Station Editor's Copy

Progressive Agriculture IN ARIZONA

IN THIS ISSUE

Vol. VII No. 1
April, May, June
1955

Published by the College of Agriculture of the University of Arizona, Tucson, Arizona

Date of planting affects root rot and production in

Castor Beans

By R. B. Streets
Department of Plant Pathology

The findings from castor bean time-of-planting trials at the University of Arizona Agricultural Experiment Station at Mesa may have immediate commercial value to those considering castor beans as a crop for acres to be taken out of cotton.

The experiments suggest that June 1 planting leads to greatest yield of beans, with a moderate amount of root rot. They also indicate that a winter green manure crop prior to the planting of beans increases bean yield and reduces root rot.

At Mesa, castor beans were grown in 1951 and 1952 on land severely infested with the Texas root-rot fungus, but not a plant died nor even looked sick. The beans followed a winter crop of safflower and were planted late, about August first.

In 1953 a planting was made at the time early cotton was seeded, April 18, and the plots following safflower were planted August 4. (These plantings were replicated for sound research procedure.) The early planted castor beans proved to be as susceptible to root-rot as cotton, while the adjoining late plantings again escaped.

In 1954, intermediate dates of planting were added to determine whether early castor beans can be planted on root-rot-infested land without appreciable loss from the disease.

The early (May 1) planting again developed much root-rot, the June 1 planting a moderate amount, and the June 15 planting a slight infection. The August planting was free from root-rot for the fourth consecutive year.

The yield of castor bean seed from each planting date would in the end determine the best date of planting after eliminating the early date because of severe damage from root rot. The largest yield (3230 pounds per acre) was from the June 1 planting, which gave 22 percent more seed than the May 1 and June 15 dates.

Of special interest is the fact that root-rot was greatly reduced (from 80 percent to 30 percent in one case) in the three earliest plantings following a green manure crop of Papago peas. The rotation developed from these same experiments has made possible good yields of cotton every year on land heavily infested by the root-rot fungus, with little loss from root-rot.

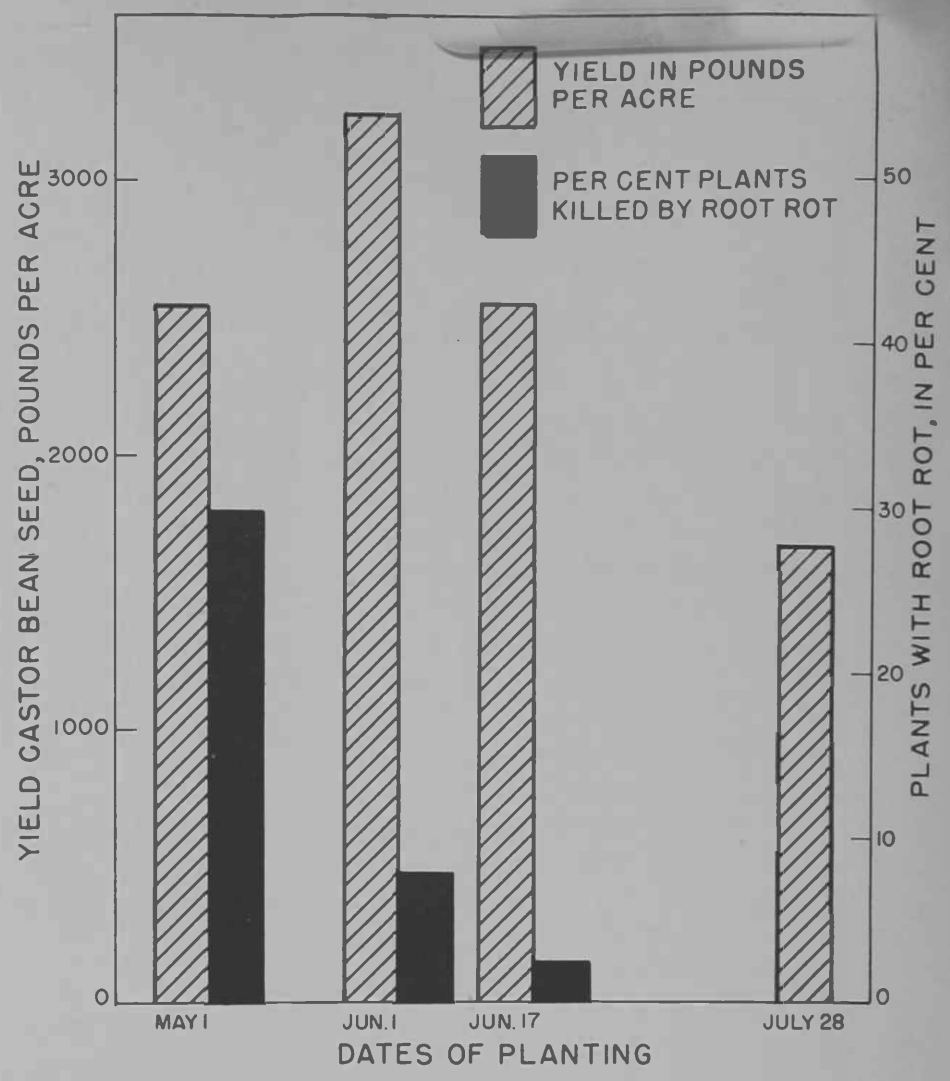

Photo courtesy United States Department of Agriculture

Effect of date of planting on yield and root rot in castor beans.

Castor bean yield and root rot in relationship to planting date and green manure crop

Castor bean planting date	Crop, Winter 52-53	Root-Rot in castor beans 1953	Crop, Winter 53-54	Root-Rot in castor beans 1954	Yield per acre
		Percent		Percent	Pounds
May 1	no crop	80	Papago Peas	30	2556
June 1	———	—	Papago Peas	8	3230
June 15	———	—	Papago Peas	3	2567
Aug. 1	Safflower	0	Safflower	0	1674

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Published quarterly by the College of Agriculture, University of Arizona, Tucson, Arizona, Phil S. Eckert, dean of agriculture. Reprinting of articles, or use of information in *Progressive Agriculture in Arizona,* by newspapers and magazines is permitted, with credit.

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

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

Editors: Arland R. Meade and Joe McClelland.

Editorial Board Members: Howard R. Baker, Extension Service; Mitchell G. Vavich, Experiment Station; R. W. Cline, Resident Instruction; Mildred R. Jensen, School of Home Economics; Ralph S. Hawkins, chairman.

For home or career, a major in

Textiles, Clothing, Related Art

By Mildred R. Jensen
School of Home Economics

Textiles, Clothing and Related Art majors from the University of Arizona have held a pleasant variety of jobs—and a larger number of them have found that their studies have been helpful in their lives as happy wives and mothers.

One decorates trailers for the family trailer business, another helps an architect husband check all his house plans, another does the interior-decorating counseling in a family-owned furniture store. Most of them write happily about decorating new and old houses, of making new slipcovers or new draperies, of designing and making a first formal for a growing daughter—and other such richly rewarding family activities.

Four Types of Jobs Open

Four types of jobs are open to graduates of the University of Arizona whose major is Textiles, Clothing and Related Art: technical textile work; interior decorating; clothing store jobs such as clothing buyer or stylist; clothing designing. Advanced study may lead to college teaching.

Those specializing in textiles should like science, as they will need chemistry and physics as well as advanced textile courses. With graduate work, these students go into textile research and college teaching. With undergraduate training they find jobs in textile-testing laboratories chiefly. (Arizona has no such laboratories now, but there are a few in nearby areas.) Some girls find their undergraduate training adequate for good positions in stores, in factory set-ups, or in special research.

Executive Positions, Too

An increasing number of executive positions in the retailing and merchandising field are being filled by women.

