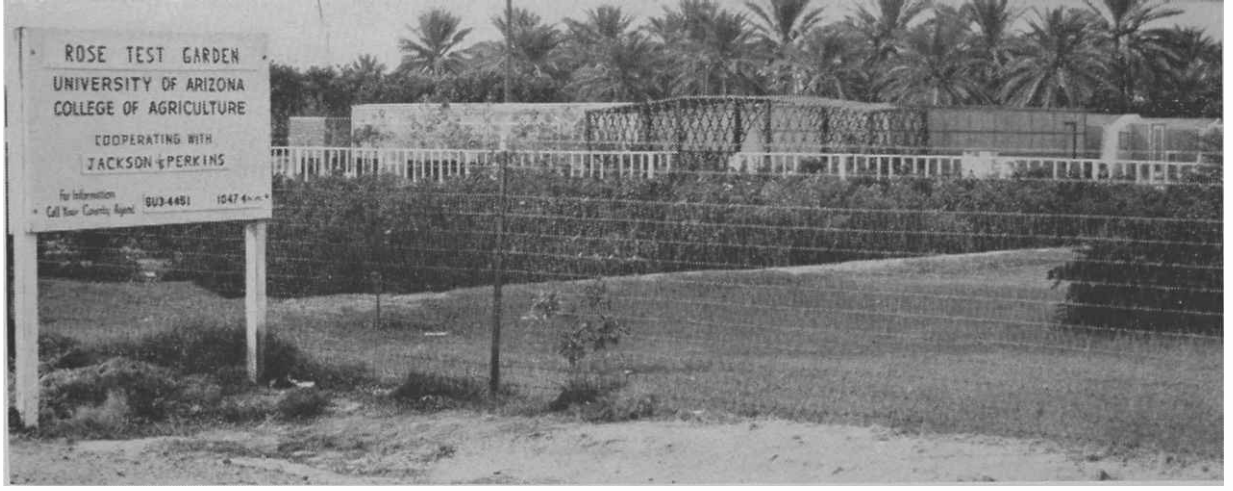
The 1965 University of Arizona rodeo queen is Kathleen Patricia Keogh, as pretty and authentic a rodeo queen as ever was. Kathy's grandfather homesteaded in western North Dakota at the turn of the century, and was a neighbor and associate of Teddy Roosevelt when the former president had the Elkhorn and Maltese Cross ranches out near Medora, in western North Dakota.

Kathy's father, Brooks J. Keogh, is president of the American National Cattlemen's Association, and past president of the North Dakota Stockmen's Association, oldest incorporated association in North Dakota — Roosevelt was one of the 10 incorporators, as was his ranch foreman, John Goodall, sheriff in that area. Also one of the 10 was Frank Keogh, Kathy's grandfather.

The Keogh ranch includes 20,000 deeded acres at Keene, on the edge of the Badlands. The ranch runs a thousand Herefords and also raises quarter horses. Like most ranch-raised girls, Kathy brought her saddle horse to college with her.

Kathy has been North Dakota Quarter Horse Queen, North Dakota Rodeo Princess, and was all-around cowgirl at the North Dakota High School rodeo in 1963. She attended North Dakota University at Fargo as a freshman, transferred to College of St. Catherine at St. Paul for her sophomore year, then came to the University of Arizona last fall.

The photo above was taken by Mike Prime, agricultural journalism student.



A NEAT SIGN along the highway tells passing motorists about the garden and the cooperation which has produced it.

UA ROSE GARDEN ON THE YUMA MESA

By Ross M. Allen and H. W. Knowles

Two kinds of growers of roses are found among the home gardeners residing on the sandy table land called the Yuma Mesa. There are those who have successfully planted a rose garden and maintained the same bushes in good health and flower productivity over a period of several years.

Then, there are the unsuccessful ones, far outnumbering the first mentioned group, who have tried rose-growing in the oven-hot sands of Yuma, only to suffer near-total defeat during the first or second year after planting.

Many of these luckless ones are hesitant to try again because the defeats frequently represent substantial losses of both time and money. It is mainly for the latter group that this article is written, in the hope that they may be encouraged to try once again for success in growing the "Queen of the Flowers." Possibly some of the methods in use at the University Rose Test Garden, located on The University of Arizona Citrus Farm at Yuma, may be helpful to the more successful growers of roses, also.

The University Rose Test Garden was established in March, 1962, with several objectives including, (1) Determination of varietal adaptability to culture under Yuma's environmental conditions; (2) Studies on cultural practices including pruning, irrigation, fertilization, and insect and disease control, and (3) Beautification of the farm headquarters area. Materials used in the garden have been restricted to those which are relatively inexpensive and readily available to the average home gardener of the Yuma area.

Dr. Allen is plant pathologist stationed at our Yuma Mesa Citrus Experiment Station, while Mr. Knowles is foreman at that station, active in helping establish the rose garden.

Nearly 100 Varieties

The garden, originally consisting of 68 bushes representing 17 varieties, has been enlarged each year and now contains 494 bushes, with 95 varieties of hybrid teas, floribundas, and climbers to be observed and compared. All of the rose bushes, field budded and grown in Arizona, have been donated to the university by Jackson & Perkins Co., whose Arizona operations include approximately 4,000 acres devoted to rose production near Buckeye, Arizona.

Each variety in the garden is represented by at least four plants grouped together for mass effect and ease of comparison. For visitors' convenience, name plates designate the variety, bush type and date of planting. Visitors are welcomed to the garden, which is now included in the American Rose Society's latest national listing of "Private and Public Gardens." The following is a summary of practices and experiences during the past three years:

Pre-planting preparations and actual planting are among the most important phases of establishing a successful rose planting. Beds measuring 6 x 88 feet were dug 6 to 8 inches deep to remove all silted phase soil so that all plants are being grown in pure Superstition sand like that predominant on the Yuma Mesa. Treble superphosphate was broadcast on the bed surface at the rate of 4 ounces per bush as indicated on the planting plan, and beds were pre-planting irrigated.

Precise Planting

All bushes were completely submerged in water for 18 to 24 hours prior to planting to replace moisture lost from the canes during storage. Planting holes, 4 feet apart, 20 inches wide and 20 inches deep, were prepared one day after the pre-planting irrigation by placing 2 inches of well-rotted manure mixed with a handful of soil sulfur in the bottom of the hole, followed by 3 inches of soil, another 2 inch layer of manure and sulfur, and capped with 5 inches of soil. Moist peat moss may be substituted for the manure, but the cost of this material may be prohibitive for more ambitious-sized gardens. In either case it has been found beneficial to pack the soil mix in the hole by tramping to prevent excessive settling of the plants.

Since all bushes obtained were of No. 1 grade (use of this grade is strongly recommended) they were thinned by pruning to 4 to 7 uninjured canes approximately 8 to 12 inches long. Roots were cut back to about 8 to 10 inches. Injured roots were removed.

In planting, roots were placed over a moist cone of soil so that the bud-union remained 1 to 2 inches above normal soil level. Soil filling the hole was settled by irrigating slowly by garden hose. A 4 to 6 inch mound of moist soil was placed temporarily over the bud-union, and lower canes and entire bushes were covered with gunny sacks to conserve moisture and prevent sunburn until after buds began to swell. All pruning wounds were covered with an asphalt-tar compound after 3 to 4 days of drying. Young bushes with new shoots were shaded by palm fronds stuck in the ground around them, especially on the west side, until rose foliage protected the canes from sunburn.

New bushes were flood irrigated twice weekly for the first 6 weeks. For established plants, flood irrigations (4 inches of water) are made weekly during summer and bi-weekly during winter. Since all bushes are mulched with 1 to 3 inches of barn-

(Continued on Next Page)

CLOSE UP VIEW of the rose garden. The ← trellis and fence add greatly to attractiveness of this test garden.

(Continued from Previous Page)

yard manure all year long, no cultivation is needed except weed removal by pulling or digging to eliminate weed roots.

Early Planting Urged

Early planting of roses in the Yuma area is essential for obtaining maximum shoot growth and resultant cane shading by foliage before the arrival of continually hot (90° F.) weather. Planting dates for the Rose Test Garden during the past 4 years have ranged from Jan. 25 to March 5. The best planting period for the Yuma Mesa is thought to be from Jan. 15 to Feb. 15. Later plantings may sunburn badly before the plants become thoroughly established.

Roses are relatively light feeders and do not require frequent nor heavy fertilizer applications. For newly planted bushes, superphosphate is applied in the pre-planting preparations. Nitrogen is supplied as ammonium nitrate or ammonium sulfate at the rate of 1 pound of material per 50 square feet of bed area in late March or early April. A second application of half the above amount is made in early September. Four ounces of soil sulfur per bush, applied in a circle 6 to 8 inches from the bud-head, is made in late September.

Established bushes are fertilized somewhat differently. In early February 4 ounces of treble superphosphate per bush broadcast over the bed, 1 pound of ammonium nitrate or ammonium sulfate per 50 square feet area broadcast, and 4 ounces soil sulfur per bush. In late March the nitrogen application is repeated. In early September, ½ pound ammonium nitrate or sulfate per 50 square feet bed area and 4 ounces of soil sulfur about each bush yields vigorous fall growth.

Pruning Is Moderate

A moderate form of pruning is done in early January. We attempt to leave 5 to 7 canes about 12 to 16 inches high on hybrid tea varieties. One or two canes are being cut experimentally to 4 to 6 inches to learn if cane renewal is increased. Floribundas are headed back lightly with little thinning of canes. All pruning wounds are treated with asphalt-tar compound after wounds have dried 3-4 days.

Insect and fungus disease problems have not been great in Yuma. Cygon (Dimethoate), 1 tablespoon per gallon of water, applied as a spray has controlled aphids, thrips and mites. Dusting sulfur has been used for powdery mildew fungus control during the cooler months of November to January. Mildew has not been a problem during the warmer months.

