

PIMA COUNTY, ARIZONA

ANNUAL REPORT

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to
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I N D E X

	Pages
SUMMARY - - - - -	1 - 2
COUNTY SITUATION - - - - -	3 - 4
ORGANIZATION - - - - -	5
PROGRAM PLANNING - - - - -	6
INFORMATION PROGRAM - - - - -	7 - 8
 PROJECTS	
 3. Horticulture	
Deciduous Fruits - - - - -	9 - 11
Ornamental Plantings - - - - -	11 - 12
Vegetables - - - - -	12
 4. Livestock	
Beef Cattle	
Range Management - - - - -	13 - 14
Pen Feeding of Cattle - - - - -	15 - 16
5. Dairy - - - - -	17 - 18
6. Poultry - - - - -	19 - 27
 7. Agronomy	
Cotton	
Fertilization - - - - -	28 - 30
Variety Tests - - - - -	31 - 35
Defoliation - - - - -	36
Insect Control - - - - -	37 - 39
Diseases - - - - -	40 - 42
Cultural Practices - - - - -	43 - 45
Weed Control - - - - -	46 - 47
Lint Improvement - - - - -	48 - 49
Alfalfa - - - - -	50 - 51
Small Grains - - - - -	52
Grain Sorghums - - - - -	53 - 55

	Pages
8. Irrigation - - - - -	56
10. Entomology - - - - -	57
11. Soils - - - - -	58
12. Rural Sociology - - - - -	59
13. Agricultural Economics - - - - -	60 - 61
14. Plant Pathology - - - - -	62

SUMMARY

Organization

The county staff included five different Home Agents and five different Agricultural Agents with a total of 1187 days work. This represents an unusual turn-over and short term employment. Orientation of new Extension workers necessitates considerable time being spent on organization and planning. It is difficult to gain efficiency with short-term employment and high turn-over in personnel. Richard D. Harris conducted a survey on poultry management practices. William F. R. Griffith, III, conducted a crops practices survey. This information is valuable for evaluating Extension work and planning future programs. These two young men were assigned to this office for a short time on a temporary basis.

Relationships with existing farm organizations were continued. These include Farm Bureau, Poultry Association, Cotton Growers Association, Cotton Producers Cooperative, Dairy Herd Improvement Association, and Agricultural Committee of the Chamber of Commerce. An Extension Advisory Committee was organized.

Horticulture

An estimated 1346 residents were given assistance on problems of growing vegetables, fruits, shrubs, flowers, trees, lawns and landscaping.

Cotton

It is estimated that 140 cotton growers were assisted with adopting new practices or improving old ones. These practices included varieties, fertilization, irrigation, land preparation, disease and insect control, harvesting and marketing. Results of cotton research and result demonstrations were included in the information program. A sharp increase in the planting of wilt resistant varieties was noted.

Grain and Forage Crops

It is estimated that 75 growers were assisted in the production of grain and forage crops. Recommendations on varieties, planting rates and dates, fertilization, irrigation, insect and disease control, and cultural methods were included in this work.

Soils and Irrigation

An estimated 250 residents of the county were assisted with soils

SUMMARY (continued)

Soils and Irrigation (continued)

and irrigation problems. Pre-irrigation of cotton land has been adopted 100%, but some growers are not obtaining the desired depth of penetration. Water penetration and pre-irrigation on other crops and ornamentals is being stressed and adoption of these practices is increasing. A reduction in both extremely late and early irrigations is noted again this year.

Livestock

Approximately 150 individuals were assisted with livestock practices. These included selection and breeding, feeding, control of diseases and parasites, and marketing information.

Farm Management

It is estimated that 20 farmers were assisted with farm management practices. These included outlook information, developing an over-all management plan, adjustments in farm operations, obtaining credit and selecting a farm for purchase.

Miscellaneous

Seven hundred and sixty-three individuals were assisted with general feeder and household insects. Thirty-three residents were assisted with control of rodents and predatory animals.

I. COUNTY SITUATION

Pima County has been primarily a range beef cattle production and cotton production county for the past four decades. Pen feeding of cattle has increased sharply during the past five years. Along with an increase in cattle feeding, the production of feed crops has increased.

Cotton acreage has decreased from 52,000 acres before acreage limitations were renewed, to 26,572 acres in 1958. The principal crops replacing the cotton acreage are ensilage and grain crops. Grain sorghums account for the largest volume of feed crops, both ensilage and grain. Barley is the principal small grain crop. While the returns from these feed crops are not very attractive, when grown in conjunction with a cattle feeding program, the returns are much more satisfactory.

Attempts to grow crops such as head lettuce, potatoes, cantaloupes, watermelons, onions, soybeans, castor beans, cauliflower, cabbage, celery, pinto beans and hybrid corn have been made during the past fifteen years. None of these crops have become established as profitable enterprises.

Crop rotation, which includes alfalfa, has been encouraged by the Extension Service. Some growers have favored this type of rotation due primarily to the soil improvement benefits derived from the alfalfa. The Spotted Alfalfa Aphid and Texas Root Rot along with high water requirements are drawbacks to alfalfa growing. The acreage of this soil building crop, and excellent feed crop, increased this year in spite of the handicaps. With the release of an aphid resistant variety of alfalfa developed by the University of Arizona, hopes are riding high for still further increases. A rotation including cotton, alfalfa, grain sorghums and small grains should be a sound cropping system.

Sound crop rotations with improved varieties and cultural practices will be the Extension Service goal for 1959. Green manure cropping will be encouraged, especially Papago Peas where root rot is a problem.

The range cattle business has been prosperous this year and should continue so in 1959. Weather, especially timely rains, along with beef prices greatly controls the prosperity of the range cattle industry. Control of grass damaging insects such as grasshoppers and harvester ants has been one of the County Extension activities. Demonstrations on reseeding, fertilization, and stock water conservation have been carried on by the County staff. The cattle feeding enterprise was financially successful this year. A majority of feeders are using improved feeding practices.

I. COUNTY SITUATION (continued)

Cotton problems, aside from economics, are how to cope with Verticillium Wilt, Texas Root Rot, Nematodes, insects and fertility. Rotation of crops is one of the first weapons to use in combatting these problems. Wilt tolerant varieties will also be of assistance.

Renewed efforts on the adoption of sound fertilization practices on small grains and grain sorghums are planned.

Chemical weed control for Morning Glory, summer grasses, and Johnson Grass in cotton will be emphasized in 1959.

During the past few years the poultry industry has grown to a sizeable enterprise. There are still wide opportunities for expansion. More assistance from the Extension Office to local poultrymen seems desirable.

There are approximately six million acres of land in the county. The 76,000 acres of irrigated land in the county, of which about 68,000 acres are in commercial production, accounts for a major portion of the county's agricultural income. Future expansion of irrigated land in the county is unlikely due to limited underground water, and the expansion of urban development in the Tucson area. Since poultry keeping requires a small amount of land and water, and the population is in the process of rapid growth, the poultry industry can feasibly enjoy rapid expansion.

Estimated Gross Agricultural Income - Pima County, 1958

	<u>Estimated Acres</u>	<u>Estimated Gross Value</u>
Cotton - Long and Short Staple	28,000	\$ 9,200,000.00
Barley and Other Small Grains	9,000	600,000.00
Grain Sorghums	8,000	600,000.00
Alfalfa	3,000	400,000.00
Other Crops, including Truck Crops	4,000	400,000.00
Poultry and Poultry Products, including Turkeys		2,000,000.00
Cattle		6,000,000.00
Dairy		600,000.00
Other Livestock		200,000.00
Total Estimated Gross Value		\$ 20,000,000.00

II. ORGANIZATION

There are two local Farm Bureaus. The local at Sahuarita includes members south of Broadway in Tucson, and the Marana local includes members north of Broadway. Each local meets monthly as does the county Farm Bureau. This year's membership was increased to 250 members.

This organization is stressing public relations and farm policy making, which includes county, state and national policies. Better roads, schools, and other facilities which make for better living are included in the organization's goals. The development of the University of Arizona Marana Farm has received active attention from this organization.

It is through this organization that much of the Extension program in the county is planned and activated. The County Extension Advisory Committee consists of the County President, Mr. Gibson Zeidler; the presidents of the two locals Mr. Art Pacheco of Marana, and Mr. N. J. Peterson of Sahuarita.

The Tucson Chamber of Commerce refers agricultural inquiries to the County Extension Office for action. The Chamber's agricultural pamphlet was revised this year with the assistance of the Pima County Extension Office.

The Pima-Pinal Dairy Herd Improvement Association maintained headquarters in the local Extension Office until this spring. The Pinal County office is the new headquarters and that office compiles the monthly records and sends the monthly news letter to the members. The Pima County Office took care of that assignment during the past twelve years when the Association was organized.

The Southern Arizona Poultry Association promotes better management and marketing practices. The Association holds monthly meetings. All meetings include some educational topic relating to poultry. The Extension Service utilizes the opportunity afforded by this organization to disseminate information on poultry management practices

III. PROGRAM PLANNING

The Pima County Farm Bureau appointed a committee of three members to serve as an Extension Advisory Committee. On the committee for this year are Mr. Arthur Pacheco, president of the Marana Farm Bureau local; Mr. N. J. Peterson, president of the local at Sahuarita; and Mr. Gibson Zeidler, president of the Pima County Farm Bureau. The committee has the prerogative of calling on any farmer, rancher, or poultryman for participation in the program planning. The three members appointed by the County Farm Bureau have been most helpful in the past.

The program is based first on needs, both long and short term problems. The committee and the Agent favor a program flexible enough to take care of emergencies which may occur. An example of emergency activities this year was an alarming infestation of grasshoppers adjacent to the irrigated crop land and to some extent in the planted fields of cotton, small grains and grain sorghums. While the situation was extremely dangerous in the eyes of most growers, a survey of the infestation revealed that the species of grasshoppers were not a serious crop pest and individual control measures on the fringe areas surrounded by desert infestations would take care of the situation. Following the survey, a growers' meeting was held and an expensive mass control program was averted. Mr. Arthur Pacheco headed-up the committee on this emergency detail. Examples of long term problems in the program is crop rotation and Verticillium Wilt control.

A crop survey was made this year which entailed most of the practices pertinent to growing the different principal crops. Another survey was made on poultry production practices. These surveys on practices will be used in considering the county program for next year.

IV. INFORMATION PROGRAM

A. Objective

Disseminating timely agricultural information to farm people and other interested residents is the objective of the information program. Bulletins, circular letters, individual letters, telephone calls, office calls, farm visits, meetings, result demonstrations, newspaper and magazine articles are all used for gaining this objective. Generally, information of the type which patrons need and want is used. It is endeavored to release such information near the season when it is applicable.

B. Facilities and Utilization

1. Daily Newspapers

The Arizona Daily Star and Tucson Citizen are furnished with agricultural information. Also, the Marana Times obtains agricultural articles from this office.

2. Magazines

The Arizona Farmer and Pima County Farmer published agricultural articles from the local Extension Office.

3. Visual Aids

Posters and charts are used to some extent in forwarding information, especially to groups of farmers. Slides and motion picture films are used for dissemination of agricultural information. One of the most important visual aids is the result demonstration. This type of Extension activity is most effective.

4. Circular Letters, Reports & Bulletins

Timely information can frequently be written up in a circular letter. This is very effective if the information is confined to pertinent and timely subjects. In other words, large numbers of indiscriminate subjects may defeat the purpose of the circular letters containing pertinent and timely information.

Reports on progress of result demonstrations, giving pertinent results, are prepared and made available to farmers and ranchers in the county.