Girls interested in store work will find textiles, clothing and art courses, together with business courses, a good foundation. A salesperson or buyer has the concrete evidence of sales figures to show what she can do. The exciting flow of new merchandise, the pleasure of being "in the know" on new fashions are all a part of the work in the merchandise marts of today.

All retailing jobs require store experience. The student interested in this field should plan to work summers in a clothing store if she does not already have such experience. This way she learns to understand how a store is organized and gets experience as stock girl or marker —becomes part of the behind-the-scenes team.

Needless to say, anyone interested in the retail field needs boundless enthusiasm, excellent health, above the average personal appearance (because of the constant public contacts), initiative and aggressiveness and some artistic sense.

Designing is probably the most difficult field to work into. A designer needs many art courses, costume history, textile courses to get to know many kinds of cloth and clothing construction, and design courses to learn the know-how of making patterns and grading them for size—as well as the business of darts, seams, etc.

Summer Work May Help

A girl interested in the designing field would do well to hunt summer work in one of the many small clothing factories in Arizona, learning to run a power machine, helping make up sample designs for "the line," and perhaps even modeling for visiting buyers will help a student to see the business as a whole. She will probably pick up some ideas about how to break into the business. She may also decide to take some business courses and aim at her own business.

Interior decorating majors, like the costume designers, need many art courses and interior decorating courses, together with history of furniture, decorative textiles, china, glass, and silver. They have to learn to mix paints, finish furniture, design and make slipcovers and drapery for they will later have to supervise such work.

Young decorators often find decorating firms or furniture stores a good place to begin work. A University of Arizona graduate, working at a Dayton, Ohio, furniture store wrote, "I am one of four consulting decorators complete with desk and phone and swatches of our fabrics." Another who worked for a Boston interior decorator often had the opportunity to teach his classes while he was away.

Top Students Teach

Graduate academic work in Textiles, Clothing nad Related Art usually leads to teaching in the larger high school homemaking departments or into college teaching. A person who enjoys teaching and who has above average grades may well plan this further preparation. Many colleges and universities now offer graduate fellowships to attract qualified students. These fellowships often call for teaching or research assistance and will pay enough to help with graduate study expenses.

Betty Johnson of Wickenburg (center) and two helpers discuss a step in the manufacture of dresses in her own dress manufacturing business. She has four power machine operators. Her sales representatives now cover eight states personally; and through publicity in "Life" magazine, and in rotogravure sections of newspapers in such cities as St. Louis and Pittsburgh, her styling is known throughout the country.

A better way to measure

Hail Injury in Cotton

By Warner D. Fisher
Department of Agronomy and Range Management

Hail storms cause thousands of dollars worth of damage to Arizona cotton each year. Many growers hedge against hail loss by taking out hail insurance. During 1954, $767,539.34 were spent by Arizona cotton growers on hail insurance.

One of the major problems confronting both the farmer and the insurance company is that of determining the damage done by a hail storm. If the damage estimate is too low, the farmer loses accordingly; if the estimate is too high, it will be reflected in increased cost of hail insurance when rates are fixed for the next growing season. An accurate appraisal of the loss means that farmers will receive a fair settlement and that the cost of insurance to all can be kept to a minimum level.

The Arizona Agricultural Experiment Station for the past three years has been conducting tests designed to help provide a sound basis for evaluating hail injury. Varying degrees of damage were inflicted upon cotton plants in different stages of development to study the effect on yield and fiber quality.

Early Season Damage

Damage inflicted during the seedling stage had little lasting effect unless it resulted in a poor stand of cotton. A series of treatments ranging in severity from one-half defoliation to complete removal of leaves and young stem tips was applied when the plants were beginning to square freely. The less severe treatments, including removal of all leaves without injury to other plant parts, resulted in only a slight reduction in yield. Removal of all leaves and young stem tips, however, reduced yield by as much as 40 percent.

Midseason Damage

This series of treatments was applied during the latter part of June when the plants were starting to bloom freely. Removal of one-half of the leaves and squares had no measurable effect but all treatments involving removal of all leaves and other plant parts or worse resulted in yield losses of 25 to 40 percent. It might be added that none of the treatments in the entire test caused death of any plants.

Late Season Damage

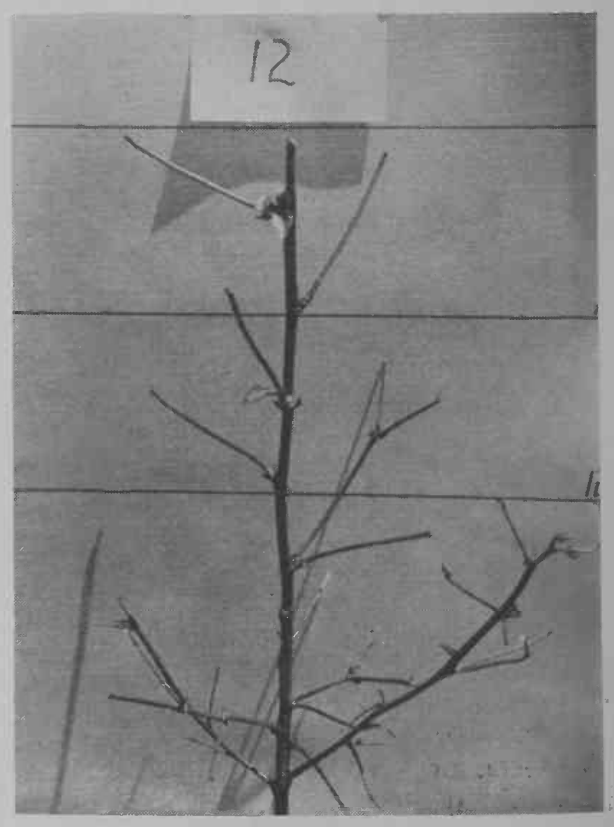
These treatments were applied in mid-August when some of the lower bolls were beginning to open. At this time all treatments resulted in yield losses ranging from about 28 percent for one-half defoliation to about 62 percent for removal of all leaves, squares, flowers and young bolls up to one-half inch in diameter.

These results indicate that the loss in yield is dependent not only upon the severity of the injury but also upon the stage of plant development when such injury occurs. The cotton plant has a rather remarkable capacity for recovery from injury when growing conditions are favorable and when sufficient time remains before frost. Cotton that is damaged later in the season does not have time enough nor the best growing conditions in which to recover. The loss, therefore, is greater than if the same degree of injury is sustained earlier in the season. The time of the first frost also influences the loss from hail injury, since an early frost reduces the time available for recovery.

Early vs. Late Season Damage

Early season damage has little effect on fiber quality, but late season damage, which also results in heavy yield losses, decreases fiber quality. With severe late season damage, most of the bolls produced are formed late in the season. These bolls tend to be smaller and the lint tends to be slightly shorter and definitely finer than bolls produced earlier. This increased fineness, whch is probably due to immature fibers, is definitely objectionable from the spinner's standpoint; therefore the farmer's loss in such cases of late season damage cannot be measured by the reduction in yield alone.

Examples of damage inflicted on cotton at bloom stage of development. Left to right: One-half defoliation; complete defoliation; complete defoliation plus removal of young stem tips, flowers, and squares.



More about the

Damaging Khapra Beetle in Arizona

By Lemac Hopkins, G. H. Spitler[1] and L. A. Carruth
Department of Entomology

These are the cast skins of the Khapra Beetle, in barley. This destructive pest is spreading in the United States. The Department of Entomology, University of Arizona, would appreciate reports from anyone finding evidence of this beetle for the first time. Actual length of the larva is 1/8 inch; of the adult, 1/16 inch. (Photo courtesy U.S.D.A.)