Iron chlorosis (yellowing of foliage, terminal stunting, and tip die-back) may be severe, especially on lighter-colored rose varieties such as the whites, yellows, and light pinks. To correct or prevent this condition, chelated iron (Sequestrene Fe 138) has been applied twice each year, in May and September, in addition to soil sulfur applications previously described (sulfur acidifies soil and makes iron available to plants). A solution-suspension of 3 ounces Fe 138 per gallon of water is an easy way of handling this material. One-third cupful is poured into each of four holes punched 8 inches deep around each bush approximately 8 to 10 inches from the bud-head. This application is always followed by a flood irrigation. Some chelate may settle from suspension unless the mixture is stirred frequently during application.

A few special practices which have been helpful deserve mention. Early spring buds have been removed from newly planted bushes in order to encourage vegetative growth in the first season. This practice substantially reduces sunburn of canes and bud-heads.

Growth Inducements

Very slow-starting bushes have been encouraged to grow *in cool weather* by placing waterproof paper cylinders (12 inch diameter, 6 to 12 inch height) around each bush. Cylinders are filled with wet peat moss covering the bush except for 2 to 3 inches of the cane tips to allow observation of bud shooting. Cylinders and peat are removed when tip shoots are ¼ inch long. This practice in hot weather (above 90° F.) may be harmful to the plant.

Several 2-year-old bushes which had been planted too deeply were successfully lifted bareroot and re-set. These plants were pruned back 50 percent more than normally practiced.

Occasionally newly-purchased bareroot bushes arrive with long white or yellowish bud sprouts. Such plants are pruned more severely than normal for planting. Premature bud sprouts rarely survive under Yuma's environmental conditions.

While most of the 95 varieties in the Rose Test Garden have performed creditably, some have shown more adaptability to this area than others. Among the hybrid teas showing overall good performance in two or more years of observations are Avon, Charlotte Armstrong, Countess Vandal, Chrysler Imperial, Eclipse, Hawaii, King's Ransom, New Yorker, Peace, Pink Duchess, Red American Beauty, Rose Bowl, South Seas, Soeur Therese, Tanya, and Tropicana.

Because of greater cane production and denser foliage most floribundas seem adapted to Yuma's conditions. Some of those with generally high ratings include Baby Blaze, Betsy McCall, Fashionette, Fusilier, Ivory Fashion, Malibu, Pink Chiffon, Spartan, and Vogue.

Follow the Rules!

Many other varieties in the Rose Test Garden not listed above show much promise for local use but have not been observed sufficiently to warrant recommendation at this time. With reasonable care, however, it is concluded that most roses can be grown successfully on the Yuma Mesa despite the sometimes severe environment. The most important obstacles may be overcome by attention to the following general rules:

1. **Plan and prepare before planting time**
2. **Obtain strong, healthy plants whether bare-rooted or potted**
3. **Plant correctly at the proper time**
4. **Prevent sunburn and iron chlorosis**
5. **Avoid over-watering and excessive fertilization**
6. **Prune moderately while plants are still winter dormant**

Follow the rules, and success with roses should be yours!

FORAGE PRODUCTION PROBLEMS IN NORTHEAST BRAZIL

By Robert R. Humphrey

Ceará, one of eight states lying partly or entirely within Brazil's so-called "Arid Northeast" has an area almost exactly half that of Arizona. The state typically has a six-month dry season and is plagued periodically by severe and extensive droughts.

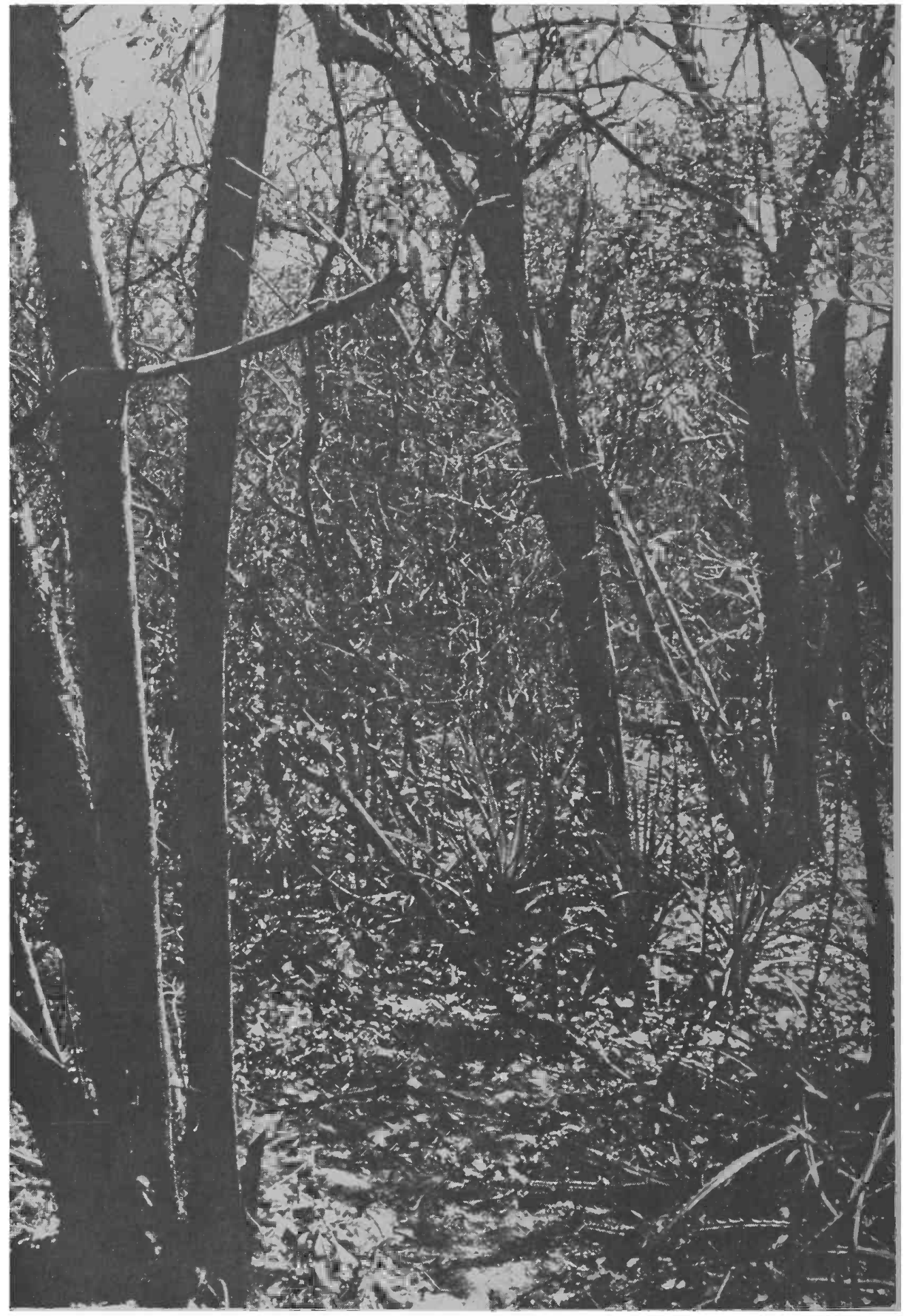
Despite these droughty features and despite its reputation as a desert area, the drier portion of Ceará has an average annual rainfall of about 32 inches. To an Arizona cattleman this doesn't sound like the precipitation of a desert-like area. Yet, it is.

Largely because of the monthly distribution pattern, the precipitation does not produce adequate forage yearlong. Most of the rain falls from January to June, leaving the balance of the year with little or no effective moisture. Add to this high temperatures, and generally shallow sandy soils that retain water poorly, and we do not have a situation conducive to production of adequate yearlong livestock feed. Then, as a final clincher, at unpredictable but too-frequent intervals there may be whole years of periods of two or three years with little rain even during the normally wet season.

It Presents a Problem

To one accustomed to thinking largely in terms of perennial grass as a forage base the climatic and soil conditions present, if not insuperable, at least difficult, problems. As the various facets of the whole picture come into focus however, the problem no longer seems to be so nearly incapable of solution.

Although fairly extensive portions of the upland sites have a soil too shallow to support perennial grasses, they do grow annuals that provide good feed for about six months of the year. These same areas are also generally covered with brush, some of which is palatable when green or the leaves of which are palatable and eaten during the dry season after they have fallen to the ground. Except during the occasional protracted droughts, on the other hand, the rainy season is not a period of feed shortage but of surplus. However, this still leaves us with the critical six-month dry season.



ABOVE, TYPICAL native vegetation in the state of Ceará before clearing and seeding.

In any forage improvement program it seems to make good sense to concentrate first on those areas with the best soil and the least aridity. A cursory analysis indicates that from 8 to 10 percent of the state of Ceará has deep, alluvial soils in the valleys of rivers or small drainages. In some of these, subsurface water is close enough to the surface to be reached by deep-rooted perennial grasses, a practice that has already been proved practical. In other areas ground water is relatively shallow, and may be pumped to irrigate forage crops. Although the extent of these alluvial valley soils is known in a general way, they need to be carefully mapped and the availability and quality of their water determined.

These lands today are growing in part a mixture of brush and weeds

(Continued on Next Page)

Dr. Robert R. Humphrey, veteran professor of range management, has depicted the range resources of all Arizona counties in a valuable series of bulletins widely distributed throughout this state. Now, as part of the UA team at the University of Ceará, Bob is applying those same talents to northeast Brazil.

(Continued from Previous Page)

with, in places, an overstory of the wax-producing carnauba palm or the oil-yielding oiticica tree. Portions are also planted to generally low-yielding stands of bananas, manioc, beans or corn. Presumably, much of the fraction planted to these various food crops would not be available for forage production. The Carnauba-oiticica areas, on the other hand, are well suited to producing forage beneath and between the trees.

Considerable Productive Land

At this point we have to make certain assumptions because of the lack of essential data. Using eight percent of the total area of the state as the alluvial fraction gives a total of 4,640 square miles. Assuming that 50 percent of this is available for pasturage (a conservative estimate) we come up with 2,320 or, in round figures, 2,300 square miles of potentially highly productive alluvial land.

Because of the uniformly high temperatures — day and night, summer and winter — in this region, plant growth and consequent forage production is high yearlong. Volume production of the commonly used giant panic (known locally as sempre verde) or elephant grass is extremely high. Even such lower-growing species as Pangola grass or coastal Bermuda have a high production.