IV. INFORMATION PROGRAM (continued)

B. Facilities and Utilization (continued)

4. Circular Letters, Reports & Bulletins (continued)

Bulletins containing usable information are furnished to all interested farmers and ranchers. Other bulletins are kept in stock and many bulletins are displayed for office callers' convenience.

V. PROJECTS

3. Horticulture

A. Deciduous Fruits

Apricot, peach and plum trees are planted most in Pima County. The history of these deciduous fruit plantings is not encouraging for commercial fruit growing. The longevity of these trees has been rather short. Root rot, nematodes, and hot summers with a short period of dormancy are contributing factors to the short life of deciduous fruit trees.

Varieties more adaptable to the area have been determined by the University of Arizona Horticulture Department. Also, Mr. W. T. Dudgeon established an orchard about ten years ago, in which he planted 90 different varieties. Mr. Harvey Tate, University of Arizona Extension Specialist in Horticulture, and the Agent took an active interest in this experimental planting. This orchard was used for demonstrating meetings for several years, until Mr. Dudgeon sold his orchard. Recommended cultural practices such as irrigation, pruning, thinning, fertilization and good ground cover during hot weather were put into practice and used for demonstration purposes. This created a great deal of interest for establishing home orchards in the county. A home orchard pamphlet prepared by Mr. Tate and the Agent is kept up-to-date as to varieties, etc. This is distributed to interested parties in the county. Home fruit orchards in the county have increased materially during the past decade.

Many office and telephone calls are received in relation to home fruit orchards. Mr. Tate's assistance in this project is invaluable. Dr. J. N. Roney, Extension Entomologist for the University of Arizona, has published a bulletin on control of fruit insects which is very helpful.

The orchard established by Mr. Dudgeon and used as a demonstration orchard was sold to Mr. Robert W. McMurtray. Three of the important orchard management practices were inadvertently omitted by Mr. McMurtray. These practices were deep water penetration, maintaining ground cover during hot weather and nitrogen fertilization. When Mr. McMurtray called on the Agent for assistance, the trees were in very poor condition, showing a great amount of chlorosis and die-back. When the practices being used were revealed it was strongly indicated that these practices could be responsible for the orchard.

Dr. J. R. Kuykendall of the University of Arizona Horticulture Department was invited to assist in the chlorosis problem in the

V. PROJECTS (continued)

3. Horticulture (continued)

A. Deciduous Fruits (continued)

McMurtray orchard. The following iron treatments were applied July 26, to severely chlorotic Kim Elberta peach trees in the orchard:

Row 32 - Tree 7 --	1 lb. Sequestrene 330 Fe
" 6 --	2/3 lb. Sequestrene 138 Fe
" 5 --	3 lb. Versenol on vermiculite
" 4 --	5 lb. Leffingwell Vitatone Stabilized Iron

Row 31 - Tree 7 -- 1/3 lb. Sequestrene 138 Fe

Materials were broadcast on soil on each side of trees and lightly raked into soil. It is our understanding that the trees will be irrigated on July 26. Photographs were made of trees prior to treatment.

The treated trees inspected on August 12, showed a slight recovery from the chlorotic condition. Tree number 7 on row 31, treated with 1/3 lb. Sequestrene 138 Fe, showed the most improvement.

Mr. Allan Halderman, Extension Irrigation Specialist for the University of Arizona, went over the water penetration problem in the orchard later in August. The irrigation on July 26, made after the iron chelate treatments had given better water penetration but moisture probing in several areas in the orchard showed the penetration still inadequate. Since it was impossible to account for the disappearance of the water in relation to the amount of water supposedly delivered and applied to the orchard, Mr. Halderman recommended the construction of a wier with which to measure the actual amount of water applied with each irrigation. Mr. Halderman drew up a special set of plans to especially fit Mr. McMurtray's need. After another irrigation in September, the chlorosis symptoms had largely disappeared without the help of iron chelates.

The orchard is to be irrigated and fertilized properly and a summer cover crop grown so as to keep the soil at lower temperatures. The work on this orchard should continue to be of value to all residents in the area who are growing deciduous fruit trees.

The root rot in deciduous fruit plantings was still active during September. Control measures were outlined for five residents. Heavy ammonium sulfate applications and build-up of organic material are

V. PROJECTS (continued)

3. Horticulture (continued)

A. Deciduous Fruits (continued)

the principal methods of combatting this disease. Mr. Orville Shields has demonstrated the use of composted chicken manure for successful root rot control in his deciduous fruit orchard. Mr. Shields' method consists of three-foot post holes on four corners of each tree, right at the tree drip. He fills about two feet of the hole with the manure and the top one foot with soil. The results of this treatment are outstanding. Mr. Shields plans to come back with four more manured holes per tree, staggered with the other four holes and nearer to the tree.

This year's peach crop was severely damaged by the Peach Twig Borer. Since the infestation of the insect was not discovered until the fruit was ripening, there was no way of combatting the fruit damaging insect. Information on the control of the Peach Twig Borer should be given to orchard owners in advance of the bud stage next spring, for that is the only time when insecticides can be applied to control this insect.

Mr. Barry Freeman, Assistant County Agent, held five pruning demonstration meetings. Mr. Tate assisted Mr. Freeman by working with him at the first meeting.

B. Ornamental Plantings

This office has many calls regarding ornamental plantings, establishing and maintaining lawns. Insect problems and disease problems are frequent subjects of these calls. The insect control bulletins published by Dr. J. N. Roney, Extension Entomologist for the University of Arizona, which cover insect control on ornamentals is very helpful in answering questions on insect damage. The several bulletins on ornamental plantings published by Mr. Harvey Tate, Extension Horticulturist for the University of Arizona, are very valuable in assisting county residents with their ornamental plantings. The Lawn bulletin published by Mr. Steve Fazio of the University of Arizona Horticulture Department, is widely used and serves the home owners well. The Landscaping bulletin published by Mr. Joseph Folkner of the University of Arizona Horticulture Department, has been of great help in assisting county residents with their ornamental plantings.

Mr. Barry Freeman held five ornamental pruning demonstrations in January and February. Mr. Tate assisted Mr. Freeman in setting-up

V. PROJECTS (continued)

3. Horticulture (continued)

B. Ornamental Plantings (continued)

the demonstrations. These meetings were well attended by appreciative audiences.

C. Vegetables

While several attempts to establish different vegetable growing enterprises on a commercial basis were made during the past two decades, none have succeeded to the point of being a permanent crop.

Plantings of cantaloupes were made this spring by five growers amounting to 300 acres. Two growers succeeded in growing fine crops of excellent quality. The cantaloupes matured about ten days too late to enjoy a profitable market.

Dr. Roney and the Agent assisted the growers with some insect control problems, mainly lygus. Control measures were very effective. Another problem the growers faced was bed forming. The bed shapers that the growers borrowed made beds too narrow and with too little slope. Partially due to poor bed shape and inadequate subbing of irrigation water, a salt line was noted in many places right at the base of the plants. By having more side slope on the beds and running water just a little longer, the salt line could be raised above the plant line where it should be for the welfare of the plants. This year's experience has encouraged these growers to enlarge their trial plantings to an acreage that will facilitate an economic packing shed operation.

Many calls are received concerning home garden problems. Mr. Tate's Arizona Home Gardening circular is invaluable for assistance to home gardeners. Dr. Roney's vegetable insect bulletin is also of great help.

Mr. Freeman assisted the city of Tucson Prison Farm in setting-up a more efficient vegetable gardening program.

V. PROJECTS (continued)

4. Livestock

A. Beef Cattle

(1) Range Management

The range cattle business is one of the principal agricultural enterprises in the county. Extensive project work on range management has not been carried on due to inadequate man power and facilities. Since the success of raising cattle on range land depends largely on grass, cattlemen are most receptive to practices that will preserve and improve the growth of grass. Range grass re-seeding projects have been carried during the past several years with very little success. Water spreading, tank building, and erosion control are other projects carried on by the Pima County Agent's Office in past years.

During recent years the work on range management has consisted of disseminating information on control of external parasites, disease control, poisonous weeds on range land, control of the Harvester Ant, control of grasshoppers, and nitrogen fertilization of range grasses. Bulletins, circular letters, result and method demonstrations, meetings and personal contacts have been used in furthering this work.

The nitrogen fertilization plots were put out on the strength of success of this practice in Colorado and California. The initial trials, made in cooperation with Mr. Karl Ronstadt in 1955, were very interesting and encouraging. The response of the grama grasses to nitrogen was about all anyone could expect. The rainy season was excellent. There were successive rains all through July and August. This summer, being very dry, similar plots gave almost negative results. Range grass fertilization, like range grass re-seeding, must have successive rains to be successful. Cattlemen remark that when there is adequate rain we don't need the extra feed from nitrogen fertilization.

Grasshoppers appear in large enough numbers to do real damage to range grasses. The populations are heavy enough some years to cause great damage to the range feed. It is for this reason that the Agent makes yearly checks during the usual hatching season so as to be able to assist ranchers with an organized control program when it becomes necessary. Letters on the subject are sent each year to all cattlemen. The letters are timed with the usual hatching season and give directions for cleaning up "hot spots," or heavy hatching grounds. This can be accomplished with a regular cattle spray rig, using a water emulsion of Aldrin, provided the terrain will permit.

V. PROJECTS (continued)

4. Livestock (continued)

A. Beef Cattle (continued)

(1) Range Management (continued)

A large scale grasshopper control program was carried on in 1949 and again in 1956. Cattlemen, in general, believe that a mass control program in a heavily infested area is good insurance against large populations during the following years. Surveys of grasshopper infestations have loaned strength to this belief. The individual control measures on hatching grounds help to keep down population build-up. While there was a threatening infestation in 1957, there were no serious developments and large scale control operations were not necessary. The Ranchers Control Committee was active, however, and cattlemen were ready to launch a mass control program. There was no threat of a serious infestation this year.

Supplemental feeding of range cattle is now a common practice with practically all cattlemen. It is believed, however, that more extensive supplemental feeding would be profitable at present beef and cottonseed meal prices. Cattlemen, who have increased their supplemental feeding, claim that it pays off in better calf crops and heavier calves. The County Agent's Office has encouraged heavier supplemental feeding.

Mr. Albert Lane, Extension Livestock Specialist for the University of Arizona, and Mr. Barry Freeman have established some demonstration projects on production testing. This entails considerable record-keeping. The following procedure is followed: (1) During the calving season, keep a close watch on your cow herd and record the birth dates of each calf; (2) By the use of ear tags (or other methods), identify each calf and its dam; (3) After weaning, record the calf's weight and at the same time, field grade the calf numerically. That is, on the basis of beef conformation and potential feeding ability, grade the calf on a basis of one to ten -- one being the best grade, ten the poorest. After calves are weighed, adjust their weight to a uniform age, sex, and age of dam; (4) After combining adjusted weight and grade, cull the cows that are producing off-type calves and light weight calves; (5) Keep heavier, typy heifers for replacements; (6) Use only bulls of known performance. This production testing program does not start bearing fruit until the third year or so after its inception in the herd. The results will be written up and used to further promote this type of selection program.

V. PROJECTS (continued)

4. Livestock (continued)

A. Beef Cattle (continued)

(2) Pen Feeding of Cattle

Cattle feeding in the county has been materially increased during the past five years. The feeding operations are mainly in the hands of experienced feeders. A large portion of the feeds used are produced on the cattle feeder's farm. The Extension program has been geared more to increasing the yields of grains and forage crops rather than to the actual art of feeding.