In January 1954 the khapra beetle, the last of the major stored-grain pests of the world not previously known to be present in the United States, was found in Arizona. A few weeks earlier it had been recognized in California and it has since been found in New Mexico. It has been previously known in various countries in Asia, Europe and in Australia.

The problem of control is made difficult because of the ability of the larvae to penetrate deeply into cracks and crevices in storage buildings, often beyond the reach of insecticides, where they are able to remain inactive but alive for even several years. In Arizona, the khapra beetle has thus far been more important as a pest of large mills and warehouses than as a pest of farm-stored grain.

Investigations of the nature and control of this new pest in Arizona have been conducted by the United States Department of Agriculture and by the University of Arizona Agricultural Experiment Station. Federal workers have made surveys to determine the extent and severity of infestations and have investigated control methods. At the University Research Laboratory at Mesa the food preferences of the khapra beetle have been investigated, with particular reference to materials of importance in Arizona and in areas to which the pest might spread.

Food Preferences Tested

Recent studies in Arizona have shown that khapra beetle larvae which were fed on processed cereal products developed into mature beetles in less time, in greater percentages, and became larger individuals than similar larvae fed on whole grain or other unaltered materials. The larvae preferred cracked grain or grain dust to sound grain.

The most rapid growth and highest rates of survival occurred, for the processed materials, in corn meal, wheat flour, and rolled oats. Of the unprocessed materials black-eyed peas, sorghum, and barley were the most favorable for rapid growth and survival. Field-run wheat was more favorable for beetle development and survival than was cleaned whole wheat. Lowest development and survival rates occurred in processed rice, cotton seed meal, castor beans, raisins, cleaned whole wheat grains, whole cotton seed, and wool yarn. In tests to date no mature beetles have been developed from larvae fed solely on the three last-named materials.

Suggested Control Methods

The search for simpler and more effective control methods for use in Arizona conditions is actively in progress by Federal workers. Present suggestions for khapra beetle control include: (1) Maintain general cleanliness in storage areas, (2) Treat walls and floors of empty storage bins with insecticides, (3) Fumigate stored grain, (4) Remove cracked grain and grain dust from sills, beams, and corners of storage areas, (5) Take every possible measure to eliminate breeding or hibernation sites, (6) Never transport grain in used bags unless they have been properly fumigated or heat sterilized, (7) Construct storage areas, or remodel them, to eliminate as many cracks and crevices as possible, (8) Spray with malathion on the walls and floors of areas in which grain is to be stored (using five pounds of technical material in wettable powder form per 100 gallons of water), (9) Protect wood surfaces by using a similar quantity of technical malathion in emulsion form but diluted with diesel oil rather than water.

Grain Fumigation

The present recommendation for grain fumigation involves the forced circulation of methyl bromide within a tightly enclosed area at the rate of four pounds per 1000 cubic feet when temperatures are between 50 and 60 degrees, Fahrenheit, or higher. When temperatures are between 40 and 50 degrees a dosage of five pounds per 1000 cubic feet is suggested. Fumigants are extremely dangerous to humans and must only be used when proper safeguards are carefully followed. Tests of other fumigants against the khapra beetle are now in progress.

The newest information concerning the khapra beetle and its control may be obtained from the University of Arizona Agricultural Extension Service or from the Stored-Products Insect Laboratory of the U. S. Department of Agriculture, Box 857, Mesa, Arizona. For information concerning quarantines, representatives of the Arizona Commission of Agriculture and Horticulture or regulatory officers of the U. S. Department of Agriculture in Arizona should be consulted.

[1]Entomologist, Mesa Arizona Laboratory, Stored-Product Insects Section, Agricultural Marketing Service, U. S. Department of Agriculture.

Gifts to the College of Agriculture, University of Arizona

(For research and other use)

Department of AGRICULTURAL BIOCHEMISTRY

Grunow Lois Memorial Clinic.....$5,000

Department of AGRICULTURAL CHEMISTRY AND SOILS

Monsanto Chemical Co. $1,500
" " " .....150 lbs. IBMA
Wesvaco Chemical Division,
Food Machinery and Chemical Corp. $2,500
" " " .....400 lbs. fertilizer
California Spray-Chemical Co. $2,000
U.S. Atomic Energy Commission $2,600
Braun and Co. .....300 lbs. Orzan
Yucca Mining Co. .....1000 lbs. Fero-Til

Department of AGRICULTURAL ENGINEERING

Arizona Cotton Seed
Distributors .....160 lbs. of Long Staple Cotton Seed
Frank Whiting.....Vacuum governor for Chevrolet
National Rainbird Sales & Engr.....6 nozzles, various sizes
2 Model 35 Rainbird sprinklers
2 Model 25A Rainbird sprinklers
Southwest Cooperative Wholesale....1—4-row set of Doskocil Weeder attachments for cultivator
Arizona Pest Control Company.....100 lbs. of Shed-A-Leaf defoliant
Gotcher Engineering & Mfg. Co....4 small new-type burners for flame cultivator

Department of AGRONOMY AND RANGE MANAGEMENT

Arizona Cotton Planting
Seed Distributors.....$1,687.59, cotton research
Bard Ranches.....Acreage for revegetation research
Boquillas Land and Cattle
Company.....Fencing of 1280 acres for experimental use
Central Aircraft Company....Aerial application of herbicides for range brush control
Dow Chemical Company.....Chemicals for weed control research
Hail Insurance Adjustment and
Research Association.....$1,000, cotton research
Northrup-King & Company.....Seed for corn silage research
Peppard Seed Company.....Seed for corn silage research
Rohm & Haas Company.....Chemicals for noxious plant control research
United States Industrial
Chemicals Company.....Herbicides for range weed control

Department of ANIMAL SCIENCE

Mr. Don Butler.....Quarter Horse trophy (high individual on Livestock Judging Team)
Arizona Quarter Horse Breeders Ass'n....Engraved trophy to each member on Judging Team
Art Pollard.....Trophy to each member of Judging Team

Department of DAIRY SCIENCE

American Seal Kap Company.....Use of milk bottle capping machine
Arizona Dairy Technology Society.....Scholarship $225
Borden Company.....Scholarship $300
DeLaval Pacific Company....Use of milk separator—clarifier
Diversey Corporation.....Cleaning and sterilizing compounds
Virginia Dare Extract Co., Inc. .....Award $25

Department of ENTOMOLOGY

American Cyanamid Co. $1000
Ethyl Corporation $1200
Chemagro Corporation $1800
Hercules Powder Co. $1000
Shell Chemical Corp. .....$ 750

School of HOME ECONOMICS

Detergents, Inc. .....4 dozen small packages of All
Calgon, Inc. .....48 packages of Calgon
Gold Seal Company.....1 dozen small packages of Snowy Bleach
Mrs. Evelyn J. Kirmse.....Glassware, and other various household items
Glamorene, Inc. .....6 half-gallon jars of Glamorene
" " .....1 applicator

Department of HORTICULTURE

Arizona Grape Growers Association $300.00
Ari-Zonolite Company .....Vermiculite
W. A. Cleary Corporation .....Experimental turf fungicides
Connor, H. D. $100.00
E. I. DuPont DeNemours & Company.....Nugreen
Fannin Gas & Equipment Company.....Fertilizer and Insecticides
Ferro Corporation .....Fritted trace elements
Geigy Company .....Iron-organic chemicals
Lynchburg Planter Mfg. Company.....Vegetable transplanter
Monsanto Chemical Company.....Krilium
Monrovia Nursery Company.....Ornamental trees and shrubs
National Frost Protection Company.....Tropic Breeze Wind Machine for citrus
Phillips Chemical Company $1200.00
O. M. Scott & Sons Company.....Herbicides
Shaw Mowing Equipment Company.....Turf plugging tool, rotary lawn mower
Stannard, Carlos .....Thermograph
Toro Manufacturing Company .....Greens mower
U. S. Rubber Company .....Maleic hydrazide
Upham's Nursery .....Nursery supplies

Fresh vegetables for experimental storage tests were furnished to the Department of Horticulture by the following: Bodine Produce Company; S. A. Gerrard Company; Gold Badge Farms; Earl C. Recker Company; Stanley and McDaniel Company; and Western Vegetable Distributors.