Although actual carrying capacity figures have not been obtained, it does not seem unreasonable to expect that their present carrying capacity is probably less than 1/10 of the potential.

Quadruple Carrying Capacity

On the basis of these figures, these bottomlands could be developed to support an absolute minimum of more than four times the number of cattle being produced in the entire state at present. And, perhaps most important, these cattle would be well fed and fat the year round, eliminating the usual starvation losses of today and increasing growth rate, animal weights and health, and percentage calf crop.

The developed alluvial areas should be used in conjunction with the non-improved or improved uplands. These uplands provide considerable forage during the 6-month rainy season, generally more than can be used by the available animals while the forage is green. They do constitute an important fraction of the total feed produced during a 12-month period. As this forage consists largely of annuals and the leaves of deciduous brush, it is largely wasted by leaching, oxidation and consumption by termites when it is not grazed.

In conjunction with development of the alluvial areas, a consistent program of research is needed to determine the adaptability of specific grasses and legumes to particular dryland sites. For the most part the grasses studied should be perennials, the legumes either annuals or perennials, and either herbs or shrubs. The sites should be those without free water during much of the dry season, or where the water table is too deep to be reached by grass roots, or where for various reasons pumping may not be deemed feasible.

Because of the yearly hazard of almost complete desiccation of the soil to root penetration depth or to bedrock, the theoretical grass best suited to most sites should have the following characteristics:

1. **It should be a perennial but should have the rapid and prolific establishment characteristics of annuals.**
2. **It should be highly drought resistant.**
3. **It should be a prolific seed producer.**
4. **The seed should be readily disseminated by natural means.**
5. **It should be at least moderately palatable and nutritious.**

Research may indicate several grasses with these characteristics. On the basis of today's rather limited information, however, two grasses seem most nearly to meet these particular requirements. They are Lehmann lovegrass *(Eragrostis lehmanniana)* and Boer lovegrass *(E. chloromelas)*. Initial tests of these species look promising, and they will be included and more widely planted in the continuing research program.

"Man will conquer poverty, famine and disease only as he masters the problems of water supply.

"Water is our most vital resource. Man can exist without food for as much as 60 days. Without water, he will perish in five. Three billion people on this planet are competing for the available fresh water — but there is essentially no more water today than there was when civilization began.

"Furthermore, it is essentially the same water. The dribble from a leaky faucet in our homes may be the liquid which slaked the thirst of a dinosaur, watered the Hanging Gardens of Babylon, or refreshed Hannibal at some Alpine stream." — Secretary of the Interior Stewart Udall.

ELEPHANT GRASS just six months after planting of vegetative shoots. Man in the picture indicates tremendous growth of this forage species.

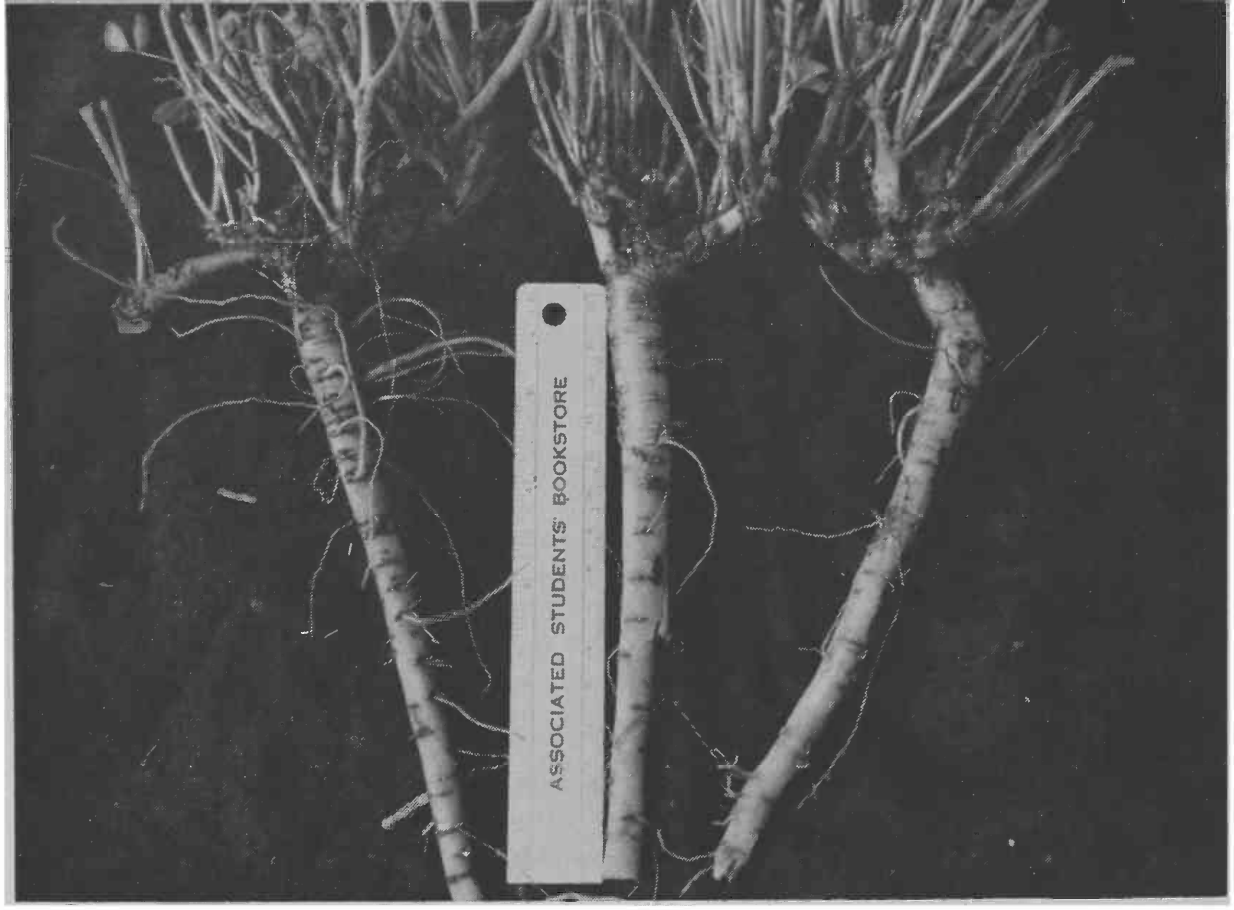


FIGURE 1 — Typical alfalfa roots which were dug from the different management schedules in this study. Roots were cut ← six inches below the crown and separated from the crown tissues. This portion of the main tap root was used for carbohydrate analysis.

Season of Year and Sugar Content Influence Alfalfa Seed Production

By A. K. Dobrenz and M. A. Massengale

Much of the alfalfa seed produced in Arizona is from plants used for both forage and seed. Growers often produce forage during the spring when temperatures are cool, yields are high, pesticide residues are at a minimum and the price is favorable.

Then, during the summer months when growth is somewhat retarded and the competition for water is at a maximum, the alfalfa plants are used to produce seed. Research work conducted at The University of Arizona has shown that, in general, alfalfa plants produce higher yields of seed early in the growing season than in late summer and early fall.

Carbohydrate Level Important

Several studies concerning seed production have shown that the level of carbohydrates in the roots is one of the factors influencing seed yield. Since the major food manufacturing areas (the leaves) are removed from the alfalfa plant at each cutting, carbohydrates stored in the roots and crown play a vital role in supplying energy for new vegetative growth. The plant is completely dependent on this supply of carbohydrates stored in the roots until after new leaves are formed and functioning.

An alfalfa stem changes from a vegetative to a reproductive stage of growth very early in its development. It follows that the quantity of carbohydrate fractions available in roots during this period may influence the number of flowers and thus potential seed production.

Also, the kind and amount of specific carbohydrate fractions present during the change from a vegetative to a reproductive stage of growth and seed set may determine the composition of nectar and therefore the attractiveness of flowers to pollinating insects.

This study was initiated to determine the concentration of fructose, glucose and sucrose found in alfalfa roots and their effect on seed production at different times during the growing season. Although these sugars are a part of the total acid-hydrolyzable carbohydrates reported in the literature, little research has been done to determine how these individual fractions vary at different stages of growth and development of the alfalfa plant.

Determination of Sugars

Alfalfa roots (Figure 1) were dug from plots which had been managed so that growth for seed production began in each of three different months of the growing season. These roots were dug and retained for carbohydrate analysis when plants were first cut, and at intervals of one week extending for a period of five weeks after the initial forage removal.

Samples of alfalfa roots, which had been dried and ground in a Wiley mill, were placed in flasks, and the carbohydrates were then extracted by warming in an alcohol solution. The chromatogram stripper (Figure 2) was used to place a small sample of the extracted sugars on the chromatographic papers. The "stripped" chromatograms were placed in a chromatography jar and the sugars were separated by using a solution of pyridine, ethyl acetate and water. Figure 3 shows a chromatogram on which the guide strips (areas to the right and left of the vertical lines) and sample areas have been developed.

Glucose, fructose and sucrose were removed from the paper chromatograms with alcohol and a biological filtering apparatus. Samples of these sugar solutions were placed in test tubes and the concentration of each determined by use of the Bausch and Lomb Model 20 spectrophotometer and solutions containing known amounts of glucose, fructose, and sucrose.

Level of Sugars Declines

Data in Figure 4 show the percent-

(Continued on Next Page)

FIGURE 2 — Chromatogram stripper used for the uniform application of sample solutions in micro-quantities.

The co-authors are a former graduate assistant and professor in the Department of Agronomy, respectively.