The Assistant Agent, Mr. Barry Freeman, cooperated with the University of Arizona Extension Livestock Specialist in setting-up a result demonstration on implanting stilbestrol in steers on feed. The following is the plan of the project as outlined by Mr. Lane.

Purpose: This trial was established to check comparative gains between steers implanted with stilbestrol (24 mg. per head) and steers receiving no implant. Furthermore, the cattle will be slaughtered and an evaluation made of the carcass grades and the meat quality.

Fifteen steers were implanted and were identified with green plastic ear tags. Their average weight -- 621 pounds. There were 14 control steers in the same pen, identified with white ear tags. Their average weight -- 649 pounds. These steers will be fed for a minimum of 120 days, then will be slaughtered and processed at the Harbour Meat Co.

(Table of individual weights, etc., on following page)

V. PROJECTS (continued)

4. Livestock (continued)

A. Beef Cattle (continued)

(2) Pen Feeding of Cattle (continued)

Following are the individual starting weights and numbers of the steers in the trial:

24 mg. Implant		Control	
No.	Weight	No.	Weight
18	580	16	575
19	610	17	655
20	680	18	730
21	680	19*	570
22*	625	20*	605
23	640	21	700
24*	505	22	710
25*	610	23	585
26*	625	24*	600
27	625	25	615
28	605	26	655
29	620	27	675
30**	630	28	620
31*	590	29	No Weight
32	695	30	790

These cattle were all shrunk 4% at the beginning of the trial. Their next individual weight will be carcass weight.

* These are poor quality steers and would not be graded as choice feeders.

** Crossbred steer

There has been considerable interest shown by cattle feeders in the use of tallow in their feeding operations. Tallow has a twofold effect; it reduces dust up to 6% and increases intake of energy as much as 1½%. Mr. Barry Freeman, Assistant Agent, and Mr. Ted Welchert, Extension Agricultural Engineer for the University of Arizona, worked with the Harris Ranches and Farmers Investment Company feed lot operators in making improvements in their tallow heating systems. The objective is to establish the use of a cheap, safe, easily constructed type of tallow heating apparatus for use with average sized feed mills.

V. PROJECTS (continued)

5. Dairy

Each year the amount of milk produced locally in proportion to the amount of milk hauled in from outside the county has become less. With a rapid increase in population in the county, the number of dairy cows decreased this year.

One of the main problems facing local dairymen is feed prices. The Extension Service has endeavored to point the way to greater and more economical feed production during the past ten years. The use of commercial nitrogen fertilizer on pastures and grain crops has been demonstrated during the past years. Warble or Cattle Grub control demonstrations were conducted. The County Agent's Office has cooperated with local dairymen in dairy herd improvement work for the past thirty-two years.

The Pima-Pinal Dairy Herd Improvement Association maintained a close relationship with the local County Agent's Office from the time it was organized until this year. All records and business of the Association were handled within the local office. This gave the local Agent a close contact with the dairymen, since monthly reports with a news letter were prepared by the Agent for the dairymen. The Agent was relieved of this responsibility during a protracted illness during the past year. It was well to have the local County Agent's Office relieved of the routine work, but it does necessitate a new method of approach in the matter of being of assistance to the dairymen.

The following summary of the Dairy Herd Improvement Association's work was prepared by Mr. Ralph Van Sant, Extension Dairy Specialist for the University of Arizona.

(Summary on following page)

V. PROJECTS (continued)

5. Dairy (continued)

The Pima-Pinal Dairy Herd Improvement Association has completed another successful year. Here are the herd summary records comparing the past four years.

ANNUAL AVERAGES

Pima-Pinal Counties D.H.I.A.

	1955	1956	1957	1958
Average number of herds on test per month	19.1	19.9	19.3	22.8
Number of herds reporting	20	20	20	22
Number of cow years reporting	1,667	1,616	1,729	2,058
Average milk	9,428	9,922	10,539	10,136
Average fat	344.3	360.0	388.7	370.8
Number of cows sold or culled	446	445	491	491

Progress in the improvement of dairy herds cannot be judged in year-to-year comparisons. Glancing back to 1947, the first year of operation of the two-county D.H.I.A., it is noted that there were only nine herds reporting; the average milk production was 9,072 lb. and butterfat 353.4 lb. With an increased number of herds and number of cows on test, the average production has increased substantially during the eleven years of the Association's work.

V. PROJECTS (continued)

6. Poultry

The poultry industry in Pima County continued on a fairly even keel during the past year. There is room for expansion in poultry raising, especially egg production. Local demand for eggs still greatly exceeds local production. Through the efforts of local poultrymen working in an association known as the "Southern Arizona Poultry Association," a premium on fresh local eggs is realized. It is believed that this premium on eggs offsets the disadvantage of the higher-than-average feed prices. Loss of production during the hot summer season is also somewhat offset by the favorable weather conditions during winter months. The disease problem is somewhat less serious in this dry climate than in areas with high humidity. The poultry industry, in general, has an "in and out" history. Many ill-adapted and under-financed poultrymen have come and gone. The County Agent's Office has a duty to perform in this respect, since each year many prospective poultrymen call for advice on starting in the poultry business. Many of these callers are discouraged when the facts are presented. In spite of the hazards in the poultry industry, it is holding steady in Pima County.

Expansion of the poultry business has been by a few commercial sized flock owners. This type of expansion has been advocated by Mr. Ralph Van Sant, Extension Poultry Specialist for the University of Arizona, and Dr. Michael Pasvogel, Head of the University of Arizona Poultry Department. The efficiency is so much greater in large unit operations. The pamphlet published by Mr. Van Sant, which portrays the costs involved in establishing a laying flock, and the returns which should be expected, is an excellent guide for new prospective poultrymen. Influencing under-financed and ill-adapted people to "look before leaping," not only helps the people who find they are not in a position to go into the poultry business, but also is a benefit to the local poultry industry. Failure in a business is not healthy for that particular business. The trend toward large flocks is cutting down the failures in the local poultry industry.

The poultry Extension program in the county has not been a well organized project. Bulletins and other pertinent information on poultry are furnished to the poultrymen. Some assistance in disease and parasite control has been given to individual poultrymen. Demonstrations on culling, lice and mite control, and pullorum testing has been given. The Agent and the Poultry Specialist along with the University of Arizona Poultry Department staff, have taken an active part in the functions of the Poultry Association. A poultry management problem is scheduled for discussion at each monthly meeting. The Extension staff and Experiment Station Poultry Department staff are most active in these meeting

V. PROJECTS (continued)

6. Poultry (continued)

programs. This affords a splendid opportunity to advance improved poultry management practices.

The University of Arizona Poultry Department, in cooperation with Mr. Van Sant and the Agent, prepared a comprehensive survey questionnaire on poultry management practices. Mr. Richard Harris, who was assigned to this office for a short time last spring, was assigned to the survey project. Mr. Harris did a splendid job of contacting local poultrymen and tabulating the information outlined in the survey. It is believed that the conduction of this survey alerted poultrymen to some of their practices which could well be profitably improved. This should be followed up with individual poultrymen. It forms a sound basis for a definite poultry management program in the county. The Agent used one of the Association's meetings to present the general results of the survey.

The following represents a summary of the survey as presented to the Poultry Association:

The average poultryman has been in the poultry business $10\frac{1}{2}$ years; $8\frac{1}{2}$ years in Arizona.

500 layers, or more, included in survey

52 flock owners contacted

30 floor operators 170,624 layers

22 cage operators 76,705 "

Total 247,329 layers

The small flocks, under 500, would probably bring the total up to near 300,000 layers.

The 1954 census reported 168,577 layers for Pima County.

67,000 turkeys are being raised currently.

V. PROJECTS (continued)

6. Poultry (continued)

BROODER HOUSE CAPACITY (Average)

Floor Operation	4,280
Cage Operation	954

GROWER HOUSE CAPACITY (Average)

Floor Operation	5,836
Cage Operation	1,425

PHYSICAL PLANT

	<u>Cage</u>	<u>Floor</u>
Average number of houses	3.1	4.2
Average size house (W x L)	32 x 103	31 x 128
Average number of units per house		3.4
Average number cages per row	125	
Average number double rows of cages per house	4.1	
Average number single rows of cages per house	2.5	
Average amount of floor space per layer		2.20 sq.ft.
Average number nests per 100 birds(individual)		16.6
Average number nests per 100 birds (community)		1
Average amount of roost space per 100 birds		19.1 ft.
Average space between roosts		13.1 inch
Average feeder space per 100 birds (automatic)		26.8 ft.
Average feeder space per 100 birds (hand)		21.8 ft.
Average water space per 100 birds (automatic)		6.7 ft.
Average water space per 100 birds (trough)		8.3 ft.
Average number of lights per house	22	7.7
Average size watt of bulbs	50	52
Average floor space per bulb	262 sq.ft.	428.4 sq.ft.

Miscellaneous Layer House Information

All flocks kept in cages have dirt floors, and 22 of the 30 floor flocks have dirt floors.

Half of the floor flock houses run East and West, and half North and South.

V. PROJECTS (continued)

6. Poultry (continued)

Miscellaneous Layer House Information (continued)

Ten cage houses run East and West, and 13 North and South.

There were only ten poultry farms having vegetation surrounding the houses; 42 of the plants did not have trees, grass or shrubs.

Twenty-four floor, flock owners had gable roofed houses; five had shed roofs; and 2 had both types.

All cage houses were gabled roofed, except one that was flat.

Feeders

Automatic feeders were used by 12 floor, flock owners; and 16 floor flocks were fed by hand. Only one cage operator used an automatic feeder.

Waterers

2 floor flocks have automatic waterers.
17 have trough waterers, and 11 have fountains.
14 cage operators use running V troughs; 5 use trough and float waterers; the others use dew drop and heart cup waterers.

Lighting

Flourescent

3 floor
4 cage

Incadescent

27
18

Lighting Programs

	<u>Floor</u>	<u>Cage</u>
Morning	13	6
Evening	3	4
Both evening and morning	3	10
All night	5	1

V. PROJECTS (continued)

6. Poultry (continued)

COOLING of HOUSES

	<u>Floor</u>	<u>Cage</u>
Fogger system	19	1
Roof sprinklers	4	10
Evaporative		6

BROODING PROGRAM

	<u>Floor</u>	<u>Cage</u>	<u>Total</u>
Arizona chicks	21	19	40
Out-of-state chicks	15	11	26
Straight run chicks			2
Started pullets			6
Average brood per year	3.3	5.0	
Gas brooders	14	2	
Oil brooders	4	2	
Infra-red lamps	4		
Electric brooders	3	13	

Favorite litter is shavings, first; and cane pulp, second. Half of the brooder houses have dirt floors and half have concrete.

Most poultrymen use wire guards around brooder when chicks are first started. Some use paper and metal guards.

Seven poultrymen who start chicks on wire, use a battery brooder and four use a heated area with a run.