Samples of seeds have been furnished to the Department of Horticulture by the following: Aggeler Musser Seed Company; Associated Seed Growers, Inc.; Atlee Burpee Seed Company; Bozeman Canning Company; Casey Seed Company; Corneli Seed Company; Ferry Morse Seed Company; Kilkore Seed Company; Loomis, George & Sons Seed Company; Northrup King & Company; Pieters Wheeler Seed Company; Robinson, Lawrence & Sons Seed Co.; Robson Seed Company; Rocky Ford Seed Breeders Association; Rogers Brothers Seed Company; Tal Wi Wi Ranch; Woodruff & Sons Company.

Land use and labor for vegetable experimental plots were furnished by the following: Russell Badley, Bodine Produce Company, McLaren Company, D. G. Nunnaley, Lehi Palmer, Charles Roer.

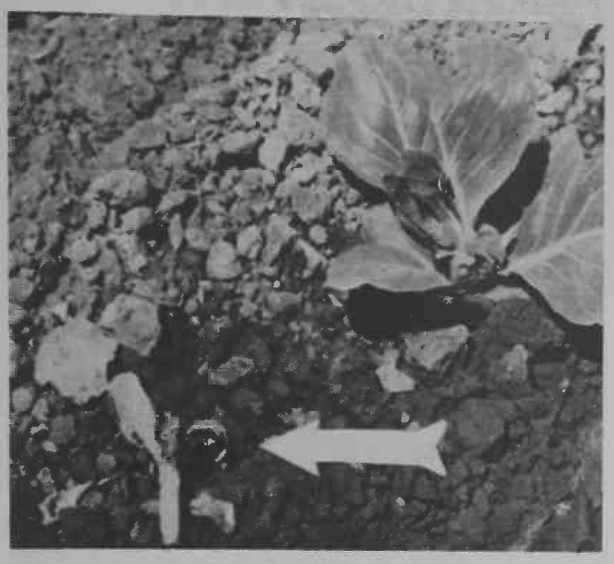
Department of PLANT BREEDING

Arizona Cotton Planting Seed Distributors $9557.50

Department of PLANT PATHOLOGY

Associated Seed Growers, Inc. .....8 lbs. vegetable seed
Arizona Fertilizers, Inc. .....100 lbs. Zintox dust
" " " .....2 lbs. zineb concentrate
" " " .....2 lbs. zinc sulfate
American Cyanamid Company .....$1000 Grant-in-aid
" " " .....200 lbs. High test Calcium Cyanamide
Baseline Flower Growers, Inc. .....10 lbs. Squash seed
Casey Seed Company .....12 lbs. Lettuce seed
" " " .....35 lbs. Cantaloup and Squash seeds
" " " .....1,000 Hotcaps
" " " .....6½ lbs. vegetable seeds
California Spray Chemical Corp. .....1 lb. Orthocide 75
Carbide and Carbon Chemical Corp .....8 oz. sorbic acid
E. I. duPont de Nemours & Co. .....3 lbs. seed treatment fungicides
Ferry-Morse Seed Co. .....5 lbs. vegetable seed
Gold Badge Farms .....16 cartons of lettuce
John Powell and Company, N. Y. .....30 lbs Experimental fungicide
" " " " .....2-4 Nitrochlorobenzene
" " " .....1 lb. Phytomycin (antibiotic)
Mathieson Chemical Corporation.....500 lbs. PCNB fungicide
" " " .....200 lbs. of Special fungicide
" " " ....2 qts. experimental bactericide
Merk & Co. .....3.7 kg. streptomycin formulation
Tennessee Corp. .....20 lbs. Nu-Iron
" " .....20 lbs. Cop-O-Zinc
United States Rubber Co. .....4 lbs. seed treatment fungicides
" " " " .....100 lbs. Spergon-5D
White Chemical Co. .....300 lbs. experimental bactericide

(continued on page 11)



The arrow points to a cabbage plant that was infected by the "yellows" fungus. Notice that it is light-colored and stunted.

RESISTANT DETROIT

RESISTANT GOLDEN ACRE

Two yellows-resistant cabbage varieties, Resistant Golden Acre and Resistant Detroit, yield well and are high quality crops for our desert areas. These two cabbages were grown on same yellows-infested field as was the stunted non-resistant one shown above.

Good cabbage crop possible in spite of

Cabbage Yellows

By R. B. Marlatt
Plant Pathology Department

A cabbage disease was found in the Glendale area in the fall of 1952 which caused a loss of about 20 percent of the crop in a severely diseased field. Since that time the disease has been found in additional fields in the Salt River Valley and has been identified as "yellows."

The Cause

Cabbage yellows is a disease caused by a fungus that lives in the soil. It is frequently found in fields in which cabbage has been planted for several seasons. Once our soils become infested with the fungus, no way is known to rid the soil of the fungus.

Yellows is a hot-weather disease; only the early fall plantings have been damaged severely. If cabbage is planted after the latter part of September, the soil is usually too cold for the fungus to grow rapidly and the farmer will not have to worry about yellows attacking his crop.

Symptoms

A young plant that is infected by the fungus becomes yellowish-green and is stunted. As the disease becomes worse, the lower leaves die and eventually the entire plant may be killed. Not all infected plants die; some may survive but will never head properly and the dying lower leaves become brown or almost black. The remaining yellowish-green leaves may roll inward slightly at their margins and sometimes only half of a leaf may be affected.

We can easily identify the disease by splitting the tap root lengthwise. Brown or black streaks will be seen along the inside of the root which may even extend up the stem if the plant is severely affected.

Control

The only control of this disease is provided by growing yellows-resistant varieties. Some of these resistant types will grow well under our desert conditions and others are not adapted. During 1953 and 1954 six early resistant cabbage varieties were grown in a field in which yellows had been severe and were compared to the commonly grown Golden Acre variety which is very susceptible to the disease.

In order to be acceptable to cabbage growers, a fall variety must have more than disease resistance: It must give a heavy yield of solid heads of about 5½ to 6 inches in diameter; the cabbage should be early and the top of the head should not become badly damaged by sunburn or frost.

All of these qualities were considered when the varieties were compared and only two of them qualified as high quality, yellows-resistant types: The Resistant Golden Acre and Resistant Detroit proved to be far superior to Golden Acre in several respects in addition to being resistant to the yellows disease. Red Hollander, a red variety, was found to be very resistant to the yellows.

Even if a field has not become infested with the yellows disease it would be advisable for a grower to try the Resistant Golden Acre or Resistant Detroit varieties because of their superiority in such characteristics as yield, earliness, and resistance to sunburn or frost damage to the cap leaf.

FIRST MELON SEED CERTIFICATION IN ARIZONA

The first melon to be certified according to the rules and regulations of the Arizona Crop Improvement Association, is the new "Arizona Sunrise" cantaloup.

Arizona Sunrise was developed by Dr. R. E. Foster of the Agricultural Experiment Station of the University of Arizona, in cooperation with commercial growers. (See Progressive Agriculture in Arizona, January 1955 issue.)

The new regulations for certification of musk melons (including cantaloups, honeydew, casaba, Persian melons and Cranshaws) are aimed at the production of good seed of the same genetic makeup as the originally developed strain.