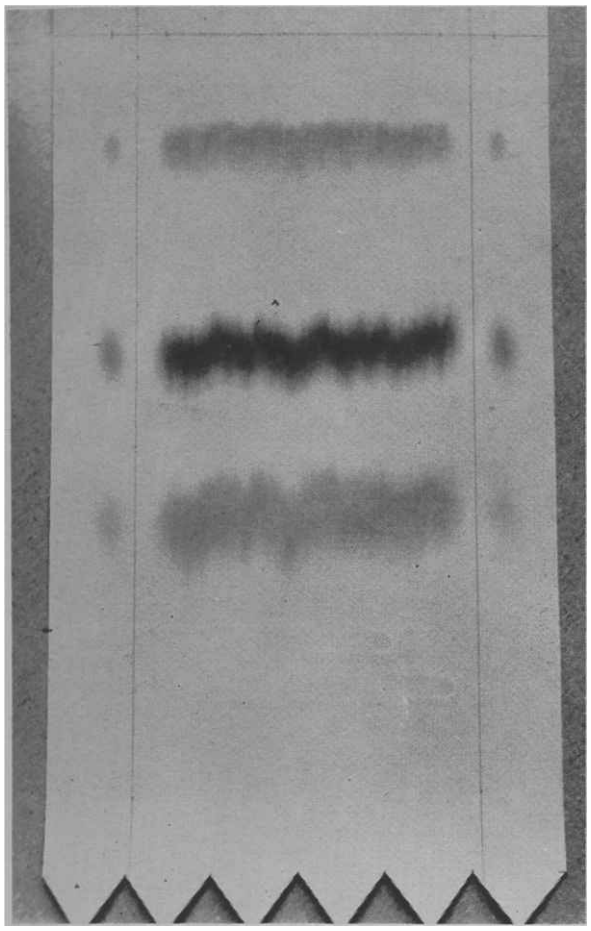


FIGURE 3 — Chromatogram which has been developed, showing the guide strips and sample areas of the chromatogram. The spots on the strips are used to locate the sucrose (top), the glucose (middle), and fructose (bottom) on the undeveloped chromatograms.

(Continued from Previous Page)

ages of glucose, fructose, and sucrose in alfalfa roots during the five-week period after cutting in April, June and August. There was a steady decline in the concentration of both glucose and fructose in alfalfa roots after forage removal. Glucose, fructose and sucrose were highest in the roots of plants which produced seed in April and lowest in those plants producing seed in June and August. Statistical analysis of the data indicate that high seed production was associated with higher levels of these carbohydrate fractions and that the number of seeds per pod and the number of pods per stem appeared to be correlated with fructose, glucose, and sucrose percentages.

The percentage of sucrose in alfalfa roots did not follow the same trends as glucose and fructose during the first five weeks after cut-off. The increase in sucrose concentrations after forage removal in June and August may mean that this sugar is more readily synthesized in the warmer periods of the growing season.

These data suggest that, under a management system which involves the production of both forage and seed from the same plants, highest seed yields can be obtained when plants are allowed to produce seed in the spring of the year. Although many environmental, managerial and physiological factors determine the amount of seed which is produced, the level of glucose, fructose and sucrose present in the roots of alfalfa when plants set seed appears to have a significant influence on seed yield.

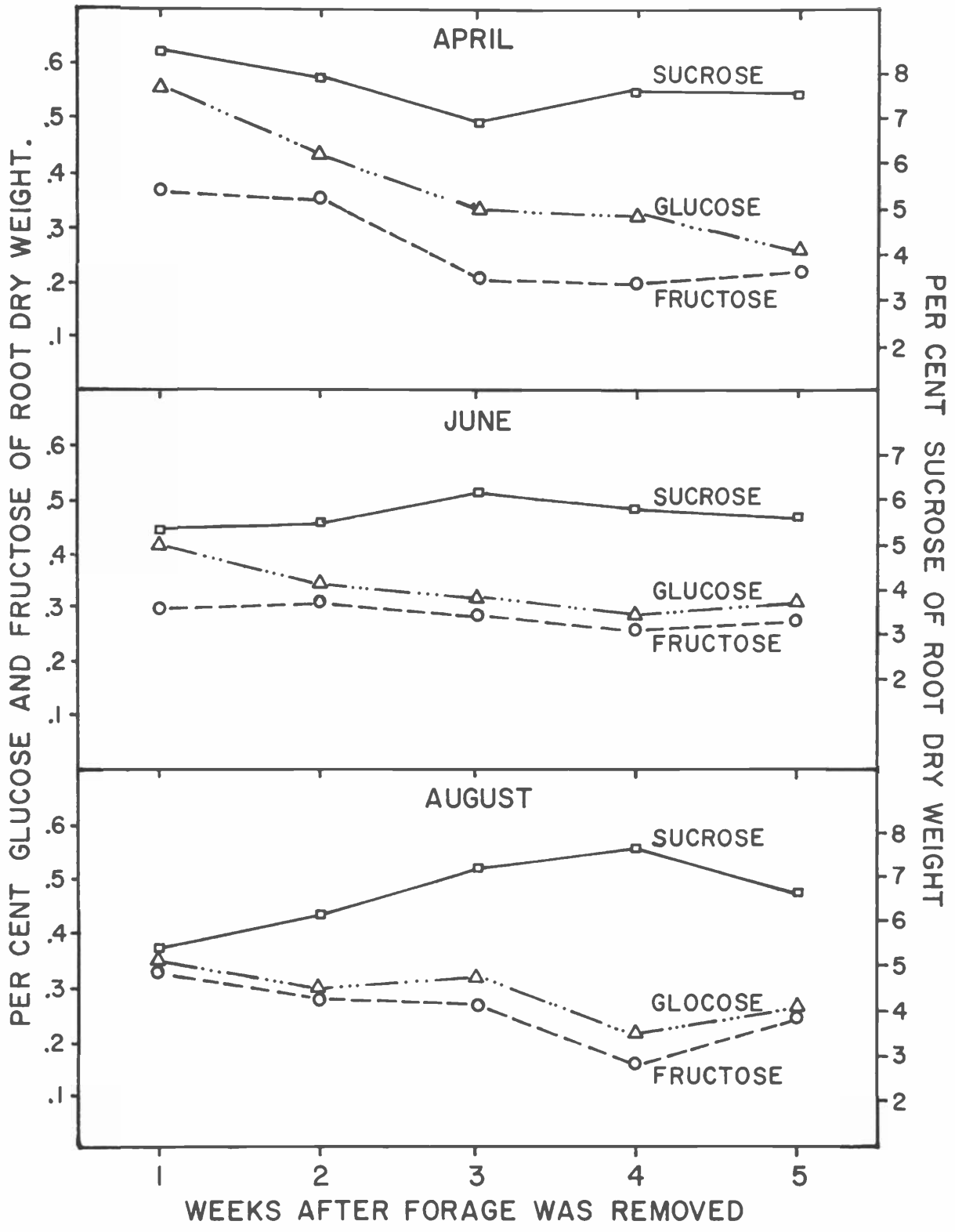


FIGURE 4. AMOUNT OF GLUCOSE, FRUCTOSE AND SUCROSE STORED IN ALFALFA ROOTS DURING A FIVE-WEEK PERIOD AFTER FORAGE WAS REMOVED IN APRIL, JUNE AND AUGUST.

Arizona 1966 Cotton Acreage Is 366,000

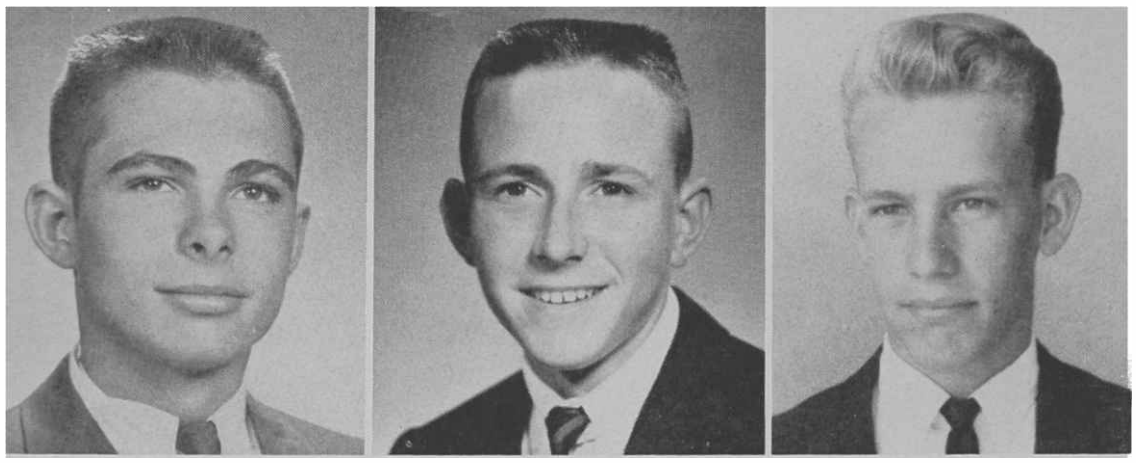
Arizona's 1966 cotton allotment will be 366,000 acres, the U. S. Department of Agriculture reports.

Upland cotton takes up 330,674 acres and long staple 35,515.

Pinal County leads in upland cotton acreage, getting 130,280, followed by 122,180 acres in Maricopa; 29,960 in Yuma; 22,543 in Pima; 13,661 in Cochise; and then 8,857 in Graham; 1,770 in Greenlee; 1,097 in Santa Cruz; 267 in Mohave; 37 in Gila and 12 acres in Yavapai County.

Long staple: Maricopa 14,806; Graham 9,824; Pinal 7,338; Pima 2,761; Yuma 340; Cochise 201; Santa Cruz 22 and Gila 13.

3 Arizona Boys Receive $500 4-H Scholarships



Pritchard Jones Smith

Three 4-H Club boys from Arizona, representing Yuma, Coolidge and Thatcher, were named national winners of $500 scholarships at the National 4-H Club Congress in Chicago recently.

The winners are Tom Pritchard, 17, son of Mr. and Mrs. Frank Pritchard of Yuma, recipient of a $500 educational scholarship as a result of his work in the 4-H agricultural program. He received his award from International Harvester Company.

Dan Jones, 17, son of Mr. and Mrs. Clyde B. Jones of Route 1, Coolidge, named a national winner in the 4-H beef program. His $500 educational scholarship was donated by E. I. du Pont de Nemours & Company, Inc.

Glade Smith, 17, son of Mr. and Mrs. Keith E. Smith, Thatcher, who operate an 80-acre quarter horse ranch. For his seven years of work in 4-H electric projects, Glade won a $500 scholarship given by Westinghouse Electric Corporation.