V. PROJECTS (continued)

6. Poultry (continued)

FEEDING PROGRAM

Chicks

Mash - 37
 Crumbles - 13

Laying Flocks

	<u>Floor</u>	<u>Cage</u>	<u>All</u>
Mash	14	7	
Crumbles	7	8	
Pellets	9	7	
Bulk Storage	20	18	
Oyster Shell	23	14	
Grit	18	7	
Mix own feed			3

DISEASE and SANITATION

	<u>Floor</u>	<u>Cage</u>	<u>Ave.</u>
Vaccinate for Bronchitis	13	8	
" " Newcastle	21	16	
" " Fowl Pox	23	15	
" " Laryngotracheitis	2	1	
No vaccination	3	3	
Debeaking	22	11	
Disposal pits for dead birds	7	7	
Cremate, bury, or carried away by garbage truck	23	15	
Droppings removed per yr.			11
Clean out between groups of layers	23		
Stir litter occasionally	8		
Use bait for fly control	10	14	1
Spray	5	14	
Dust	4	6	
Mechanical	1	2	

V. PROJECTS (continued)

6. Poultry (continued)

MARKETING PROGRAM

Sell to Processing Plants	- 18
Process their eggs & sell to wholesaler	- 27
Process and retail	- 22

PROCESSING & CARE of EGGS

	<u>Floor</u>	<u>Cage</u>
Wash all their eggs	12	11
Wash only dirty eggs	12	9
Dry-clean their eggs	2	
Hand-washing		14
Mechanical egg washer		6
Refrigerated storage	12	13
Evaporative cooling	4	5
Use refrigerators	3	2
Times daily that eggs are gathered	3.3	2.2
Times marketed per week	3.2	4.2

LABOR

Poultry with cages have average of 1.1 employees
 Poultry with floor operation have average of 1.3 employees

FINANCE & CREDIT

	<u>Floor</u>	<u>Cage</u>
Financed construction of plant	7	6
Use credit with feed dealer and/or hatchery	5	4

SUMMARY:

1. Egg production in Tucson area on upgrade. Probably most important county in the State -- poultrywise.
2. Larger flocks -- this means more efficiency.
3. Management practices are, in the aggregate, very good.

V. PROJECTS (continued)

6. Poultry (continued)

It is interesting to note that the survey shows that two floor operators account for over 50% of the total birds kept on floors. Also, that three cage operators had over 40% of the total layers kept in cages. This indicates that the majority of commercial flock owners may expand their operations to an advantage.

The average amount of floor space per bird is 2.2 sq.ft. compared to a minimum of 2.5 sq.ft. and a desirable 3 sq.ft. per layer. This indicates over-crowding in several operations.

The number of nests per 100 layers seems adequate, in the aggregate, but some operations need more nests for efficiency.

The survey shows a drastic shortage of roost space per 100 layers but only a slight fault on distance between roosts.

The average feeder space for both automatic feeders and hand feeders, averages less than the recommended space.

The drinking space for both automatic and trough type averages entirely too low. This is a most important practice during summer months. Only two floor operators use automatic waterers. Where cool water can be obtained by this type of waterer, it is particularly advantageous during hot weather.

Twenty-four floor operators and twenty-one cage operators were using lights in their houses. This leaves seven of the commercial poultrymen not using lights.

Forty poultrymen use some kind of cooling for their laying houses. The fogger system was most popular, followed by roof sprinklers; six cage operators used evaporative coolers. The efficiency, economy, and results of the different methods of cooling should receive a great deal of attention.

The disease and insect control shows an excellent compliance to recommended practices. Dr. J. W. Pistor, Animal Pathologist for the University of Arizona, has cooperated with this office in promoting sound practices in disease control and sanitation. For many years Dr. Pistor took over one or two Association meetings' programs each year for the purpose of informing poultrymen on disease control and sanitation. These programs included clinics, as well as discussions. The Poultry Disease bulletin published by Dr. Pistor has been of real assistance to poultrymen.

V. PROJECTS (continued)

6. Poultry (continued)

The Agent had two of the Association's meeting programs this year. One program was devoted to a report on the survey, with Dr. Pasvogel giving recommended practices for each practice reported in the survey. The comparison between recommended practices and the average of the practices reported by poultrymen in the survey, stimulated considerable worthwhile discussions by the members present. The other meeting was devoted to sanitation and fly control.

V. PROJECTS (continued)

7. Agronomy

A. Cotton

Cotton is the major crop in the county. The income from cotton growing has exceeded all other agricultural enterprises in the county since about 1950. During the period from 1944 to 1952, the acreage of cotton trebled. The year before acreage controls were re-activated the cotton acreage had increased to about 52,000 acres. The steady decrease in the county's cotton acreage allotment has cut the acreage to 25,639 acres, or, cut it in half since the re-activation of controls.

Yields were sharply increased with the adoption of fertilization practices, varietal improvements, insect control, and irrigation practices. About the time the county average yield reached the two bale mark, a new hazard overtook the cotton grower. This hazard is Verticillium Wilt. Although this cotton disease was discovered in a few fields in the early 1940's, it didn't become prevalent throughout the county until 1953. Then in 1955, the growing season was abnormally cool and Verticillium Wilt was severe in many fields, especially on the heavy type soils. Several fields that had been producing two bales per acre or more gave yields of as low as 1/2 bale per acre.

(1) Cotton Fertilization

Fertilization of cotton in the county started in 1946, with a few growers cooperating with the County Agent in conducting test demonstration plots. During the first three years of demonstration work on cotton fertilization, the Agent and cooperating growers were handicapped by the lack of satisfactory equipment for applying commercial fertilizer to cotton. Many successful demonstration plots were even put out by hand. During the eleven year period, 1946 to 1956 inclusive, many demonstrations were conducted throughout the county. Increased yields from the best treatments in these demonstration plots ranged from 30% to an extreme high of about 800% on long staple cotton, while the percentage increases on the short staple fertilization plots ranged from about 400% to no results.

It is estimated that the average increase of all of the demonstration plots conducted on short staple cotton fertilization was about 30%. The most efficient application of fertilizer on cotton has been 100 pounds of actual nitrogen in a majority of the test demonstrations. In many cases the addition of phosphates to the nitrogen

V. PROJECTS (continued)

7. Agronomy (continued)

A. Cotton (continued)

(1) Cotton Fertilization (continued)

application resulted in earlier maturity and in a few tests the yield was slightly increased by the nitrogen and phosphate application, as compared to straight nitrogen treatment using the same number of units.

The first few years when growers had adopted the practice of cotton fertilization there was considerable sales pressure for high priced mixed fertilizers. Since many growers were buying these expensive mixes, it was expedient to conduct demonstrations comparing the commercial mixes with equal amounts of plant food in the form of simples. Six growers cooperated in these tests to demonstrate that the "simples" gave equal results to the more expensive commercial mixes.

Recommendations on fertilization practices to cotton growers have been flexible, but centers around a total nitrogen application of 100 units. The nitrogen requirement on different soils varies widely; the lighter soils generally need greater amounts than the heavier soils. Split applications of nitrogen are especially advocated for the lighter soils. Only growers who know that cotton responds to phosphates, and who can realize the advantages of early maturity are advised to include phosphates in their fertilization program. Information on all test demonstrations has been mimeographed and copies furnished to all growers. Results have been discussed with individual growers and at meetings.

Now that the cotton fertilization practice has been adopted almost 100%, it develops that Verticillium Wilt reduces the effect of cotton fertilization. In fact demonstration tests in 1955, showed no increase in yield from fertilization and the wilt symptoms were more severe on the fertilized plots than on the checks or unfertilized plots. Research being carried on by the University of Arizona is showing the same results from fertilization on severely wilt infested cotton.

County growers have been alerted to this situation but haven't fully realized the impact of it. Several growers have remarked to the Agent that there must be something wrong with the fertilizer

V. PROJECTS (continued)

7. Agronomy (continued)

A. Cotton (continued)

(1) Cotton Fertilization (continued)

they used this year because the crop didn't appear to give the response that it had in former years. Everyone of these growers had considerable wilt this year. It is evident that more demonstration work on cotton fertilization with emphasis on its behavior under different degrees of Verticillium Wilt conditions should be done. Growers have been urged to check on their cotton fertilization results by leaving unfertilized strips in their fields. This is even more important with the wilt complex of fertilization to consider.

Following are the results of a field crops survey made this spring. This includes 80 farms of most commercial importance and includes 75 cotton farms.

Cotton Fertilization

<u>% Growers Using Fert. on Cotton</u>	<u>Av. Units of Nitrogen per Acre</u>	<u>% Growers Using Urea</u>	<u>% Growers Using Potash</u>	<u>% Growers Using Phosphates</u>	<u>% Growers Claiming Questionable Results</u>
99%	97%	51%	4%	56%	* 1%

* 1957 results, one grower claimed questionable results.

47% of the growers used ammonium phosphate (16-20) for the phosphate source and added Urea, NH_3 , or ammonium sulphate to bring up the nitrogen to the desired level.

While test demonstrations conducted in the county and in other counties in the state have seldom shown increased yields by the use of phosphates in the fertilization of cotton, there are several farms where cotton responds to phosphate fertilization in the form of promoting earlier maturity. Many growers like this feature so as to facilitate an early harvest and consequently have the stalks chopped, plowed and the land irrigated at an early date. This office has recommended this program where cotton responds to phosphate fertilization by hastening maturity. The earlier harvest and earlier preparation of land for next year's crop has long been a recognized sound practice in all farming areas.

V. PROJECTS (continued)

7. Agronomy (continued)

A. Cotton (continued)

(2) Cotton Variety Tests

Varietal problems in cotton growing seem to never cease for any appreciable length of time. During the 1940's there was a growing prejudice against the cotton grown here. The mills objected to the weakness of fiber, nepiness and wastiness. Growers were not too well satisfied with yields, storm resistance and trade acceptance of their cotton. Premiums on the local cotton were low. Other varieties, unproved in the area, were brought in by several growers.

Variety testing work was started in 1946, in cooperation with county growers. When the University of Arizona Plant Breeding Department released enough seed of their three most promising varieties for variety test planting, they were included in the county's variety tests. Variety tests planted in six different areas in the county during the next three years demonstrated the superiority of the three University of Arizona varieties over the other five varieties in the tests. The X-44, now known as A-44, averaged highest in yield, storm resistance and indications of mill acceptance. Growers had maintained a keen interest in these tests and when seed became available for foundation plantings at the end of three years testing, they were prepared to change over to this new University of Arizona variety. The seed increasing process was the only limit in delaying the complete change-over to the new variety. After three years of seed increasing in the county, a one-variety county was in effect and other counties in the state were adopting the new University of Arizona variety.

This one-variety county was enjoying excellent yields and favorable mill reception for only a short time when Verticillium Wilt showed the new variety very susceptible to the disease. In the meantime, wilt resistant varieties had been developed by several cotton breeders. These wilt resistant varieties were then included in the county's cooperative variety tests. Dr. E. H. Pressley, University of Arizona Cotton Breeder who developed the A-44 variety, hadn't neglected the wilt problem in his breeding program. He had developed a wilt resistant variety which led the wilt variety test at the University of Arizona Safford Experiment Station for three straight years. Dr. Pressley released enough seed to plant in two of our county's variety tests after the three years successful results were obtained at the Safford Station. The first year showed the superiority of the University

V. PROJECTS (continued)

7. Agronomy (continued)

A. Cotton (continued)

(2) Cotton Variety Tests (continued)

of Arizona's wilt resistant cotton when planted on heavy wilt infested land. Dr. Pressley had about a double handful of W. R. seed. The Agent found a well isolated location where the grower was cooperative and wilt conscious. It was isolated three miles from other cotton and about eight miles from the headquarters of the grower, Mr. W. B. Allen. Mr. Allen had to haul his equipment that far in order to do any machine work on the one acre of the first seed increase planting of the University of Arizona's wilt resistant variety. This variety is now called W.R.-44. Subsequent variety tests where wilt is severe has shown the W.R.-44 to be the leader.