Rapid cooling makes more marketable

Sweet Corn

By J. K. Stewart
Department of Horticulture

During the spring of 1954, Arizona vegetable growers shipped 13 cars of sweet corn to eastern markets from the Salt River Valley.

Corn in three of these cars was precooled by the vacuum cooling method commonly used only for the lettuce crop. The most common method of precooling sweet corn is to immerse it in ice water for about one-half hour.

Until recently, it was felt that only leafy vegetables could be properly cooled by this method. Tests by the University of Arizona, however, have shown that the temperatures of sweet corn at the center of the cob can be lowered to desirable temperatures by the vacuum process.

Sugar Quickly Lost

Sweet corn, ready for harvest, contains approximately 6 percent sugars. If no precooling or refrigeration is provided, approximately 60 per cent of these sugars are lost during the first 24 hours after picking, principally through the conversion of sugars to starch. Because of this rapid loss of sugars, and therefore eating quality, at warm temperatures, it is extremely important that sweet corn be precooled as soon as possible after harvest and be provided with some means of refrigeration until it reaches the consumer's table.

During 1954, the University of Arizona, in cooperation with the Crystal Ice Company, Phoenix, conducted tests to compare the common method of cooling sweet corn with ice water (often called hydro-cooling) to the new method of vacuum cooling.

Four test crates of sweet corn were immersed for 23 minutes in tanks containing ice water. The temperature of the water varied from 33 to 46°F. depending upon the position of the ice in the tank.

The average temperature at the center of the cobs before ice-water cooling was 87.2°F. and after cooling was 58.3°F. This represents a temperature drop of 28.9° during the cooling period — an average loss of 1.3° per minute.

The average temperature of the sweet corn in four other crates was 89.5°F. just before being placed in the vacuum tube and after 18 minutes under vacuum, the temperature of the corn at the center of the cob was 37.8°F. This temperature reduction of 51.7° averages 2.9° per minute. The sweet corn lost 5.2 percent of its original weight due to moisture loss, apparently for the most part from the husk portion, during the vacuum cooling process.

Sweet Corn Storage Test

Four cra es of sweet corn which were cooled in ice water, four which were vacuum cooled, and four others which received no precooling at all were placed in a storage room at the University Experiment Station at Mesa. Quality ratings were made of the corn after 1, 4, 6, 8, and 11 days of storage at 37°.

The kernels of both the water-cooled and vacuum-cooled corn retained their fresh, attractive appearance throughout the 11-day storage period. However, after 4 days of storage, the kernels of the non-precooled corn began to shrink and develop dents which detracted from the fresh appearance of the corn. This shrinking and indentation became progressively worse during the storage period.

Vacuum-cooled Less Attractive

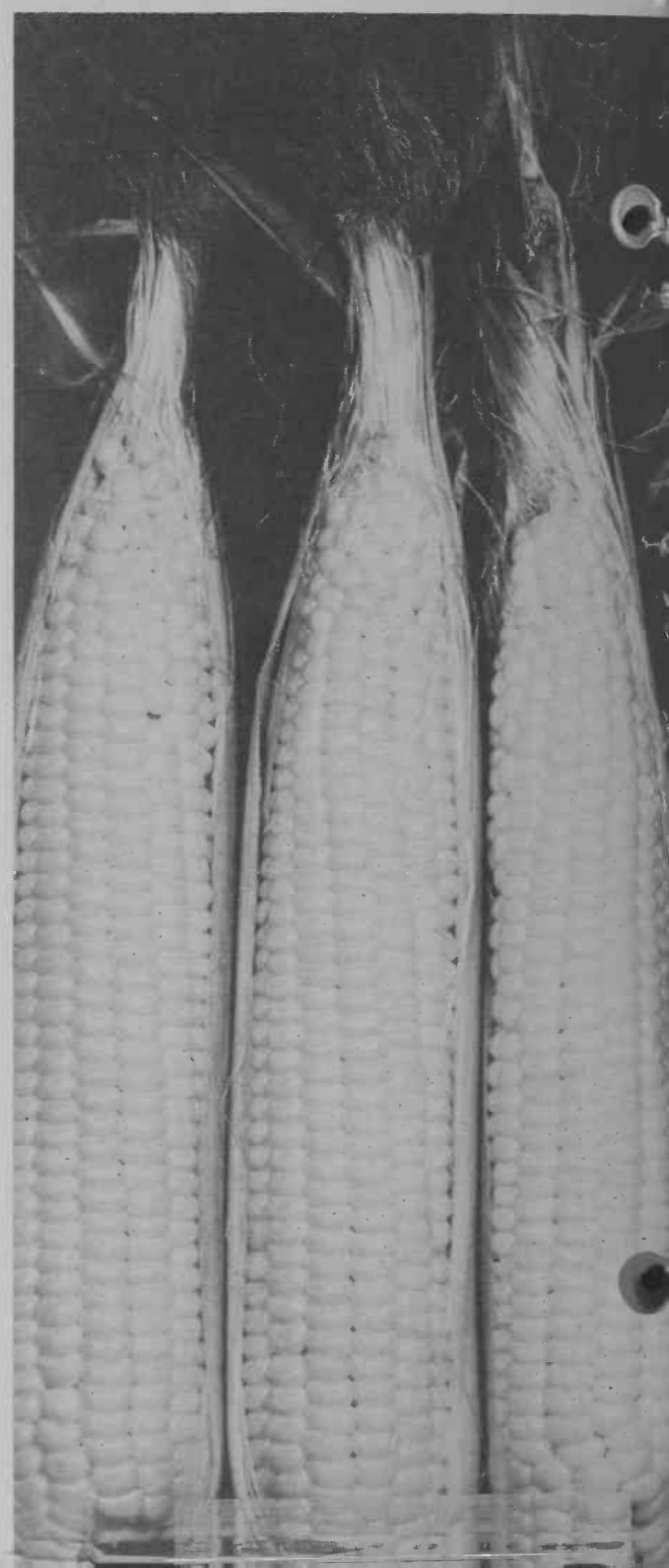
Throughout the storage period, the corn which had been cooled in ice water had the freshest and most attractive husks. The husks of the vacuum-cooled corn were the least attractive because of the loss of moisture during the vacuum cooling process. However, the commercial shipments of sweet corn from Arizona which were vacuum cooled, were received at eastern markets with comments of praise for the high quality of the corn.

At one vacuum-cooling plant in the Salt River Valley, facilities have been installed so that the corn can be sprayed with water before entering the tubes and, therefore, possibly lose less moisture at the expense of the husks during vacuum cooling. During transit, the moisture from the melting ice in the railroad car may also replace some of the moisture lost from the husks.

The hydro-cooled corn was precooled at approximately 1:30 p.m., soon after harvest, and the vacuum-cooled corn was precooled 3½ hours later at approximately 5:00 p.m. Ratings were made at various times during the storage period by a taste panel of 10 persons. The taste panel indicated that the corn precooled soonest after picking was the sweetest, the corn precooled 3½ hours later was second n sweetness, and the corn which received no precooling was the least sweet and by far the poorest in eating quality.

These ratings clearly show the importance of precooling corn as soon as possible after harvest. A delay of several hours can seriously reduce the sugar content, and, therefore, the eating quality of the corn. The vacuum cooling process was found to lower the temperature of corn on the cob to a more desirable lower temperature.

High quality sweet corn produced in the Salt River Valley: new crop for vacuum cooling.



Ranch Day at the University

The University of Arizona Department of Animal Science will conduct the first of what is expected to be an annual RANCH SCHOOL at the campus in Tucson, April 14-15. Professor Ernest B. Stanley, department head, has a program arranged that will feature lectures in the forenoons and demonstrations during the afternoons. Staff members from several departments of the College of Agriculture will participate. Registration will begin about 8 a.m. Thursday, April 14. No special program will be arranged for women, but they are welcome to join the men at the regular sessions.