Tom, Dan and Glade were among 23 Arizona 4-H Club members attending the national meeting in Chicago.

An Arizona highlight of the Congress was modeling of a wool dress and coat ensemble by Marianne Richey, 17, of St. Johns, in Apache County. Marianne was winner of the annual state 4-H dress revue at the 4-H Roundup on the U of A campus last July.

Cultivating Our Garden

By Arthur H. Beattie

EDITOR'S NOTE: This is the third portion of the talk which Dr. Beattie gave before the meeting of Gamma Sigma Delta, honorary society for agriculture. Readers will note that each published portion of the talk is complete in itself, making it a coherent unit of itself.

* * * * * *

I should like to speak briefly of the role of reading in opening our eyes to the world about us, to the familiar scenes of daily life we so often, in our blind haste or deep preoccupation with trivial things, fail to observe. You who are concerned with crops and cattle should take a special interest in reading which gives you a deeper understanding of our own region. I should place in the foremost position among those writers who help us to see and know the Southern Arizona desert in which we live Joseph Wood Krutch of Tucson. I find myself recommending frequently his books to students I am encouraging to gain a greater breadth of intellectual background—to students in the sciences who have an inadequate appreciation of literary style and of human values, and to students in the humanities whose interest in science needs to be developed. Few writers are so effective in bridging the chasm between the scientific and the humanistic cultures as Dr. Krutch.

We need not turn to purely local and contemporary authors, however, to find readings which permit us to better comprehend the world about us. Because of certain marked similarities in climate and terrain between Southern Arizona and the lands where dwelt the ancient Hebrews, a reading of certain portions of the Bible can be most enlightening about our own locality.

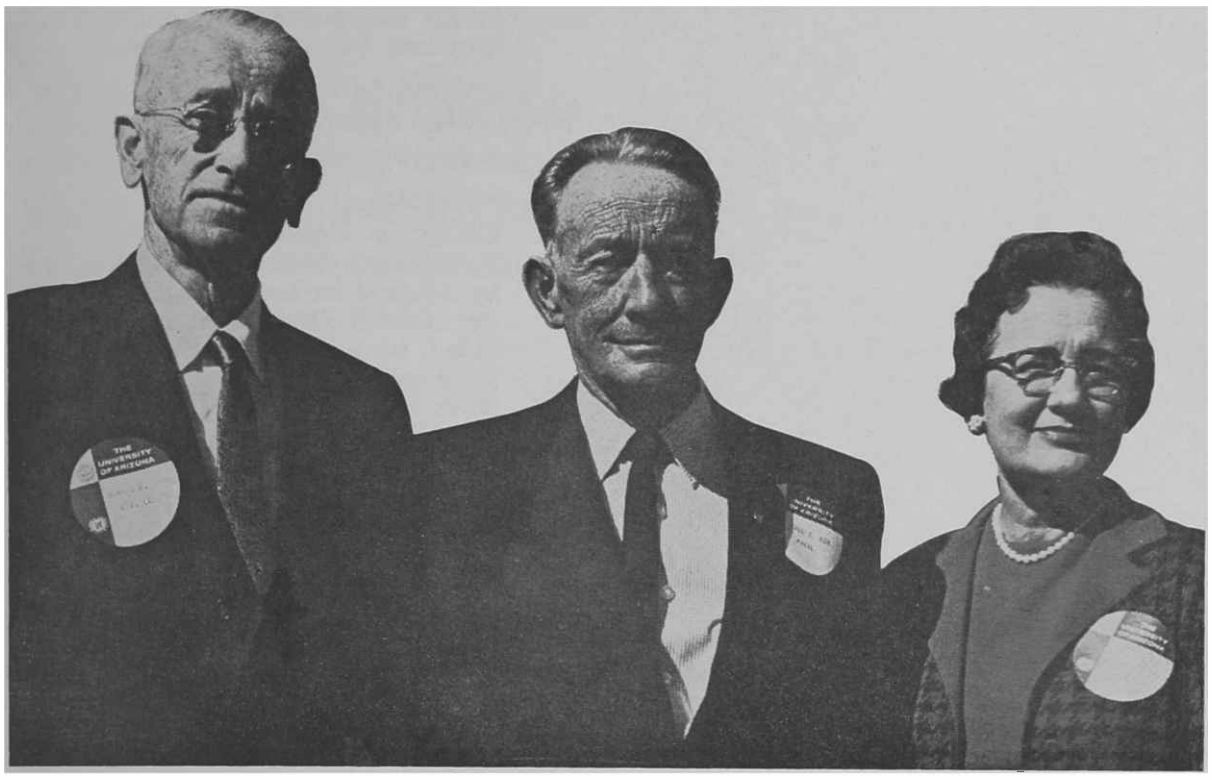
One cannot live long in this region without coming to recognize the supreme importance of water in a dry and thirsty land. Through the ancient Hebrew writings, the *leitmotiv* of water recurs constantly. In biblical narratives the importance of water is evident. Abraham's servant knows the preciousness of water, and determines to choose as a bride for Isaac that maid who will give him to drink and will draw water for his camels — the supreme act of friendship toward a stranger traveling in the desert. And when Laban receives this man in his house, he pours out water so that he and those with him may wash their feet. One has to know the dust and the heat of the desert to appreciate fully this gesture. Life is not possible for many hours in the desert without water. We can understand the heartbreaking despair of Hagar, whom Abraham had sent out into the wilderness with young Ishmael. She took with her bread and water. "And the water was spent in the bottle," we read, "and she cast the child under one of the shrubs."

The Bible records disputes over the scant supplies of available water. There is fighting over the wells Isaac has redug in the valley of Gerar, and were it not for Moses' aid the shepherds might long have delayed the daughters of Jethro from watering their father's sheep. Disputes over water are not unfamiliar to me. (After all, I shared a well with a neighbor in the desert at the time he installed a swimming pool.) There is scarcely a day that in the Tucson press we do not read of conflicts over water. Sometimes, a decision is sought with the aid of a gun, sometimes through an appeal to the courts. After years of litigation, the United States Supreme Court not long ago handed down a verdict in a dispute between Arizona and California over rights to the waters of the Colorado, but the problem is far from being resolved. The water-rights disputes of the nomadic Hebrews are not remote to us who live in or near Tucson.

Much of my life has been spent near mountains in British Columbia and in Idaho. It has long seemed to me understandable that the psalmist should sing, "I will lift up mine eyes to the hills . . ." I have sought, my-

(Continued from Previous Page)

At University Day Program



Fred T. Ash, who is an agricultural and business leader in Pinal County, was one of 120 county officials and others from the state's 14 counties who attended the University Day program on the U of A campus in late November.

Pictured with Mr. Ash, center, is Mrs. Ash, and, at left, Howard Baker, assistant director of the U of A Agricultural Extension Service.

Mr. and Mrs. Ash live at Winkelman and own the P-Z ranch in Pinal County. He is president of the Kearney Rotary Club and member of the Pinal County Extension Board.

The 120 Arizona extension board members, county supervisors, county clerks and other officials heard, on University Day, talks by U of A Pres. Richard A. Harvill, Vice President Marvin "Swede" Johnson, Dean of Agriculture Harold E. Myers, and Extension Director George E. Hull.

(Continued from Previous Page)

self, in the contemplation of mountains, an escape from pettinesses and annoyances. What I had not known, however, prior to moving to Arizona, is the character of the high mountain in the desert. Day after day in the hot season I have seen a small, fleecy cloud form in the morning immediately about the summits of the Santa Catalinas to the north, and the Santa Ritas to the south, as the air currents over the desert were deflected along the mountain slopes, and in the cooler atmosphere over the peaks their moisture content was condensed. I have frequently watched that small, white cloud billow into a towering thunderpeak enveloping the whole mountain top, and from the hot, sunlit valley heard the reverberating thunder, and seen the discharge of such formidable voltages of electricity that the lightning might leap several thousand feet from thunderhead to thunderhead. From my former office window, I have observed such storms far to the southwest over the lofty peak of Baboquivari. My reading has given me only a most superficial acquaintance with a few legends of the Papago Indians. Elder Brother, a divine spirit, dwells in a cave high up the peak of Baboquivari. His presence is manifest in such a storm. And knowing the desert peaks, and the legends about them, I think I can understand better how the story of Moses talking to God on the mountain arose, and when I read that story I can relate it to my experience here. "And Mount Sinai was altogether on a smoke, because the Lord descended upon it in fire: and the smoke thereof ascended as the smoke of a furnace, and the whole mount quaked greatly. And when the voice of the trumpet sounded long, and waxed louder and louder, Moses spake, and God answered him by a voice."

In regions such as ours, when the rains come they fall as violent cloudbursts, turning dry washes into rushing torrents which carry huge boulders and great quantities of debris into the valleys. Perhaps the memory of such flash floods is in the mind of him who sings in Psalm 46, "Therefore will we not fear, though the earth be removed, and though the mountains be carried into the midst of the sea." Any stranger to our region who in his ignorance has purchased a house in a valley or on the sands of the flood plain learns the following summer the aptness of Christ's allusion to him who built upon the sand. "And the rain descended, and the floods came, and the winds blew, and beat upon that house; and it fell: and great was the fall of it."

Yet the desert depends for life on those same destructive rains. The sudden change effected by them is almost miraculous. Overnight, grass appears on bare slopes; bushes that had seemed a lifeless tangle of naked branches are covered with green leaves; flowers blossom everywhere. And as you know the Papagos of our region, when the floodwaters had softened the sunbaked soil of their valley fields, made holes in the ground with a sharpened mesquite stick hardened in the fire, and planted their corn and beans.

The Hebrews of biblical days knew well such transformations. We read, for example, "Thou visitest the earth, and waterest it: thou greatly enrichest it with the river of God which is full of water; thou preparest them corn, when thou hast so provided for it. Thou waterest the ridges thereof abundantly; thou settlest the furrows thereof; thou makest it soft with showers; thou blessest the springing thereof . . . The pastures are clothed with flocks; the valleys also are covered with corn; they shout for joy, they also sing."