Since seed of W.R.-44 has been available, it has been recommended to growers who have severe wilt conditions. Since there are many degrees of wilt and severity, it varies with different growing seasons; it is actually a problem to choose between the W.R.-44 and A-44, or some other variety. There were four cotton varieties planted in the county this year. About 36 growers planted two to four different varieties. The Agent has asked these growers to keep records on yields, ginning percentages, grade and staple, to be turned over to the County Agent's Office for the purpose of summarizing and making this pertinent information available to all growers. These growers are also asked to report on the degree of wilt and give their personal variety preference.

The following is a summary of data taken from the crop practices survey on cotton varieties.

All growers plant Pima S-1 variety of long staple cotton. The Pima S-1 variety was developed by Dr. W. E. Bryan, Plant Breeder for the University of Arizona. The adoption of this variety was preceded by six long staple cotton variety tests, all of which demonstrated the distinct superiority of the Pima S-1 variety.

The short staple cotton varietal situation in the county is much different at this time, with four different varieties planted by county growers this year.

V. PROJECTS (continued)

7. Agronomy (continued)

A. Cotton (continued)

(2) Cotton Variety Tests (continued)

The distribution of Upland varieties planted this year can best be seen in tabular form.

Short Staple Variety Plantings

<u>Variety Planted</u>	<u>Acreage Planted</u>	<u>Number of Farms Planted</u>	<u>% of Total Acreage</u>	<u>% of Farmers Planting</u>
A-44	13,700	66	56%	88
W.R.-44	6,054	42	25%	56
1517-C	3,000	25	12%	33
W.R.4-42	1,692	2	7%	7

Besides obtaining data from growers who planted two or more varieties this year, results from six variety tests planted by volunteer cooperators will be obtained. While these cooperators planted the varieties adjacent to each other in the same field, it is a mooted question among some growers as to the advantages of comparing varieties in standard variety tests over comparing large blocks or fields of different varieties planted by the same grower. It is pointed out that there are generally physiological differences in varieties which require different practices. The small plots of varieties in one field do not permit different schedules of irrigation, insect control, fertilization, or even defoliation and harvesting.

The 1957 variety test grown by Mr. Arthur Pacheco in the Marana district is one example. The W.R. varieties are later maturing, so when the field was ready for defoliation, these varieties were not ready. Then, too, the later maturing varieties should not receive fertilizer applications or irrigations as late as the earlier maturing varieties. It is believed by some growers that the best performance of any variety requires cultural practices which are adapted to the characteristic growing habits of the particular variety being considered. This theory regarding variety testing seems very feasible. It at least indicates that large numbers of variety tests distributed well over the county among different growers would be one way to offset the physiological differences of varieties, since growers' practices in growing cotton vary in many respects.

V. PROJECTS (continued)

7. Agronomy (continued)

A. Cotton (continued)

(2) Cotton Variety Tests (continued)

The cotton variety test grown by Mr. Arthur Pacheco last year was all harvested by machine. The second picking was made very late due to wet weather. The entire cotton harvesting season was abnormally wet. This greatly influenced the results of the test and favored the more storm resistant varieties such as Arizona-44, and to lesser extent W.R.-44. Probably the least storm resistant variety was New Mexico 1517-C, but the early maturing habit was favorable to it with the wet season in the fall.

The following table represents the total results of the cotton variety test grown by Mr. Pacheco in 1957.

COTTON VARIETY TEST - 1957 CROP
 Art Pacheco, Evco Farms, Marana, Cooperator

Second Picking

<u>Variety</u>	<u>Lb. Seed Cotton per Acre</u>	<u>Lb. Lint per Acre</u>	<u>Ginning %</u>
W.R.-504	440	145	33.0
Calif. W.R.-4-42	580	192	33.1
Arizona W.R.-44	690	220	31.9
New Mexico 1517-C	390	120	30.8
W.R.-44 Progeny Mix	660	232	35.2
Arizona-44	590	203	34.4

Total

1st & 2nd Pickings

<u>Variety</u>	<u>Lb. Seed Cotton per Acre</u>	<u>Lb. Lint per Acre</u>	<u>Lb. Seed per Acre</u>
W.R.-504	2331	783	1174
Calif. W.R.-4-42	2330	815	1222
Arizona W.R.-44	2441	802	1203
New Mexico 1517-C	2556	818	1227
W.R. 44 Progeny Mix	2128	736	1104
Arizona-44	2231	784	1176

V. PROJECTS (continued)

7. Agronomy (continued)

A. Cotton (continued)

(2) Cotton Variety Tests (continued)

While the field in which this test was grown was wilt infested and the wilt resistant varieties showed more tolerance to wilt, there was very little difference in yield among the varieties with the possible exception of the W.R.-504. Seed of W.R.-504 is not available. Other tests conducted in past years showed this variety to be most tolerant to wilt and a top producer. However, the plant is undesirable for machine picking and the lint has been of poor quality. W.R.-504 will be eliminated in future variety tests. The W.R.-4-42 is earliest maturing of the W.R. varieties.

The variety test grown by Mr. R. A. Davis on his home place was picked with the following results:

1958 COTTON VARIETY COMPARISONS
R. A. Davis Farm, Sahuarita

<u>Variety</u>	<u>Lb. Seed Cotton per Acre</u>	<u>Ginning %</u>	<u>Lb. Lint per Acre</u>
Calif. W.R.-4-42	1875	38.40	720
W.R.-44	1944	35.37	687

<u>Variety</u>	<u>Grade & Staple</u>	<u>Loan Value per Lb.</u>	<u>Loan Value of Lint per Acre</u>
Calif. W.R.-4-42	SLM+ 1-1/16	33.87	\$ 243.86
	M 1-1/16		
W.R.-44	M 1-1/32	33.17	227.88
	SLM 1-1/32		

Verticillium Wilt was not severe in the field where this variety comparison was grown. The cotton was picked by machine and the one picking nearly harvested the entire crop.

Mr. Davis has another variety test yet to be harvested on a rented farm at Continental. This test includes all four varieties. It is expected that this and other variety tests will be machine harvested. Mr. N. J. Peterson has skipped over the variety test plots in his field so as to have adequate trailers for each variety when it is picked.

V. PROJECTS (continued)

7. Agronomy (continued)

A. Cotton (continued)

(3) Defoliation

The practice of chemical defoliation was of minor interest among growers until the adoption of mechanical picking. Some demonstration work was carried on a few years before mechanical pickers were introduced in the county. These were not encouraging, due to insufficient knowledge of time of defoliation, materials available and application equipment. By the time mechanical harvesters were being used, some successful defoliant had been formulated by several agricultural chemical companies. There were differences in these defoliant materials, some of which were not adaptable to our climatical conditions. Some materials were dangerous to use early in the season, since they were pretty good herbicides.

Research work on cotton defoliation was carried on by Mr. Lamar Brown of the U. S. Department of Agriculture stationed in Arizona. This work was started right along with the introduction of machine picking. It progressed to a point that, when machine picking had become important, valuable information on cotton defoliation was made available. The information was prepared in bulletin form by Mr. Brown and the University of Arizona Extension Agronomist. This bulletin, with later revisions, has been furnished to all county growers.

The research work on defoliation carried on by Mr. Brown was accomplished at the U. S. Department of Agriculture's station at Sacaton and on farms located in different areas. The Agent assisted Mr. Brown in securing cooperators and making the applications on two cooperator fields in this county.

The practice of chemical defoliation has been adopted by all major growers and all growers who use mechanical pickers. Over 80% of the cotton picked in the county this year has been by machines. Defoliation has been, in the aggregate, very successful this year. Growers have learned a great deal about preparing cotton for defoliation. Dates of the last nitrogen application and irrigation are pertinent factors. Guaging the time of application which depends on maturity conditions of the plants is very important. When plants are too succulent and do not show the autumn signs of maturity, defoliant applications are not successful. Growers recognize the importance of good defoliation practices for successful machine picking.

V. PROJECTS (continued)

7. Agronomy (continued)

A. Cotton (continued)

(4) Insect Control

The control of cotton insects in this county dates back into the late 1930's when arsenicals with sulfur were the only insecticides used. The Paris Green-Sulfur dust was effective on some insects, especially Lygus and Stink Bugs. The experimental results on this control program indicated that six to ten applications were necessary for efficient control. While growers seldom made this many applications, they were not satisfied with results obtained in relation to costs involved.

When the modern insecticides, such as the chlorinated hydro-carbons were introduced, growers rapidly adopted chemical insect control practices. Some growers became over-enthusiastic over insecticide applications. The balance between beneficial and harmful insects was being over-looked in many instances. Cases were discovered where applications of insecticides had been ordered for cotton fields where the population of beneficial insects was very high and the population of harmful insects was practically nil.

Dr. J. N. Roney, University of Arizona Extension Entomologist, and the Agent held field meetings each year for the purpose of teaching growers the technique of determining the conditions under which it is feasible to apply insecticides. Messrs. W. A. Stevenson and William Kaufman of the U. S. D. A. Cotton Insect Research Service, attended many of these field meetings and assisted in promoting successful field days. The strategy used in planning these field days was to select fields to visit that were claimed to be insect problem fields. Several sweepings were made in each field. Counts of harmful insects and also beneficial insects were made, showing the balance between the two. Growers were taught to identify these insects. Bulletins and mounts of the cotton insects were used in the furtherance of the insect control program.

Each year Dr. Roney publishes a bulletin setting forth the latest cotton insect control recommendations. All growers receive a copy of these bulletins each year, and to many of them it is their guide for their cotton insect control program. Sometimes, but not often, there are growers who find some certain control recommendation which gives poor results. This is generally the case of several recommended

V. PROJECTS (continued)

7. Agronomy (continued)

A. Cotton (continued)

(4) Insect Control (continued)

insecticides for the same insect. When such problems arise, it is the Agent's duty to make a survey of the situation, and, if possible, discover the reasons for the poor results and endeavor to find out if one of the alternate recommended insecticides is giving efficient results for other growers. Both Dr. Roney and Mr. Kaufman have been very helpful in these emergencies. Last year, the control measures for thrips weren't working. A meeting was called in the troubled areas to consider the feasibility of using an alternate insecticide. Mr. Kaufman was invited to this field meeting. He had thrips control experimental plots in the county and was having the same results with the insecticides being used by the growers. He was obtaining control, however, with one of the comparative new insecticides being tested for thrips control. This was Malathion which was more expensive and had less residual. The growers wasted no time in making Malathion applications which gave them control. A circular letter outlining the thrips situation was prepared and mailed to all growers in the county.

This year there were two instances of unsatisfactory results from control measures. The first instance was on Lygus control. A field meeting was called and Dr. Roney was invited to attend. After visiting and checking several fields, Dr. Roney discovered poor application methods. It appeared that the timing had been off and that better insecticides could be used. The second instance was cotton bollworm control. Growers using a dust containing 5% D.D.T., 15% Toxaphene with 50% sulfur were obtaining very poor control. After surveying the situation, the Agent called Mr. Kaufman concerning the problem. Here again, Mr. Kaufman had experimental cotton insect control plots and was having the same experience as the growers using the 5-15-50 dust. Mr. Kaufman called the Agent's attention to the fact that Dr. Roney's 1958 Cotton Insect Control Bulletin listed 10% D.D.T. with sulfur as the top insecticide to use for bollworm control. This necessitated a circular being prepared and mailed to all cotton growers. When checking results with growers who had been experiencing a problem with bollworm control, it was revealed that satisfactory control was obtained with 10% D.D.T. Dr. Roney presented a splendid talk on cotton insect control at a growers' meeting held early in the season at Marana. Dr. Roney stressed the cultural practices and the precautions necessary for the successful use

V. PROJECTS (continued)

7. Agronomy (continued)

A. Cotton (continued)

(4) Insect Control (continued)

of the systemic insecticide Thimet for thrips control.