Home freezer is a handy source of

Hot Rolls

By Fra Clark, School of Home Economics

Gone is the day when college students need to use "miniature" recipes in learning to make yeast rolls. At the University of Arizona School of Home Economics the girls make family-sized batches and store the baked rolls in a home-type freezer for later class use in meal preparation.

Recipes Fit Utensils

There is an advantage in using recipes that fit family-size utensils and of baking all the rolls at one time in the average-sized oven. For the family who enjoy homemade rolls, this may be the practical way to have hot rolls more often during the summer—with the extras stored in the home freezer. The table response might encourage the cook to increase the size of her recipe to the maximum capacity of her equipment to allow for a few more extras to be frozen each baking day.

A sweet-dough recipe such as the following one has been well liked for hot rolls straight from the oven and for freezing. It makes from 18 to 24 rolls depending upon the size and shape. The recipe may be doubled by doubling the amount of each ingredient. (Not true of every recipe.)

Scald ..... ½ cup milk
Stir in ..... ½ cup sugar
1½ teaspoons salt
¼ cup shortening
Cool to lukewarm
Measure into bowl ½ cup warm water
Cool to lukewarm. Sprinkle or crumble 2 packages or cakes of active dry or compressed yeast. Stir until dissolved. Stir in lukewarm milk mixture.

Add 2 eggs beaten and 3 cups sifted enriched all purpose flour.

Beat until smooth.

Stir in additional 2 cups (about) sifted flour.

Turn dough out on lightly floured board. Knead until smooth and elastic. Place in a greased bowl, brush top with melted shortening. Cover with waxed paper and let rise until double in bulk. Punch down and turn out on a lightly floured board. Shape into pan rolls; clover leaf, cinnamon rolls, etc. Place in greased pans, brush with shortening. Cover with waxed paper, let rise in a warm place free from drafts, until double in bulk. Bake in a moderate oven (350°) about 35 minutes.

Quick-freeze Extra Rolls

The extra baked rolls may be "quick frozen" as soon as they are cool. Place them in a covered pan or carton in the coldest section of the home freezer for two to three hours. The frozen rolls may then be packaged for storage in a number of ways. Several methods are shown in the accompanying picture. It is essential that air not be permitted to reach the rolls. Wrap closely with aluminum foil, plastic material, or pack in freezer containers. Seal, label, and store in the freezer.

When rolls are to be used, remove the package and either thaw in the original package at room temperature, allowing about one hour, or in a 250 to 350°F. oven, allowing 15 minutes. The thawed rolls may then be heated about five minutes in a hot oven (400°F.) and served piping hot.

Freezing Storage is Expensive

Freezing storage is expensive storage unless there is a turnover of foods. In experimental work, baked yeast rolls have been stored satisfactorily for 12 months. It is more practical never to store rolls longer than four months, thus releasing freezer storage space for other foods. Once rolls are thawed they stale rapidly after reheating.

A double recipe of hot rolls baked at one time in a home-sized oven. Miss Marilyn Downey, University of Arizona student from Hayden, Arizona, will freeze half the rolls for later use.

Packaging to exclude air and labeling the "quick-frozen" rolls is easily done with plastic sheets or bags, aluminum foil, or special freezer containers.

Fruit measurements and tensiometers can tell you

WHEN To Irrigate Citrus Trees

By R. H. Hilgeman and L. H. Howland
Department of Horticulture

An irrigation experiment now in its seventh year at the Citrus Experiment Station demonstrated that applying five and one-half acre feet per year produced good tree growth and yields, but gradually induced iron chlorosis (yellow leaves with green veins). When, however, only three acre-feet of water were applied per year, tree growth and yield were reduced. Therefore, the problem is to determine not only how much but also just when to irrigate to promote maximum tree growth and yields without causing iron chlorosis.

Wilting Leaves Are No Index

Wilting of the leaves cannot be used as an index, because citrus trees have a deep root system which supplies sufficient water to the tree to prevent wilting even though the tree and fruit growth is restricted. By measuring the circumference of immature fruit with a steel tape at sunrise at 4- to 7-day intervals during the summer, a record of growth can be obtained. When these results are plotted, changes in growth rates can be observed and irrigations applied at intervals to maintain relatively uniform growth. However, if the grower waits until fruit growth is markedly restricted he has delayed too long.

Tensiometer Provide Easy Correlation

Tensiometers have been tested as a method of easily correlating soil moisture with fruit growth. A tensiometer is a hollow porous cup attached by a water-filled tube to a vacuum gauge. As the soil dries, water exudes from the cup into the soil causing a suction force (tension) to develop within the tensiometer which can be measured up to eight-tenths of an atmosphere by the vacuum gauge. This is the equivalent of a column of water about 800 centimeters high and tensions are reported as centimeters of water. Since soil at the wilting point has a tension of about 15 atmospheres, it is necessary to place the cup where the soil is always moist.

The growth of Valencia oranges in relation to the soil moisture tension at a depth of 30 inches was observed under two irrigation programs. Fruit on trees irrigated on July 23, August 13 and September 9 (Figure 1A, solid line) grew uniformly from July 23 to September 2. Soil moisture tensions during this period (Figure 1B, solid line) ranged from 110 immediately after irrigations to 325 prior to the August 13 irrigation, and on September 2. Between September 2 and 9 fruit growth was retarded and soil moisture tensions rose above 325.

Fruit growth was irregular on trees irrigated on June 2, July 23 and September 9 (Figure 1A, dotted line). The