SOMETHING NEW IN field days was the "Cotton Wives'" field day at the U of A Cotton Research Center, Phoenix, last October, just before the annual field day for the ladies' husbands. Here Dr. Ruth Hall, director of the School of Home Economics in this college, discusses cotton fibers with a group of visitors. The article on this page by Miss Birong, by the way, is based on her presentation at this special field day for cotton wives.

Permanent Press — New Fabric Finish

By Elizabeth Birong

Permanent press is the latest development in the field of fabric finishes and is a logical extension of wash and wear finishing. It is achieved by establishing covalent chemical bonds between the molecules of the individual fibers. The most important garment aspect is not the crease but the smooth appearance and the absence of seam puckering so typical of some wash and wear garments.

Permanent press can be achieved on 100 percent cotton or other cellulosics, and when cotton is used in a blend with nylon, polyesters or other specific synthetic. The proper proportions for blends are determined through research and may vary with the synthetic used.

Miss Birong is an associate professor in the School of Home Economics.

A cotton yarn is more easily changed when it has a minimum amount of twist and when thicker and coarser. A cotton fabric is more easily influenced when there is plenty of "give and take" between the warp and filling yarns. Cotton that is mercerized before applying the permanent press finish will have improved appearance and increased wear life.

Structural changes in a garment, such as letting out darts or seams, removing pleat creases, etc., cannot be made in a permanently pressed garment. However, seams or darts can be taken in, hems shortened, trouser cuffs cut off and re-attached with some degree of success. Stretch fabrics can be given a permanent press finish also.

The permanent finish can be applied:

1. **By pre-curing the cloth before making the garment.**
2. **By post-curing (also called delayed or deferred) after the garment is constructed (commonly used).**
3. **By treating the creased areas with a thermoplastic finishing substance and finished under a hot-bed press. This is the poorest treatment for 100 percent cottons from the standpoint of abrasive wear on the creased edges.**

A garment of 100 percent cotton is frequently favored over one that is a blend with synthetics for the following reasons:

1. **Cotton is comfortable;**
2. **Easy care; the only fiber that can be washed in hot enough water to get fabric clean and sterile and dried in any manner yet give a garment free from wrinkles;**
3. **Does not get a gray cast in laundering since it does not pick up soil from the wash water;**
4. **Melt holes minimized;**
5. **Iron does not stick;**
6. **Absence of pilling.**

Suggestion for Laundering

To keep your wash and wear and permanently pressed garments perfectly clean and retain the new appearance, follow these suggestions in laundering:

1. Check the interior of your washer-dryer. The porcelain glaze should be smooth—not worn and rough.
2. Pre-treat soiled shirt collars, etc. with a small amount of liquid detergent.
3. Turn trousers, pleated skirts, etc., inside out to reduce abrasive wear on creased edges and avoid lint collection.
4. If possible, tumble-dry wash-wear and permanently pressed cottons separately from untreated cottons, such as towels. Fabrics with these finishes dry approximately five minutes faster.
5. Avoid chlorine bleaches generally; specifically if the label says so, instead, use perborate bleaches. Avoid letting garment get so soiled it needs bleaching.
6. Launder oily soiled white garments, as men's shirts, etc., at high temperature wash water.
7. Remove wash-wear and permanently pressed garments from tumble-dryer immediately garment is dry. Over-drying causes abrasive wear on creased edges and allowing garments to heap up in dryer causes unwanted wrinkles.

Not all fabrics in the laundry are 100% cotton. If they are a blend with synthetics, follow the above directions with these exceptions:

Use warm, not hot water. Use low or medium setting for tumble drying.

Synthetics take even less time to dry than treated cottons, so remove them immediately after the dryer stops, to avoid wrinkling.

HERBICIDE COMBINATION IN COTTON

By K. C. Hamilton and H. Fred Arle

Interest in herbicides to control annual weeds in irrigated cotton started in 1954 when monuron was used to control annual morningglories. Many new herbicides have since been developed.

HIGHER QUALITY TEXTILES AT LOWER COST may result from some novel experiments being conducted by a New Jersey firm under contract with the USDA. The firm is studying the behavior of cotton when subjected to high-intensity sound waves of varying frequencies. The waves, it is hoped, may prove capable of removing trash from lint cotton before it is processed into yarn and fabric. Cleaning machines now in use remove only about 60% of the trash. Moreover, because of the repeated mechanical actions involved, they often damage cotton fibers.

The following herbicides are now registered for use in cotton: CIPC, dalapon, DCPA, dicryl, diuron, DSMA, linuron, monuron, MSMA, norea, petroleum oils, prometryne, trifluralin and combinations of herbicides with various surfactants.

Some of these herbicides which are effective against grasses do not control all broadleaved weeds. Others control broadleaved weeds but have little effect on grassy weeds. When the weed problem is a single species, one herbicide may provide effective control. However, in most cotton producing areas of Arizona annual weed infestations contain a mixture of grassy and broadleaved weeds. The best control for this type of infestation usually is a combination of herbicides.

Many Application Methods

Herbicide combinations can be applied one or more times during each season. They can be applied before furrowing, or preplanting irrigation, or seedbed preparation. In limited areas one or more herbicides are applied immediately after planting. After cotton emerges, herbicides can be applied in combinations in a single application or individually at two or more times. The choice will depend on the relative cost of herbicides and applications, the availability of labor and equipment, and the germination pattern of weeds.

The herbicide combinations of trifluralin and diuron are effective on the weed infestations at the Cotton Research Center in Phoenix, where the dominant weeds are groundcherry, carelessweed, and several annual grasses. The annual grasses and carelessweed can be controlled by an application of ¾ pound per acre of trifluralin. However, this herbicide does not control groundcherry. Diuron at the rate of 1 to 1¼ pounds per acre gives season-long control of groundcherry but annual grasses are not controlled with the maximum cleared rate of 1.6 pounds per acre.

A combination of trifluralin and diuron will control annual weeds and with less herbicide than if either were used alone. It can be applied preplanting, postemergence, or one herbicide, preplanting; the other, postemergence.

Effects of the trifluralin-diuron combination on cotton and weeds in one experiment at the Cotton Research Center are summarized in the accompanying table. The combination produced excellent weed control and yields equal to those of hand-weeded cotton. Trifluralin, alone controlled grass, but not broadleaved weeds. Diuron achieved the reverse. Use of only one herbicide permitted increased weed competition which reduced yields.

Shift With the Opposition

Herbicide combinations should be altered for specific weed problems. Where morningglories are present, monuron might be applied at layby in place of diuron. If small weeds became established in the row, DSMA or diuron with surfactant could be applied as a directed spray. In fields where preplanting applications of trifluralin might injure cotton, DCPA could be used.

Combinations have several advantages over single herbicides, giving better control of mixed weed infestations, and minimizing the buildup of weed species resistant to one herbicide. Combinations may permit a lower total rate than a single herbicide, resulting in less danger to cotton and usually costing less. Lower rates should mean less residues to affect following crops, and this may be their greatest importance.

To assure season-long control, selection of combinations should be based on performance of individual herbicides in the field. The grower should vary herbicides, rates, times and methods of application from field to field, depending on weeds, soil type, irrigation practices and crop rotations. Growers experienced with individual herbicides will have an advantage in selecting the best combinations.

Look at the Label

All use of herbicides should be in accordance with restrictions and directions on the manufacturer's label. Before using the herbicides mentioned in this article, a potential user should consult with his local Extension Service representative for guidance.

Weed Control and Cotton Yield in Herbicide Combinations Test at the Cotton Research Center in 1964.

Treatment					*Weed control Percent estimated 9/30/64*		*Yield of seed cotton in pounds per acre*
Treatment		*Layby*					
Herbicide	*lb./A*	*Date*	*Herbicide*	*lb./A*	*Broadleaf*	*Grasses*	
trifluralin	.75	6/18	diuron	1.25	94	96	2,720
trifluralin	.75				79	96	2,420
		6/18	diuron	1.25	95	81	2,420
Check-cultivated and handweeded					99	96	2,720
Check-cultivated					0	0	1,170

Dr. Hamilton is professor of agronomy at The University of Arizona, Tucson, while H. Fred Arle is agronomist with the Crops Research Service, U. S. Department of Agriculture, and stationed at the UA Cotton Research Center, Phoenix. He is also father of Arizona's 1965-66 "Maid of Cotton," the very gracious and attractive Miss Pamela Arle.

AGRICULTURAL EDUCATION

Its Future Points to New Areas, Wider Scope And Need for New Research by Trained People

Future research in agricultural education will take on a wider scope, accelerated pace, and turn to many new areas of interest. So says Dr. Darrel S. Metcalfe, director of resident instruction in the U of A College of Agriculture.

Speaking at an international gathering in Paris, France, Director Metcalfe said: "Research (in the future, in agricultural education) will focus on the range and kind of employment opportunities available. They will be assessed, as will be the competencies individuals need to enter and make progress in the new work.

Dr. Metcalfe

"Questions to be answered will include:

"What are the current and emerging occupations for which vocational and technical programs are or should be available? What are the present and projected numbers of employees in these occupations by job title and other essential strata? What are the skills and knowledge needed for securing, holding, and advancing in these occupations and how are these skills likely to change? How well are we meeting the needs of persons now employed for retraining or continuing education? What are the logical job clusters for training purposes?

"Research," said Dr. Metcalfe, "will focus on people as we find them — their origin and abilities, their knowledge, skills, aspirations and motivations. Research will study the implication of these studies in the over-all program of human resource development. Such questions as the following need to be investigated:

How Get Them Started

"(1) What specific steps can be taken to motivate the socio-economically handicapped youth? (2) How can programs be best designed to assist youth from the ethnic minorities? (3) What can be done to motivate the potential dropout to continue in school and to achieve his highest potential? (4) What can be done to encourage students to aspire to prepare for levels of employment commensurate with their abilities and interests?

"(5) Why do people differ in aptitudes, and can these aptitudes be modified? (6) How can we prepare rural people for employment and living in an urban environment? (7) How can we assist students to cope effectively with career changes throughout life? (8) How can we determine the potential occupational attitudes, abilities, and persistence interests of students? (9) How can we identify persons who will benefit from vocational education and types of training that would be most beneficial?