The crops practice survey revealed the following information on cotton insect control.

COTTON INSECT CONTROL

% Growers Using Insecticide for Cotton Insect Control	% Growers Considering Beneficial Insects in Control Prog.	Average Number of Applica- tions of Insecticides	% Appli- cations by Air	% Appli- cations by Ground Rig	% Using Thimet Treated Seed
98	90	3	72	28	45

Practically all insecticide applications were reported as giving good results. However, the systemic insecticide applied to the seed gave some growers considerable trouble in obtaining a stand. The Thimet treated seed did give excellent results on early thrips control. Planting in a warm soil (60° or higher) with adequate moisture will greatly alleviate the problem of poor germination of Thimet treated seed. This has been pointed out to all growers.

The survey showed that the majority of growers ranked the harmful cotton insects in the following order: (1) Thrips, (2) Lygus, (3) Aphids, (4) Bollworm and (5) Stink Bug. This ranking was rather a surprise to the Agent since bollworms had been reputed to be the most damaging and offered the greatest problem of obtaining efficient control. Thrips control was a bit slow to gain adoption in the county and the Extension Service has stressed its importance.

V. PROJECTS (continued)

7. Agronomy (continued)

A. Cotton (continued)

(5) Diseases

Verticillium Wilt has become the major cotton disease in the county. Fourteen years ago there were only a few fields showing even a trace of the wilt. By 1954 it was realized that wilt had pretty well spread all over the county to some degree. Then in 1955, when the growing season was abnormally cool, the wilt became severe in many fields, causing drastic reduction in yield. While the wilt has not been as severe during the past three years as it was in several fields in 1955, it has become more prevalent all over the county. It appears that since wilt has become a major cotton problem in the county every effort possible should be made to reduce its severity and consequent reduction in yield. Growers are now quite conscious of the seriousness of wilt.

Variety test work carried on by the Extension Service and cooperating growers, which included wilt resistant varieties, has been mentioned under the heading of Variety Tests. These tests indicate that the cotton breeders can only assist in improving the wilt situation to a small degree when and wherever wilt is severe. The existing varieties do show promise and it is hoped that future developments in cotton breeding will give much more relief. Growers attending a Field Day at the University of Arizona Marana Farm were particularly interested in the W.R.-44 progeny test plots. After hearing the discussion on the progeny tests by Dr. Pressley, growers appeared to be somewhat encouraged. While the present W.R.-44 is gaining in popularity, growers are prone to criticize its ginning percentage and storm resistant characteristics as compared to A-44.

The crops practices survey reveals some interesting information on cotton diseases. Here are some tabulations which will be followed with some discussions.

COTTON DISEASES

<u>% Growers Reporting Verticillium Wilt</u>	<u>% Growers Reporting Some Texas Root Rot</u>	<u>% Growers Using Fallow or Crop Rotation to Combat Wilt</u>	<u>% Growers Reporting Soreshin</u>	<u>% Growers Using Chem. Treatment for Soreshin</u>
100%	100%	100%	100%	5%
Some light	Some light		Occasionally	

V. PROJECTS (continued)

7. Agronomy (continued)

A. Cotton (continued)

(5) Diseases (continued)

Here are some pertinent factors to be considered in dealing with the wilt problems.

The severity of Verticillium Wilt varies with the weather during growing seasons. Cool soils increase the activity of the wilt fungus. Heavy soils are cooler soils than light soils and consequently the effect of wilt is more severe on the heavier soils. Fertilization of cotton under severe wilt conditions will not increase yields. Test demonstrations in this county have demonstrated this wilt vs. fertilization problem in cotton. Research workers of the University of Arizona had the same results at the University Wilt Experimental field near Eloy. Growers have been kept well informed on this peculiarity of wilt and all other information on the wilt problem. Through observation and counsel of growers it has been fairly well determined that summer fallow and crop rotations decrease the wilt hazard. This control measure has been advocated by the Agent during the past three years.

Rotations which exclude tap rooted plants like alfalfa and cotton reduces the incidence of Texas Root Rot to some extent. Heavy applications of manure or Green Manure cropping is the most successful and practical method of root rot control. The Green Manure cropping requires a large amount of water, especially for the high yielding summer grown crops. The Agent has recommended Papago Peas, which is a winter grower, as a green manure crop for root rot control and otherwise a splendid soil improvement grower. Dr. R. B. Streets, Plant Pathologist for the University of Arizona, proved the value of Papago Peas plowed under for root rot control. The few growers who have followed this practice have been very successful in reducing root rot and improving the soil.

Chemical treatment of soil around the seed was demonstrated and found somewhat effective in the county. A few growers followed the practice, but it has not spread to any extent as noted in the crop practices survey. This probably is due to the fact that Soreshin is prevalent only occasionally.

Nematodes are a heavy enough infestation on the lighter soils where cotton is planted. There have been two nematode demonstrations set up with Dowfume 85 being used. Due to faulty applications of

V. PROJECTS (continued)

7. Agronomy (continued)

A. Cotton (continued)

(5) Diseases (continued)

the material the results were nil. The first demonstration was the case of poor land preparation and failure to properly seal in the soil at point of application. The second demonstration failed on account of faulty application due to the material being carried over from the previous year in steel barrels which resulted in a formation of material that clogged up screens and jets in the application equipment. This resulted in some portions of the plots receiving too much of the material and other portions not receiving enough.

This possible nematode control practice could well be used to increase cotton yields on the lighter soils in the county. Further demonstrations should be attempted on this practice.

V. PROJECTS (continued)

7. Agronomy (continued)

A. Cotton (continued)

(6) Cultural Practices

Factors considered under the heading of cultural practices include land preparation, planting rates and dates, spacing and cultivation. The University of Arizona Agronomy Department has published bulletins on growing cotton which cover recommended practices. These bulletins have been distributed to all growers. Result demonstrations on some of the cultural practices have been conducted in the county. There are variances in cultural practices at different elevations and different soils, such as texture, organic content and soil profiles.

There is a choice between disc and moldboard plows. The latter is recommended. Deep plowing is sometimes practiced. This is a feasible practice where a hard-pan can be broken up or top soil can be improved. Exploring the subsoil is recommended before deep plowing. In any event, plowing should be deep enough to bury all crop residue. This is recommended. One of the principals of land preparation advocated by the Extension Service is to work the land as little as possible and still obtain a suitable seed bed. The correct moisture content of the soil along with texture and organic matter content will greatly determine the success of this operation. Growers are advised against working a soil when it is too wet or too dry. Either one will tend to puddle soils, making water penetration difficult with consequent poor plant growth. Addition of organic matter is always stressed in Extension recommendations.

Chopping cotton is expensive, and on some light and medium soils is not advised. This is qualified by the rate of planting or stand of cotton. Many growers hesitate to plant just enough seed to obtain a stand that they would want to leave without chopping. Heavy soils appear to grow cotton that needs chopping. Experience has indicated that the yield is reduced on solid stands, without thinning, when cotton is grown on heavy soils. Test demonstrations carried on in the county have shown a distinct absence of bottom crop, and reduced yields on the unthinned cotton grown on heavy soils.

The following data on cultural practices of growing cotton are tabulated from the information obtained from the crops practices survey.

V. PROJECTS (continued)

7. Agronomy (continued)

A. Cotton (continued)

(6) Cultural Practices (continued)

PLOWING & CULTIVATION PRACTICES

<u>% Using Moldboard Plows</u>	<u>% Using Disc Plows</u>	<u>Range in Depth</u>	<u>Av. Depth</u>	<u>Average Number Cultivations</u>	<u>Average No. Hoeings</u>
62%	38%	8" to 28"	15½"	7½	3

PLANTING DATES

<u>% Growers Planting in March</u>	<u>% Growers Planting April 1 to 15</u>	<u>% Growers Planting after April 15</u>
15%	75%	10%

A majority of long staple growers plant early. Recommendations on planting dates have been April 1 to 30, for short staple and about ten days earlier for long staple. In the past, there has been some tendency toward early planting. Many times the very early plantings give poor results due to cold soils. It is considered hazardous and is discouraged by the Extension Service. The survey indicates that fewer growers are planting at extremely early dates.

Planting rates ranged from 6 to 40 lbs. per acre. All growers used acid delinted seed. The recommendation is a rate of 18 to 20 lbs. of seed per acre.

SPACING

<u>% Did Not Thin but Planted to Stand</u>	<u>% Thinned</u>	<u>% Chopped by Hand</u>	<u>% Thinned by Machine Chopper</u>
35%	65%	53%	12%

V. PROJECTS (continued)

7. Agronomy (continued)

A. Cotton (continued)

(6) Cultural Practices (continued)

When cotton is chopped the spacing is about one hoe width and will average about 8 or 9 inches. This has been recommended for the heavier soils while unthinned cotton has been recommended for the lighter soils. Due to Verticillium Wilt occurring in a more severe form on heavy soils, there are cotton authorities who claim that unthinned cotton will yield better on heavy soils. However, the only tests run in this county indicate that the reverse is true where the cotton is blocked to about one hoe width, as a majority of county growers are now doing. A great deal of additional work should be carried on to determine best spacing of cotton under wilt conditions. There may be some significance in the fact that the spacing trials conducted in Pima County of heavy soils with severe wilt, were all hand picked. Unthinned cotton on heavy soils very seldom sets a bottom crop and some mechanical picker operators claim that failure to set a bottom crop makes very little difference in yield when picked by machine. Furthermore, it is claimed that solid stands of cotton pick much better by machine. Other growers and operators feel that the blocked cotton, about standard hoe width between blocks of cotton, picks just as well as unthinned cotton and results from blocking are better in cotton grown on heavy soils.

V. PROJECTS (continued)

7. Agronomy (continued)

A. Cotton (continued)

(7) Weed Control

Annual Morning Glory, summer annual grasses, and Johnson grass have cost many growers exorbitant amounts of money per acre in attempts of eradication or control. There are instances where the per acre cost for hoeing was as high as \$50 and \$60. Another sad feature of mechanical methods of controlling these weeds is that many times the weeds will take over after the rainy season starts, and mechanical methods are impossible on account of a continuous wet soil. Thus, the weeds can still do great damage to the crop in spite of the large sum of money the grower has already spent on mechanical weed control.

Dr. Keith Hamilton of the University of Arizona Agronomy Department, started working on this problem in cooperation with Mr. H. Fred Arle of the U. S. Department of Agriculture. Dr. Hamilton established control plots here in Pima County in 1955. Growers were invited to inspect the weed control plots. They were favorably impressed with the results obtained by chemical weed control. Dr. Hamilton was invited to speak on this subject at some of the county growers' meetings. The enthusiasm spread still further. In 1956, Dr. Hamilton assisted the Agent in preparing a circular letter outlining methods of applying C.M.U. to cotton fields well ahead of the rainy season. Some very satisfactory results were obtained by C.M.U. applications, but there were at least three growers who experienced some serious residual effects of the weed-icide on following crops. Growers had been warned about residual effects that could occur on certain crops, and that the soil should be plowed and thoroughly irrigated before planting any crop after C.M.U. applications. These growers overlooked these warnings and their hard luck greatly retarded the progressive adoption of this practice.

The following information on weed control practices was tabulated from the Crops Practices Survey.