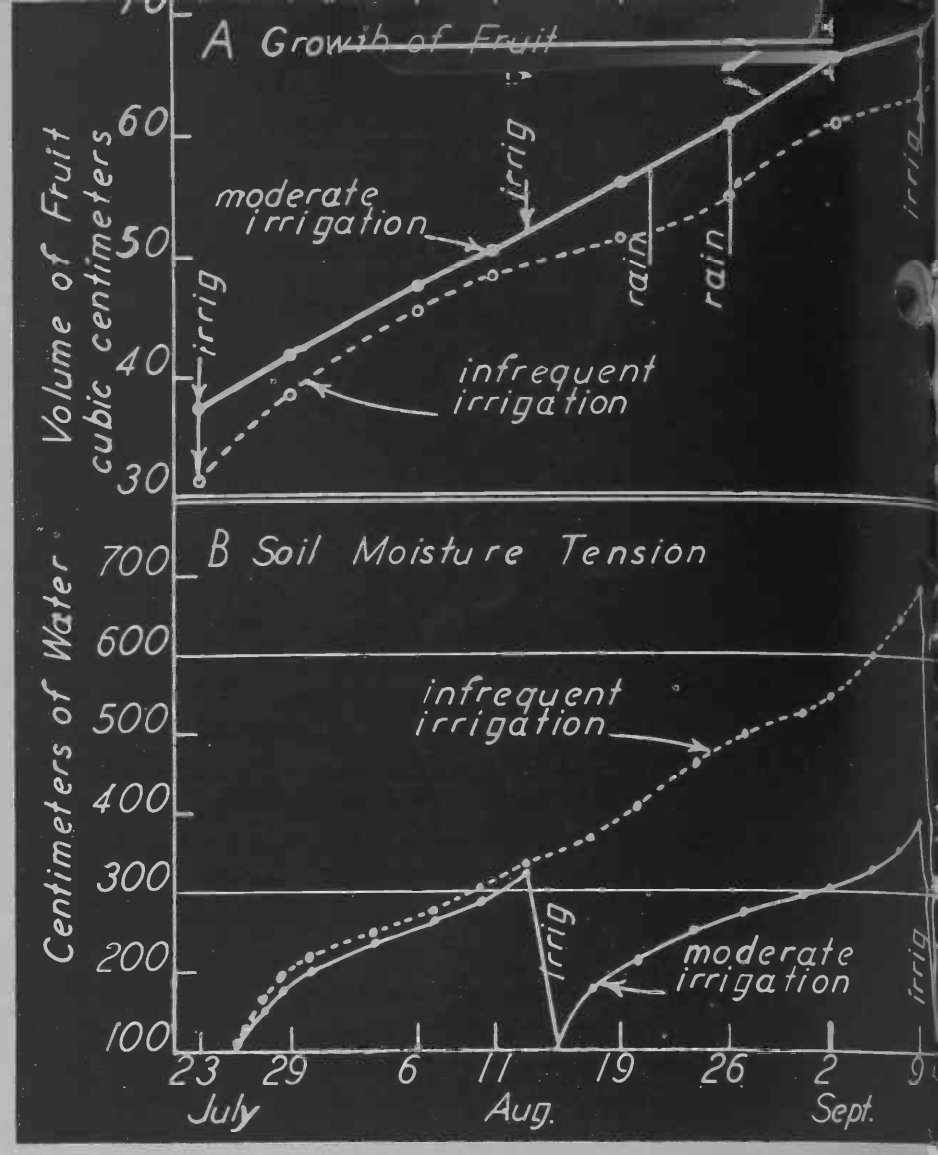


Figure 1.
Relationships between fruit growth and soil moisture tension under two irrigation programs. (Data from University of Arizona Citrus Experiment Station near Tempe, 1954.)

rapid fruit growth between July 23 and 29 indicates the tree was under a moisture stress when irrigated. The reduction in growth between August 11 and 19 reflects the gradual drying of soil below the best level for fruit growth, and is associated with soil moisture tensions above 325. (Figure 1B, dotted line). These stressed fruit responded to the rainfall on August 20 and 26 by a resumption of normal growth, but again grew slowly between September 2 and 9 when the soil moisture tension rose to 700.

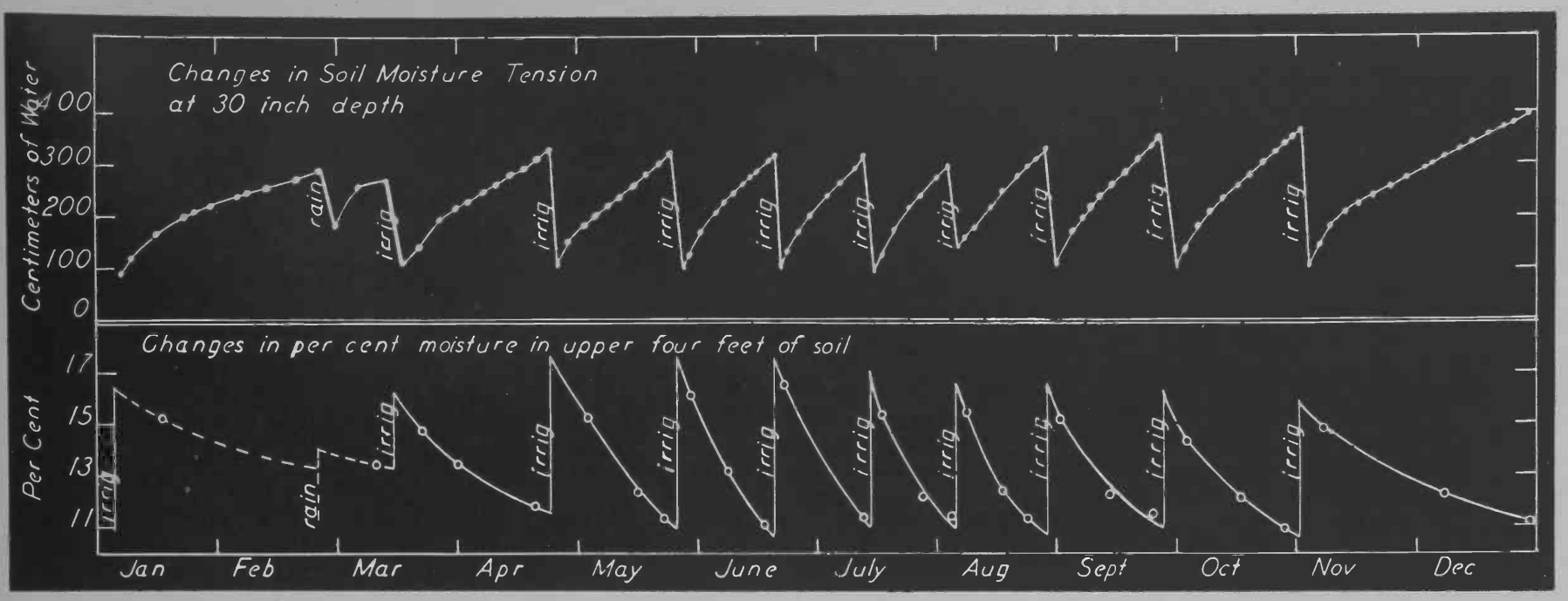
Low Tensions Indicate Wet Soils

Low subsoil moisture tensions of 300 to 350 show that the subsoils are always wet. Such wet caliche subsoils cause iron chlorosis to develop eventually. To overcome this problem in this soil type the subsoil is allowed to dry each year during October.

Correlations of fruit growth with soil moisture tensions vary with soil types and root distribution. In a loam soil in the Mesa district, irrigations applied when tensions at 30 inches deep are between 500 and 600 provide relatively uniform fruit growth. It is probable that such levels are the normal situation which will occur in many groves, but it is necessary to establish a program for each situation.

To establish an irrigation program: first, determine the interval of irrigation from fruit measurements; second, correlate this with tensiometer readings at depths of two and four feet; third, if subsoil tensions are always low in caliche subsoils, provide a drying out period each year.

(See graph on next page)



Seasonal changes in soil moisture tensions in relation to changes in the per cent of soil moisture. Tensions decrease after irrigating when water penetrates to the level of the tensiometer and increase as the soil drys. Tensions of 300-350 are associated with 11-12% average soil moisture in the upper four feet of soil. The irrigation program indicated above provided good fruit production and tree growth. (Data from University of Arizona Citrus Experiment Station near Tempe, 1950.)

Here are Radio and TV programs for farm listening. Be sure to tune in on your local stations.

Cochise County

Wednesday, 6:30 a.m.—KAWT

Coconino County

Tuesday and Friday, 8:15 to 8:20 a.m. —KCLS

Graham County

Saturday, 10:30 a.m.—KGLU

Greenlee County

Saturday, 12:30 p.m.—KCLF

Maricopa County

Monday through Saturday, 6:10 a.m.—KTAR

Sunday, 8:45 a.m.—KOY

Friday, 6:00 p.m.—KTVK, Channel 3, "County Agent Notebook"

Pinal County

Monday through Friday, 6:50 a.m. to 6:55 a.m. (County Agent); 8:50 to 8:53 a.m. (Home Demonstration Agent — KCKY

Yavapai County

Monday, Wednesday, Friday, 8:45 to 8:50 a.m.—KYCA

Yuma County

Monday, Wednesday, Friday, 7:20 a.m. (Western Farm Digest)—KYUM

Tuesday and Thursday, 7:20 a.m. (On the Farm Front)—KYUM

Thursday (TV), 6:15 p.m.—KIVA

Thursday (TV), 7:30 p.m.—KIVA, Channel 11, "Farm Front"

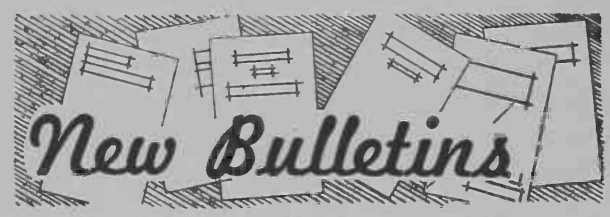
University of Arizona

Saturday, 12:30 to 1:00 p.m. (Arizona Farm and Ranch Hour)—KOY, Phoenix; KTUC, Tucson; KSUN, Bisbee; KYMA, Yuma; KCLS, Flagstaff; KVNC, Winslow; KAWT, Douglas.