"(10) What psychological factors affect flexibility in anticipating and accepting change in employment situations? (11) What basic skills are transferable from one occupation to another or which function in clusters? (12) What psychological adjustments are required of persons when they leave the protective situation offered by the training program and face the competitive working world?"

We Need More Research

The University of Arizona educator told his European audience that his studies have indicated the need for additional research in several areas of educational resources development and training.

"Under curriculum experimentation and development," said Dr. Metcalfe, "research to these questions will be undertaken: (1) What curriculum core content is common to various occupational categories? (2) What curricula are best for new and emerging occupational fields? (3) What is the relationship between curriculum and the dropout ratio?

"Questions will be asked in instructional methodology and media: (1) What is the communicative effectiveness of teaching material? (2) How can we identify and compensate for individual differences in learning situations? (3) What is the influence of various instructional patterns on skill acquisition and retention? (4) What are the best procedures for evaluating student progress? (5) What is the optimum mix of theory and practice?

A Call for Trained People

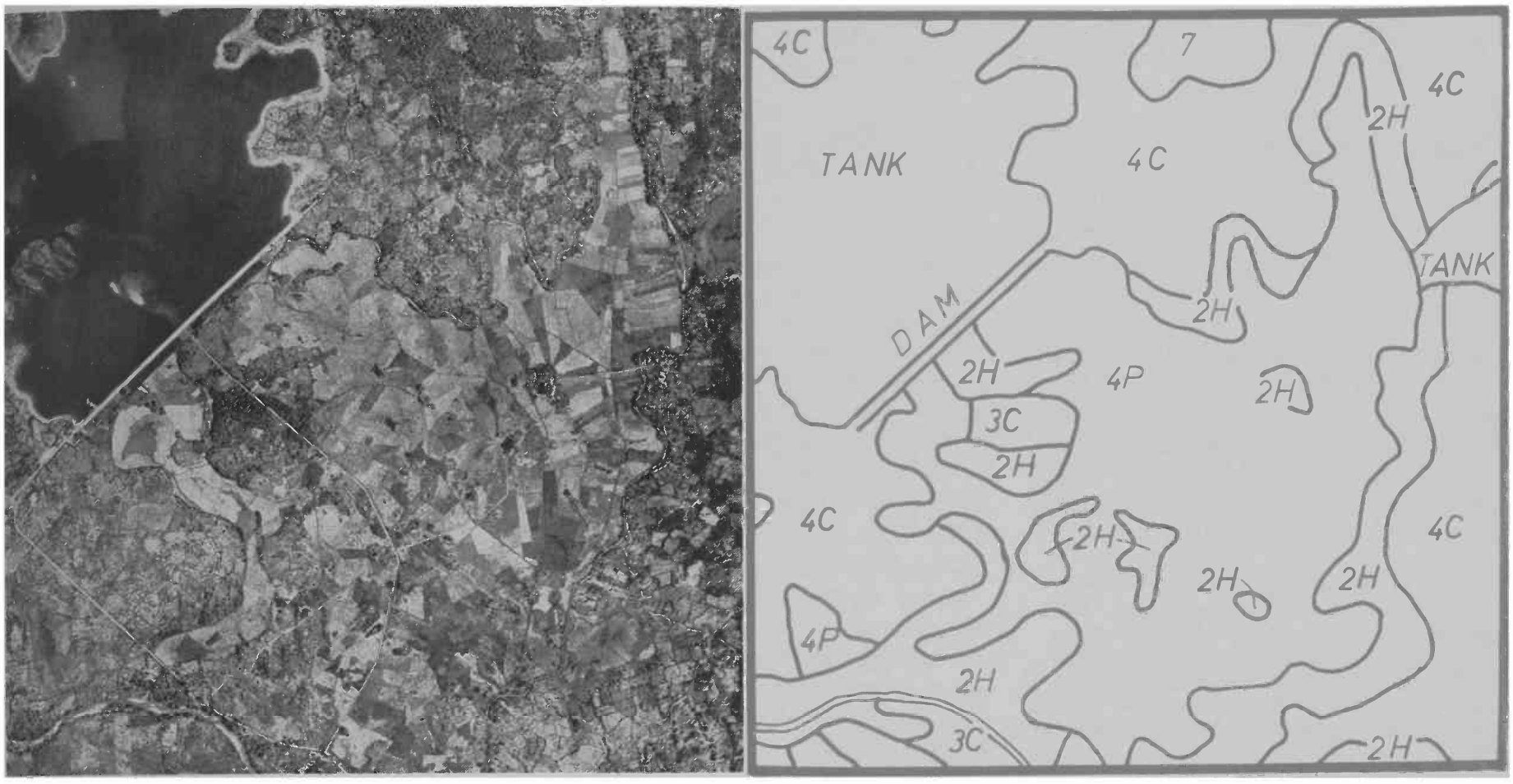
"Personnel must be recruited," he said, "and developed for program organization and administration with specific questions: (1) What are the sources of personnel appropriate to specific needs? (2) What are the critical competencies of successful personnel? (3) What are the methods for forecasting local, regional, and national manpower needs and utilizing these projections in designing and operating vocational programs?

"In the area of vocational guidance and counseling, answers must be found to the following questions: (1) What are the most effective vocational guidance and counseling procedures? (2) What are the educational and occupational aspirations of youth? (3) What is the nature of career patterns? (4) How can placement and follow-up of graduates be best handled? (5) What is the process of occupational choice?"

Concluded the Arizona educator: "The facts which govern the behavior of civilized man today are the products of yesterday's research, and the facts of tomorrow will be the product of today's research."

LESS TIME TO PRODUCE WHEAT

It now takes only 12 man-hours to produce 100 bushels of wheat, compared with 44 man-hours in 1944 and 90 in 1920, according to a just-completed United States Department of Agriculture study. Major factors in the rise to a new high in wheat-producing efficiency, says USDA, are increased use of fertilizer, and better seeds, methods and machinery.



AN EXAMPLE FROM southern Ceylon of the use of aerial photographic interpretation in agricultural Planning. Photographs were used to map the present use of land in this part of the country. Some of the categories shown are: 2H — homestead garden; 3C — coconut plantations; 4C — shifting cultivation; 4P — paddy or rice fields; 7 — forests. The dam is earth-filled and about one mile long. It holds a tank or reservoir for irrigation water to grow the rice.

Aerial Photography Aids Agriculture

By Simon Baker

Almost as soon as the science and art of photography had reached a point where cameras could be used outside of the studio and exposure times for making images were shortened, experimenters began taking pictures from the air.

This happened in the middle 1800's, long before the invention of the airplane. Cameras were mounted on kites or captive balloons, to be raised to elevations where the resulting photographs were true "bird's eye views."

An early practical use of such photographs was made by Union forces in the Civil War, when cameras mounted in captive balloons were used to photograph Confederate positions in Virginia. When the newly developed airplane came into wide military use during World War I, cameras were mounted for photographing the enemy and learning of his strength.

Dr. Baker is a member of the Department of Geography of The University of Arizona. However, originally he was "one of our boys," receiving his B.S. and M.S. degrees in the Department of Agronomy of this College of Agriculture. Currently his teaching includes courses in aerial photographic interpretation and agricultural geography, so he is highly qualified to write the article appearing here.

Vastly Improved

In the years between World War I and World War II both aviation and photography developed to the point where good vertical photographs giving stereographic coverage could be made. During this same period, various agencies of the U. S. government began to use aerial photographs in their work. The Department of Agriculture, the Forest Service, and the Geological Survey were among the earliest agencies to use aerial photographs.

The widespread and intensive use of such photographs, however, did not begin until World War II and the years following. Military examples of photo interpretation and intelligence spurred civilian use of aerial photographs. In recent years there have been great advances in the instrumentation and technology for using photographs taken from the air.

Today, aerial photography is coming into its own as a research tool as well as an aid in regional planning and development, topographic mapping, and civil engineering. Agriculture is involved in all of these uses of aerial photography and benefits from them.

In Other Lands

A rather dramatic example of the modern use of aerial photography is the resources inventory survey of the type being carried out in many of the world's developing countries. The writer participated in such an effort in Ceylon in 1957 and 1958. The government of Ceylon had earmarked a river basin in the south of the island for the construction of a large dam, and the opening of new areas to irrigation by the stored waters of the dam.

Production of food is a very press-

(Continued on Next Page)

Make-It-Yourself Calf Starter Ration Can Be Better, Cheaper

By Robert W. Gardner

Dairymen can formulate their own calf starter rations, getting nutritional value and palatability — and at less than half the cost of some commercial starters. To the dairyman who is raising his own replacement heifers this can be a substantial saving.

In our research we started with the assumption that an acceptable calf starter must satisfy three requirements —proper nutrients in the right proportion, palatable to the calf so it is readily eaten, and at reasonable cost when figured on basis of calf gains.

In the field of cost, we first turned to combinations of locally grown and readily available grains which can be obtained at reasonable cost. We felt that the sooner a calf starts eating large amounts of grain, the earlier it is possible to wean the animal; and secondly, a larger fraction of total daily feed intake can be used for productive purposes in excess of the animal's basic maintenance requirements.

Started at 3 Days

Forty-eight Holstein calves, weighing an average of 92.7 pounds when we took them off their dams at three days of age, were divided into three groups. One received our "simple" starter ration in mash form, a second group got the same ration formulated as pellets, and the third received a complex pelleted commercial ration.

Cost of the "simple" ration was $70 per ton, compared to $190 per ton for the commercial ration. Ingredients in the "simple" starting ration — identical in mash and pellets — are listed here:

TABLE 1. "Simple" starter

Ingredient	*Ton mix (lbs.)*
Rolled barley	1000
Wheat bran	200
Cottonseed meal	560
Dicalcium phosphate	20
Trace mineralized salt	20
Aureofac 10	10
Vitamin A (30,000 I. U./gm.)	2.5
Molasses	200

Ingredients in the more complex commercial starter ration include feeding oat meal, soybean meal, ground yellow corn, dried whey, linseed meal, hominy feed, dehydrated alfalfa meal, animal liver and glandular meal, ground limestone 1.0%, dicalcium phosphate 1.0%, salt 1.0%, brewers dried yeast, ground fenugreek seed, vitamin A supplement, irradiated dried yeast (source of vitamin D_2), vitamin B_{12} supplement, niacin, calcium pantothenate,

(Continued on Next Page)

Dr. Gardner is a member of the Department of Dairy Science. Research he describes was done, and is being continued, at the U of A Dairy Research Center in Tucson.