CHEMICAL WEED CONTROL

<u>% Using Some Chemical Control in Cotton</u>	<u>% Using C.M.U. on Cotton</u>	<u>% Using Dowpon on Ditch Banks</u>	<u>% Using Oils on Ditch Banks</u>
60%	30%	8%	32%

V. PROJECTS (continued)

7. Agronomy (continued)

A. Cotton (continued)

(7) Weed Control (continued)

Growers who attended a Field Day held at the University of Arizona Marana Farm were most favorably impressed with the C.M.U. weed control plots under Dr. Hamilton's supervision. There were some of the doubtful believers in the soundness of this practice who came away vowing that the practice would go forward on their farms next year.

A new University of Arizona bulletin on control of weeds in farm crops was distributed to all growers during the year. Prospects for increased adoption of chemical weed control methods in cotton looks encouraging at this time.

V. PROJECTS (continued)

7. Agronomy (continued)

A. Cotton (continued)

(8) Cotton Lint Improvement

An Extension Service project on cotton quality improvement was started on a statewide basis in 1956. Mr. Ted Welchert, University of Arizona Extension Agricultural Engineer, headed-up the project and County Agents carried on the program under his direction. The program called for the formation of a countywide committee to actively support the program. Grower representatives were Messrs. Robert Hale, Dan Clarke and Albert Oshrin. Messrs. Sonny Dale, and Claire Lusby were gin operator representatives. Messrs. Bud Ahmen and Jerry Weymen represented implement dealers who sell and service mechanical harvesters. Meetings with well rounded out programs on the different aspects of cotton improvement were well attended. Beside the committee members, the County Agents' staff, representatives of the U.S.D.A. Cotton Classing Office, the U.S.D.A. Cotton Ginning Laboratory and the Plant Breeding Department of the University of Arizona, the National Cotton Council contributed to these programs.

The cotton improvement program was followed by circularizing printed material among the growers and preparing news articles on different phases of improving the quality of lint cotton. Ginners have cooperated with the growers to a great extent in advancing this program.

The following harvesting practices, as revealed by the crops practices survey, are a pertinent part of the cotton quality improvement program.

Harvesting Practices

Only about 18% of the cotton in the county is picked by hand. It is very apparent that any cultural practice must give mechanical harvesting first consideration. The operation and care of the mechanical picker has become one of the major practices in the county's cotton production. Cotton quality schools have been held in the county and were well attended. It is interesting to note that some of the practices stressed at these meetings have been largely adopted according to the survey. These practices are: Tramping in baskets and in trailers has been discarded except in the case of a severe shortage of trailers. Spindles are kept clean. Cotton is grouped at the gins -- machine picked cotton in one group and hand picked cotton in the other

V. PROJECTS (continued)

7. Agronomy (continued)

A. Cotton (continued)

(8) Cotton Lint Improvement (continued)

group. This assists the ginner in making necessary adjustments so as to do the best job of ginning on each group of cotton. There often is a wide difference in moisture between hand picked cotton and machine picked which requires adjustments on the driers between ginning of the two groups of cotton. Then, too, there is often a difference in trash content between the two groups.

The quality of machine picked cotton has compared more favorably with hand picked cotton during the past three years.

G. E. Blackledge
Barry N. Freeman
Pima County
Arizona
1958



The top picture shows an unpicked portion of a cotton field producing about 3 bales per acre.

The lower picture shows Mr. N. J. Peterson, the grower, standing in portion of field from which 2 bales had already been picked. It is of interest that the field had been in alfalfa the previous five years, and although in a bad wilt area, there were only slight symptoms of wilt.

G. E. Blackledge
Barry N. Freeman
Pima County
Arizona
1958



Group attending field day at University of Arizona Marana Farm. The long staple cotton, Pima S-1 progeny test planting is in the background. Later, the group inspected the progeny plots. The apparent improvement noted in some of the Pima S-1 families was very encouraging to the growers present. The W.R.-44 strain tests were also viewed with much interest, as well as the grain sorghum varieties and weed control plots.

V. PROJECTS (continued)

7. Agronomy (continued)

B. Alfalfa

While it is believed that alfalfa is an important crop to include in a sound cropping system, it is a difficult one for growers to manage. The high water requirements and comparative low cash returns discourage many growers who have grown alfalfa. It is recognized by some growers that even though they do not break even on their alfalfa, a substantial profit results in increased yields of cotton following alfalfa. The Extension Service attempts to promote alfalfa growing on this basis, i.e., figure on the returns of a ten-year or longer over-all crop rotation system.

The Spotted Alfalfa Aphid became a menace to alfalfa growing about five years ago. The ravages of this insect have had considerable influence on alfalfa growing in this county. Growers have followed the recommended insect control measures and found the operation expensive. Even with good control methods being used, stands were difficult to obtain and hay was often damaged and reduced in yield. Growers have planted several different varieties other than the recommended varieties in an attempt to find one that is resistant to Spotted Alfalfa Aphids. The crops practices survey shows the variety situation to be rather mixed up, as the following table indicates:

ALFALFA

% Growers Who Grow Alfalfa	Varieties Grown with Acreage					
	African	N.K.919	Lahontan	Chilean	Ranger	Hairy Peruvian
37%	1,786	466	437	405	111	105

While the yellow or spotted alfalfa aphid has not been as numerous this year as in some of the past few years, it remains a serious pest. It is for that reason that the new variety Moapa is being recommended. Growers are being alerted to the fact that while the Moapa variety is more resistant to the spotted aphid, it is not entirely immune. Suggestions that new plantings be especially checked for aphid infestations are being made.

Growers are urged to use timely control measures when this aphid shows up in the new plantings. The University of Arizona Agronomy

V. PROJECTS (continued)

7. Agronomy (continued)

B. Alfalfa (continued)

Department developed the Moapa variety of alfalfa for resistance to spotted aphids. The researchers have made tests comparing it to the other varieties, and it demonstrates a fair resistance to this insect. The yield tests grown under spotted aphids conditions proved Moapa as materially the best yielding variety. It is hoped that the introduction of Moapa will result in a sharp increase of the county's alfalfa acreage.

The Extension Service has conducted phosphate fertilization demonstrations in the county with fair success. The practice was demonstrated to be a profitable practice on all demonstrations carried. While the information on favorable results from the use of phosphate fertilizer on alfalfa has been furnished to the growers, the practice has not been adopted to a great extent. The crop practices survey shows only about a 30% adoption. It is believed that this could be another reason that alfalfa is not more widely planted in the county.

Renovation of alfalfa when the planting is two or more years old is recommended on soils that seal up and fail to give proper water penetration. This is also a weed control measure. Applying phosphates to an old stand of alfalfa is recommended with the renovation, so as to permit the material to be applied into the soil as deep as possible. About 50% of the growers renovate alfalfa according to the survey.

Pre-irrigation with a penetration of water to a depth of six feet is recommended. Here is another practice which has not been adopted to a great extent. Two irrigations for each cutting of hay is a common practice. It is believed that more efficient use of water can be obtained when the land is pre-irrigated in preparation for planting. Stands are also easier to obtain.

More effective work on alfalfa growing practices is needed in the county.

V. PROJECTS (continued)

7. Agronomy (continued)

C. Small Grains

Barley acreage has increased during the past few years. This winter and spring crop fits well in a cropping system, especially so far as the distribution of water is concerned. The crop has a rather low income return, and for many growers during the past, it has been reported that they suffered a loss on the crop some years. Double cropping with barley and grain sorghums is often practiced. Some plantings of barley follow cotton. Many of these plantings are made too late in the season to produce profitable yields.

The increased use of fertilizer, more timely planting dates and increased rates of seeding have been factors in making the crop somewhat more attractive.

While the Arivat variety has been recommended for the past fifteen years, Harlan barley is now recommended along with Arivat. Plantings of the new variety are being made now and more expected to be made later. The University of Arizona Agronomy Department has published a bulletin on the Harlan variety, giving favorable results obtained on yield tests. This, of course, has been distributed to all growers. News articles, circular letters and personal contacts have been used to disseminate information on the new variety, along with fertilization recommendations.

Very effective result demonstrations on fertilization have been conducted in the county. The practice didn't start until 1947, after the results of the first set of demonstration plots were obtained. The survey indicates that barley fertilization is now a standard practice and that the average application is 78 units of nitrogen per acre. Some growers use 16-20 ammonium phosphate alone and in combination of additional nitrogen.

The survey showed the seeding rate to be an average of 100 lbs. per acre which fits the Extension Service recommendation. Also, the variety was 100% Arivat, the recommended variety. Planting dates as shown by the survey were fairly well in line with Extension Service recommendations. 85% planted in November and December; the other 15% planted in a range of September through February. The average yield this year was about 1-3/4 tons per acre, according to the survey.

V. PROJECTS (continued)

7. Agronomy (continued)

D. Grain Sorghums

The acreage of both grain type and forage type sorghums has increased during the past few years. This is partially due to the decrease in cotton acreage, caused by acreage controls. However, the yields have been increasing in both forage and grain. Increased activity in cattle feeding has stimulated the planting of forage type sorghums. Varietal recommendations, planting rates and dates, fertilization, irrigation practices, and weed control have been included in the county's Extension program.

Variety tests and fertilization tests have been conducted. During the past two years the Agent has cooperated with Dr. Lee Stith of the University of Arizona Plant Breeding Department, and Dr. Curtis Tucker of the University of Arizona Soil Science Department, in conducting variety tests and fertilization tests.

The Agent obtained the cooperation of Mr. Weymen Gladden for Dr. Tucker's fertilization plots. Results on Mr. Gladden's grain sorghums were nil. The plots were located on the heavy soil on Mr. Gladden's farm. Had the plots been on the lighter soils, that are on his farm, the results would have been, in all probability, very positive. At least that has been true with cotton fertilization on Mr. Gladden's farm. The Agent secured the cooperation of Mr. Edward Anway for Dr. Tucker's fertilization tests this year. A lighter soil was selected for the plots. Results were positive this year. The results from these fertilization plots are interesting, in that the most economical treatment was practically the same fertilization program which he used on 200 acres of grain sorghum.

The Ed Anway plots included 15 treatments with levels of nitrogen from 60 to 240 lb. per acre. The 120N. treatment gave an increase of 1188 lbs. of grain per acre with an expenditure of \$18.74 per acre for the practice. The 60N. application accounted for only 900 lbs. grain increase per acre, but this was injected NH_3 and only cost \$7.72 per acre. The 900 lb. gain from the 60 units of nitrogen (NH_3) injected, was worth \$16.72 net. This leaves a net profit of \$9.00 per acre for this practice. This, of course, shows the 60 units of nitrogen injected in the form of anhydrous ammonia to be a most profitable practice. This low income crop may not pay off on high levels of nitrogen, although in this test they did give materially higher yields. These field tests will greatly benefit the growers.

V. PROJECTS (continued)

7. Agronomy (continued)

D. Grain Sorghums (continued)

Variety tests of forage type sorghums have demonstrated that there are some varieties which will give substantially higher yields than the standard adopted variety Hegari. This is especially true with the Tracey variety which produced 87,290 lbs. of ensilage per acre compared to 27,300 lbs. for Hegari in one of the tests carried on last year. The serious objection to these high yielding varieties offered by cattle feeders is the excessive moisture content. It appears that some extensive research on comparative feeding trials using ensilage from Tracey and Hegari may be necessary before ensilage growers will plant much acreage to the new forage type varieties. Two plantings of the new high yielding varieties this year lodged very badly, which is another serious objection.