Saturday (TV), 5:00 to 5:30 p.m. (Across the Fence) — KVAR, Mesa, Channel 12

HAPPY BIRTHDAY TO US

With this issue, "Progressive Agriculture in Arizona" begins its seventh year of publication. We hope you like the way it brings you information about the three great functions of your College of Agriculture: teaching, research, extension. Would you write us a note giving us the benefit of your opinion?



Agricultural Extension Service

Growing Arizona Cotton, Circular 222

Insects and Diseases of Cotton, Circular 223

4-H Entomology Project, Folder 67

Agricultural Experiment Station

Arizona Agriculture 1955 ,Bulletin 261

Agricultural Credit in Arizona, Bulletin 262

Malathion for the Control of Pests in Southern Arizona, Report 115

Annual Report for the 65th Year

THE COVER PICTURE

Fashion designer Betty Johnson Wickenburg, models a creation of hers called "Desert Magic." The skirt is done in shading: that is, if it is a grey dress, the top tier would be in light grey, the second tier in medium grey, and the bottom tier in dark grey. A similar sequence would follow in any other color.

Gifts *(continued from page 6)*

Department of POULTRY SCIENCE

Chas. Pfizer & Co., Inc. .....100 lbs. Terramycin.
American Cyanamid Company .....400 lbs. Aureomycin
E. I. duPont de Nemours .....10 lbs. Methionine
Lederle Laboratories Division .....750 mg. Acetazoleamide Sodium
The Squibb Institute .....100 mg. Prolactin
Nichols Poultry Farm .....30 dozen New Hampshire hatching eggs
Ghostley's Poultry Farm .....30 dozen White Leghorn hatching eggs
Rothway Cornbelt Hatchery .....100 Hyline pullets
Western Cotton Products Co. .....400 lbs. Cottonseed meal
Buckeye Cotton Oil Co. .....400 lbs. Cottonseed meal
Tucson Tallow Co. .....25 lbs. Stabilized fat

Cotton Is Benefited By Bees

By S. E. McGregor and Frank E. Todd
U.S.D.A. Beekeeping and Insect Pathology Laboratory

Production of Pima S-1 cotton caged with bees has experimentally produced about 25 percent more cotton than Pima S-1 with bees excluded. This increase in production was the result of more bolls being set with more seeds and lint per boll.

Similar tests with A-44 cotton showed no difference in total production, but bolls in the bee cages matured earlier. The first picking from plants in the bee cages was always greater than where bees were excluded, but later pickings offset this gain to even production. The bees help the plant set its maximum load earlier, but under a long flowering season it can eventually produce to its capacity without bees. In areas with a short flowering season, an increase in upland cotton production would probably be obtained with bees.

How Tests Made

These findings were from tests set up like this: Large plastic screen cages, each of which enclosed about 50 cotton plants, were used to exclude bees; and other cages enclosed bees with the cotton plants during the entire flowering period. The bees lived in regular hives in a corner of the cage which they soon learned as home and from which they flew to collect water from the feeders or nectar and pollen from the caged plants.

Bees Affect Flowers

When bees were present in the cages, pollen was scattered thoroughly over the stigma of the flower soon after it opened. By mid-afternoon the upland flower petals would begin to change from white to pink, and both the upland and the Pima S-1 flowers would begin to wither and close.

Flower stigmas from which the bees were excluded remained free of pollen above the anthers and the petals stayed turgid (distended) and unchanged until sunset. A stigma well covered with pollen by mid-morning, and flowers beginning to close, change color or wither by mid-afternoon, are good field guides for determining the presence of plenty of pollinators.

Sometimes honey bees show a preference for the nectar produced on the plant outside of the cotton flower when nectar is also present within. Under such conditions they are of no value as cotton pollinators, unless bees are so abundant that they need this second choice nectar in the cotton blossoms.

Self Polination Not Best

Research workers have shown that continued self-pollination decreased productiveness of many varieties. Assuming that undesirable qualities would not be contribuited by other nearby varieties, planting-seed produced in fields where pollinating insects are abundant should produce more cotton than seed from fields where pollinators are scarce.

Individually, some of the wild bees are highly efficient as pollinators of cotton, but there may not be enough of them. Fortunately, honey bees can be transported and established in any quantity to supplement lack of native pollinators.

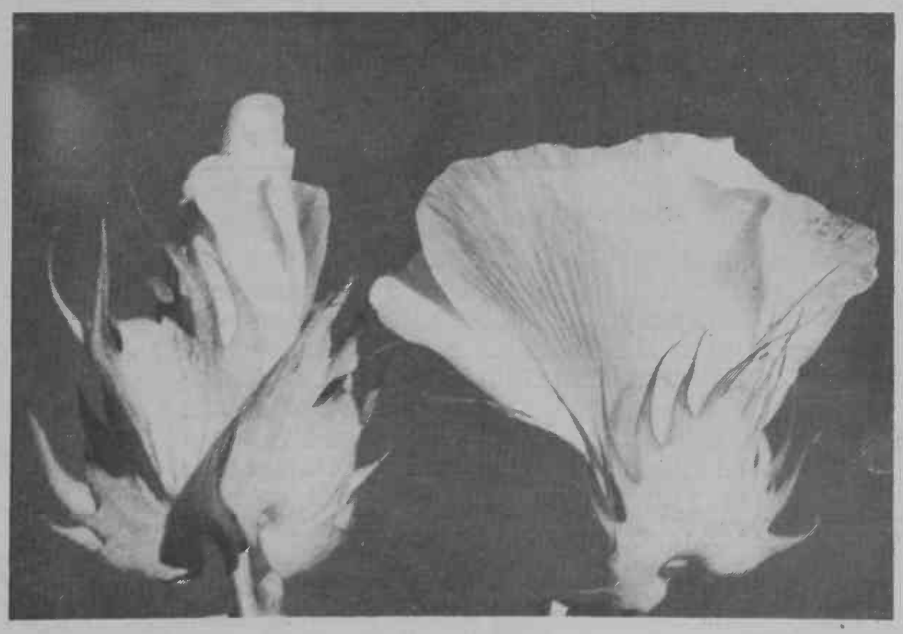
With selection of the right insecticides and the use of proper precautions, harmful insects may be controlled without serious damage to pollinators. Sulfur, toxaphene, DDT and demeton (Systox) will control usual insect pests present on flowering cotton in Arizona. Most other insecticides are too toxic (poisonous) to be used with safety when bees are present.

Watch the Flowers

The effective range from the colony of bees drops sharply beyond one-fourth mile; therefore, the colonies should be placed in or adjacent to the field.* One colony per acre is the rule for many other crops that are benefited by bees and may prove adequate for cotton under most conditions. Frequent examination of the flowers throughout the season will tell whether enough bees are visiting the field.

***Present information does not warrant advising cotton growers to pay rental fees for colonies.**

Bee-visited A-44 flower (closed, pink) and flower from which bees were excluded (open, white). Photo taken midafternoon of day flowers opened.



Bee-visited Pima S-1 flower (wilted, stigma covered with pollen) and flower from which bees were excluded (expanded, stigma bare). Photo taken midafternoon of day flowers opened. (Photo by William Nye, U.S.D.A.)