(Continued from Previous Page)

ing problem in Ceylon and other so-called underdeveloped countries. The International Bank for Reconstruction and Development refused to make the loan necessary to carry out the project because of the insufficiency of information about the river basin. Ceylon was faced with a problem which is all too common around the world — a lack of basic information about areas necessary to plan for their most productive future use.

To collect the kind of information needed about the river basin by means of ground survey techniques would have taken years and been extremely expensive. The food problem of Ceylon and other such countries is too pressing to be solved by the slow, though satisfactory methods of the past. The solution in Ceylon and many other countries of Asia, Africa and Latin America has been to use teams of specialists trained to work with aerial photographs.

The same set of photographs was used by the geologist, forester, hydraulic engineer, soil surveyor, and geographer. Each specialist was able to extract from the photographs the information he required about the river basin.

Furnishes Important Data

The resulting reconnaissance survey report presented the most comprehensive collection of data and maps ever collected on the study area. The report did not tell the whole story, but it focused attention on the most promising areas for future development, and made possible the most efficient use of ground survey personnel. The whole process of information gathering, planning and development was speeded by years. Thus, the use of aerial photography is contributing to a solution of the world food problem every day.

Of what practical value is aerial photography to the agriculture of a country like the United States, which has no food problem at present? Put very simply, one of the reasons for the efficiency of U. S. agriculture has been the application of the results of research to the farm. If our agriculture is to continue to prosper it must recognize and use the results of research carried out with the help of ordinary aerial photography now, and with satellite photography in the near future.

Practical Applications

It is possible now, using infrared photography, to detect certain leaf diseases in plants before they can be seen on the ground. Surveys of range vegetation can be made more accurately and quickly from aerial photographs than on the ground. Photographs may be used to make counts of grazing animals as an aid in establishing good range management practices. Acreages devoted to various crops in a region may be determined very accurately without the necessity of taking a census. Soil mapping and land capability studies are speeded by the use of aerial photography. Soil erosion may be rapidly mapped on aerial photographs and this can be accomplished more efficiently and at less expense than using ground survey methods. Irrigation works are planned with the help of aerial photographs, while watershed management and snow pack surveys are aided by such photography.

Scientists are only beginning to employ the great potentials of aerial photography. The coming years should be marked by many startling new uses for aerial photography which will prove very beneficial for agriculture. For the scientist, the expanding use of such photography will provide him with his long-awaited opportunity to bring the world into his laboratory for close examination and research.

riboflavin, anise oil, ethoxyquin (a preservative), trace minerals.

Tag analysis:

Crude protein, not less than 25.0%
Crude fat, not less than 3.0%
Crude fiber, not more than 6.0%
Ash, not more than 10.0%
Added mineral, not more than 4.0%
Moisture, not more than 11.0%

Because of restrictions of a "closed formula" policy, the amounts of each ingredient in the starter are not available.

The calves were fed and housed individually. The starters and alfalfa hay were offered free choice. We kept records of daily feed weights and calf weights at the start of the trials and weekly thereafter.

For the first three days after birth the calves suckled their dams to gain the advantage of colostrum milk. After this initial time with the cow, milk was fed in addition to the starters and hay according to age and body weight as shown in Table 2.

TABLE 2. Milk feeding plan

	Daily feed[1]	
Calf Age	*Whole Milk*	*Skim Milk*
(days)	*(lb./10 lb. body weight)*	*(lb./10 lb. body weight)*
0-3	On cow	
4-7	1	——
8-14	0.5	0.5
15-35	——	1.0
36-42	——	0.5
Weaned by 42 days		

[1] Milk divided into two feedings.
[2] Skim milk obtained in liquid form from University milk processing plant.

The "simple" starter formulated by us and mined by a local feed manufacturer, was preferred by the calves, either as mash or pellets, as shown in the table listing feed consumption, daily gains, and days required to reach our target of 200 pound weights. (Table 3). In fact, calves on our simple formula reached that weight eight days before those on the much more expensive commercial starting ration. Calves on the commercial ration also ate much more hay — probably not because they liked the hay more but liked the starter ration less!

This same preference, as shown in starter acceptance, occurred both before and after weaning at 42 days of age, resulting in small daily weight gain advantages both before and after being weaned (Table 4). When approaching the 200 pound weight, calves were consuming up to six and seven pounds of the "simple" starter ration per day.

An additional bit of information: We found no advantage in pelleting the simple mix. The calves did selectively consume the molasses coated rolled barley in the mash, leaving large amounts of cottonseed meal and the wheat bran which was difficult for the calves to separate from the meal.

The fact that calves which shoved the cottonseed meal aside did as well as those forced to eat the cottonseed meal, because it was part of the pellets, suggests that not all of the protein provided by the cottonseed meal was required, and the amount could be reduced in future formulations to lessen costs and increase palatability. Accordingly, we are currently studying protein requirements on a free choice grain feeding program.

Also, we found no advantage in feeding a combination of plant and animal proteins. In fact, such a mixture seemed less palatable to the animals and was not consumed readily.

Fortunately, these good calf responses were obtained with only a limited amount of milk, as is indicated in Table 5.

TABLE 5. Average total milk consumption

Starter	*Whole milk (lb.)*	*Skim Milk (lb.)*
Simple mash	95.7	290.9
Simple pellet	87.6	282.3
Complex pellet	103.8	276.9

The clincher for the simple ration, in addition to the fact that the calves preferred it and made their best gains on that ration, is comparison of cost. In Table 6 we show that the simple starter cost between a third and half as much as the commercial mix, and even with the additional cost of hay the simple formulated mixture cost less than half as much as the complex starter ration in raising these Holstein calves to the 200 pound weights.

TABLE 6. Average total feed costs for starters and hay required to raise calves to 200 lbs.

Starter	*Starter Cost[1] ($)*	*Hay Cost[2] ($)*	*Total Cost ($)*
Simple mash	6.86	.94	7.80
Simple pellet	7.65	.87	8.52
Complex pellet	17.05	1.36	18.41

[1] Simple starters $70.00/ton, complex, $190.00/ton.
[2] Hay cost — $30.00/ton.

The work will continue in our effort to find the ration which best represents all three requirements — nutritive value, acceptability and low cost.

TABLE 3. Summary of average feed consumption, days required to reach 200 lbs., and daily gains

Starter	*Total Starter*	*Total Hay*	*Days to reach 200 lbs.*	*Average daily starter consumption*	*Average daily gains*
	(lb.)	(lb.)		(lb.)	
Simple mash	193.6	62.9	80.4	2.4	1.34
Simple pellet	218.5	57.8	80.7	2.7	1.34
Complex pellet	179.5	90.4	88.4	2.0	1.21

TABLE 4. Weaning weights, average daily feed consumption before and after weaning, and weight gains after weaning.

Starter	*Weaning weights*	*Average daily starter consumption*		*Average daily gains weaning*
		Before weaning	*After weaning*	
	(lb.)	(lb.)	(lb.)	(lb.)
Simple mash	132.4	1.00	4.1	1.82
Simple pellet	131.3	1.26	4.5	1.88
Complex pellet	125.9	0.75	3.3	1.71

Investigaciones recientes realizadas en estaciones agrícolas experimentales muy distantes indican que existen factores no identificados presentes en la alfalfa deshidratada que estimulan las funciones del rumen y contribuyen al bienestar del ganado vacuno y del lanar. En Texas se encontró que la adición de harina de alfalfa deshidratada a la ración del ganado vacuno incrementa el aumento de peso en 15.4% con una disminución del 15.2% en los requisitos alimenticios por unidad de aumento.

A Wish For The New Year

We hope the somewhat jesting prayer you have seen or read frequently is not sacrilegious, for it seems to us to carry the germ of great common sense. In essence, it pleads for "strength to do something about those things about which I can do something; the good sense not to attempt those things I cannot affect, and wisdom to discern between the two."

It is tiresomely repetitious to say "We live in an age of change," but that is true. Change is the most important thing about us, in the world today.

For that very reason we need the great wisdom to discern between changes which are good and those which endanger the future of our nation and the world. We are traveling in fast company — the company of the whole world — and it seems we are usually picking up the check.

In our own lifetime we have seen a change in education, from the time when the son of the immigrant, the farmer and storekeeper was eagerly grateful for the meager educational opportunities offered, to the present day when the most refined, cultural and scientific education in the world is sometimes repudiated by hecklers and dropouts. Realizing that the unappreciative young people are in the minority, we must judge calmly and not emotionally.

In agriculture new techniques and learnings have transformed an entire way of life, one once dominated by the pitchfork and the walking plow. Agriculture in the U. S. is picking up the tab, as its prodigious output feeds much of the world. In education the teacher and scientist roam the world, serving a global classroom and getting a global viewpoint.

The motives behind all these things are warmly gracious. We hope they are for the best. In all honesty, we don't know. We hope the alert, smart younger generation will make wise decisions.

If we offer them, humbly, a tiny fragment of advice it is that occasionally they seek to withdraw themselves from this maelstrom of change. That they seek an afternoon in the country, the eye-enriching loveliness of a western sunset, the music of poetry and the poetry of music, and the stimulation of great literature.

John Burnham, Editor
Progressive Agriculture in Arizona

JOE METCALF (right), manager of the Sears-Roebuck store in Tucson, presents $3,000 in checks to officials of the U of A College of Agriculture. The money is for ten $300 scholarships — seven for freshmen in agriculture, one for a sophomore in agriculture, and two for home economics majors. College of Agriculture officials, left to right, are Dean Harold E. Myers; Dr. Darrel S. Metcalfe, director of Resident Instruction, and Dr. Ruth C. Hall, director of the School of Home Economics.