Here are the 1958 variety test results from Mr. Anway's farm:

1958 GRAIN SORGHUM VARIETY TEST
 Ed Anway, Avra Valley, Cooperator

<u>Variety</u>	<u>Average Yield per Acre</u>	<u>Per Acre Gain or Loss Compared to Plainsmen</u>
De Kalb F-62A	7,576	+2,376
RS 610	7,062	+1,862
Texas 620	6,998	+1,798
De Kalb E-56A	6,773	+1,573
Amak R-12	6,067	+ 867
Plainsman	5,200	
RS 650	5,040	- 160
Texas 660	4,526	- 674
RS 501	* 3,980	-1,220

* RS 501 had some bird damage and damage from livestock. Grain from all varieties had 13% moisture content. Ten feet of row was harvested in three locations of each variety.

V. PROJECTS (continued)

7. Agronomy (continued)

D. Grain Sorghums (continued)

The RS-650 hybrid seed produced by Mr. R. A. Davis was all planted in Pima County. There was also some Texas-660 planted. While there was no great amount of dissatisfaction expressed by growers who planted these two hybrid grain sorghum varieties, there was very little favorable comment.

The six plantings of Texas-660 made by growers for comparing yields with Plainsman and Double Dwarf Milo-38, did not show any advantage for this hybrid. These six plantings were made in 1957, by Mr. J. B. Bull, Farmers Investment Company, N. J. Peterson, Weymen Gladden, Bert Wallis and Ed Anway.

It appears to be feasible for some extensive tests to be made in 1959, with the top varieties in the 1958 variety test, i.e., De Kalb F-62-A, RS-610, Texas-620, DK-E-62-A, and AMAK-R-12.

Planting dates for grain type sorghums have been advancing a little earlier each year. It is believed that some yield is being sacrificed by the earlier plantings. The County Extension Service has held to a recommendation of grain type sorghum planting dates from June 20 to July 10. The survey this year revealed that most plantings were in May. According to the survey the average yield of grain is about 2 tons and 18 to 20 tons of sorghum forage. These averages in yields are only fair. The Agent has discussed the problem of planting dates for grain type sorghums with leading growers. They all agreed that the early plantings gave smaller yields than the later plantings. Weather, insects and bird damage are serious obstacles with the early plantings. Planting dates will be stressed more next year.

The average acreage of grain sorghums received 66 units of Nitrogen per acre and very little phosphates according to the crops practices survey. Maybe it is a coincidence that this average is so close to the best test result obtained on the Edward Anway farm. Anhydrous ammonia was used by 61% of the growers in fertilization of their grain sorghum crops.

G. E. Blackledge
Barry N. Freeman
Pima County
Arizona
1958



Dr. Lee Stith, University of Arizona Plant Breeder, on left, standing on a row of hybridized grain sorghum and the Agent, on the right, standing on a row of Plainsman which was the pollinator used to fertilize the male sterile on the left. This hybrid seed production project was carried on by Mr. R. A. Davis. The Agent cooperated with Dr. Stith in setting up the project. This was the second year for Mr. Davis as a hybrid seed grower.



The above picture shows Dr. Stith standing beside one of the very few rogues in Mr. Davis' hybrid seed production field.

V. PROJECTS (continued)

8. Irrigation

Due to an apparent limitation of underground water, the efficient use of irrigation water is most vital. Since the water table has been receding and labor costs have increased, the cost of water has increased.

Some of the practices of efficient water use advocated by the Extension Service have been land levelling, ditch lining, thorough pre-irrigation so as to store water in the soil for plant use while the weather is cool, and to defer irrigation of cotton until the plants can use more water.

Many miles of irrigation ditches have been lined with concrete under the Agricultural Stabilization and Conservation Committee program. Land levelling has also accounted for a fair share of the county's payments for conservation practices.

The extremely early irrigation of cotton practiced by quite a few growers during the past few years, has in many cases been a waste of water. Besides the waste of water applied to a cold soil, the cotton was harmed. The Extension Service has discouraged the unnecessary early irrigation of cotton, by the use of discussions at meetings, news articles, mimeographed material and personal contacts.

The crops practices survey shows considerable improvement with respect to irrigation practices. Only 15% of the growers reported first irrigations prior to May 15; 60% of the growers made their first irrigation between May 15 and May 30. The remaining 15% irrigated their cotton during the first week in June.

Other irrigation practices have been discussed under appropriate crops.

One water conserving practice advocated by the Extension Service is termination of irrigations on cotton when the crop is ready to mature. The dates range from August 20 to September 15, depending on soil texture. Lighter soils need later irrigations than the heavier soils. Some growers were irrigating cotton up to the middle of October. It is evident that this expensive practice of late irrigations of cotton has been greatly improved.

V. PROJECTS (continued)

10. Entomology

Insect control work has been reported under the appropriate headings of the crops involved.

There are many miscellaneous insect control problems handled by the County Agent's Office. Many calls are received on home garden insect problems, ornamental plantings and household insects. Dr. J. N. Roney, University of Arizona Extension Entomologist, makes the job of answering many of these calls comparatively easy by preparation of bulletins on all latest insect control methods. The Entomology Department of the University of Arizona assists in these miscellaneous insect problems, especially when the correct identification of an insect is in doubt.

An infestation of a desert type grasshopper caused much concern by both urban residents and farmers this spring. Many calls from home owners were received by the County Agents concerning the hordes of grasshoppers entering the residential areas. This same hopper was doing some fringe damage to crops in areas adjacent to the desert. Growers were advised to apply appropriate insecticides in fringe areas bordering the desert and having succulent crop plants growing. While control measures were successful, there were several farmers who wanted to request a Federal-State-and-grower cooperative mass control program. Their opinions were based on reports from an adjoining county where such a program was in progress, which entailed the application of insecticides to the desert areas. Dr. Roney was called on to assist with the problem. Through his able leadership the growers were persuaded to follow the control plan outlined by the Agent, i.e., to apply insecticides to control grasshoppers in fringe areas of their fields where the hoppers had invaded. Dr. Roney pointed out, at a growers' meeting in Marana, that this plan would be much less expensive to the individual grower than the cooperative mass control program being conducted in the neighboring county and would be even more effective if the individual grower practiced timely control. The plan proved successful and only a very small amount of crop damage was caused by the grasshoppers. The growers' choice of a control program saved them a great deal of money.

News articles, meetings, personal contacts and distribution of bulletins have been the methods of carrying on the program in miscellaneous insect control.

V. PROJECTS (continued)

11. Soils

The irrigated land in Pima County is located mostly in a narrow valley. Most soils are illuvial and vary greatly in texture and fertility within a rather small area. The light or coarse textured soils are generally deficient in nitrogen and to some extent available phosphorus is low enough to require phosphate fertilization. The heavy or fine textured soils are more fertile, require less water, but offer more tillage and water penetration problems.

Water penetration problems on some soils have been improved by gypsum applications where high alkalinity exists. One handicap in the practice of applying gypsum is the requirement of applying excessive water after the gypsum treatment so as to complete the reaction and leach out the resulting excess salts. Pumped irrigation water in the county is expensive and limited in quantity. The Extension Service has carried on result demonstrations in the county on the use of gypsum for improvement of alkaline soils. A few farmers have used gypsum successfully, but the necessary use of excessive amounts of irrigation water greatly discourages growers from adopting the practice.

The low organic content in the irrigated soils of the county is the most serious problem in soil management. Manure applications, growing and plowing under green manure crops, and plowing under all crop residue are practices encouraged by the County Agent's Office. Plowing under crop residue is about all of the organic replacement needed on a major portion of the county's cropland. Result demonstrations, circular letters, meetings, news articles, personal contacts and distribution of bulletins are methods used in an endeavor to promote the practice of green manure cropping for soil improvement. Objections to this practice are the extra water required and no direct cash return from it. Several growers who have grown green manure crops have seen worthwhile benefits.

Under separate crop headings, fertilization practices and other soil management practices have been discussed.

V. PROJECTS (continued)

12. Rural Sociology

Pima County's farm population is decreasing as farm units increase in size. The average commercial farm, i.e., a farm where products are produced for market and where the operator makes his living from the farm, is 579 acres; 55% of the total acreage is farmed by 16 operators, all of whom farm 1,000 acres or more; 26% of the operators have farms of 500-1000 acres; 57% of the farms are less than 500 acres. There are about 100 commercial sized cattle ranches in the county covering about 6,000,000 acres. Thus it can readily be seen that farm life is necessarily much different than most farming areas in the nation.

There are more owner-operators on farms than there were a decade ago. Tenants have become landowners in many instances. This is always a healthy situation, for it not only means good farmers but also good citizens in a community. There are only two rural social centers in the county. These are at Marana and Sahuarita. Farm Bureau locals, churches, schools, women's clubs, Homemaker Clubs, and service clubs function in these centers. The farming areas are near enough to Tucson for daily visits to the city, so a great majority of local farmers enjoy much of the city social life.

The Extension Service furnishes programs for some of the organized groups, both recreational and educational.

V. PROJECTS (continued)

13. Agricultural Economics

The Soil Bank farm program as related to cotton growers was one of the economic problems faced by Pima County growers. The County Agent's Office prepared production costs data with net returns from different yield levels for Pima County cotton growers. Comparisons between probable net returns for growers choosing the Soil Bank plan and growers who did not enter into it were set up at different yield levels. Suggestions were given on soil improvement practices, weed control and disease control which could be accomplished on the Soil Bank acres. These were only suggested as bonus credits. Mimeographed copies of the economic analysis of the Soil Bank plan were prepared and mailed to all growers. This subject was also discussed at meetings and with individuals. Dr. George Campbell, University of Arizona Extension Economist, also prepared a similar treatise on this subject some time later. This was also furnished to local growers. When discussing the subject with some of the growers, the Agent was informed that the yield basis for Soil Bank payments was not set up on yield history. It was pointed out that some of the assigned yields were substantially lower than the actual yields. These growers expressed an opinion that the analyses information prepared by the Extension Service was very helpful to growers who were assigned yields, that were reasonable and commensurate with their actual yield history, but for some growers it was not applicable.

Cattlemen have been assisted with obtaining Livestock Market News Services. This year, Dr. Campbell instigated a plan whereby all cattlemen could receive the market news service direct from the source. All cattlemen in this county were placed on the list. Poultrymen receive the Market Service. Cotton market news service is made available to growers through their gins and this office.

County Extension offices are responsible for compiling the necessary data on acreages, varieties, along with names and addresses of growers. This is done each year in order to have the necessary organization papers filed for obtaining the Smith-Doxey Government Cotton Classing Service. The crop practices survey showed that 100% of the growers sell their cotton on the basis of the government class cards.

It has been attempted to give pertinent information on judging land values to all interested parties. The office callers inquiring about land credit and production credit are always directed to the source of the type of credit desired. The functions of the different credit agencies are explained.

V. PROJECTS (continued)

13. Agricultural Economics (continued)

The Agent cooperates with the Farmers Home Administration in their work with clients in Pima County.

Outlook information and economic information on agricultural products is disseminated by use of circular letters, news articles, meetings, current bulletins on the subjects, and individual contacts.

V. PROJECTS (continued)

14. Plant Pathology

Miscellaneous calls on plant disease problems are received from many home owners. These calls include disease problems in home gardens, home orchards, lawns, trees and shrubs. Major diseases involved are Texas Root Rot, Nematodes, Powdery Mildew, Fire Blight, and Curly Top of tomatoes. A considerable amount of time is devoted to answering these calls. A popular bulletin covering these diseases would be very helpful in servicing calls of this nature.

Besides office and telephone calls, news articles are used to disseminate information on these miscellaneous plant disease problems.

Plant diseases effecting crops have been discussed under the different crop headings.