

1945
ANNUAL REPORT

J. N. RONEY
EXTENSION ENTOMOLOGIST

AGRICULTURAL EXTENSION SERVICE
University of Arizona
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of
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Introduction

The program of the Extension Specialist in Entomology, of the University of Arizona Agricultural Extension Service, has now become established in all counties. The request for the services of the Extension Entomologist in the various counties increases each year.

In Arizona we find that the environmental conditions are usually favorable for reproduction of insect pests of Agriculture, as well as otherwise. The altitudes of the agricultural regions of the state vary from 150 to 9,500 feet above sea level. We also find that the temperatures and rainfall vary in a like manner. We find insects attacking crops and livestock in practically all parts of the state. In the lower altitudes the injury is usually greater, as 75 percent of the crops are produced in these areas.

The same condition prevails today, as of a year ago. The labor situation continues to be one of the problems giving the grower the greatest worry. Many farmers are going out of business as they do not know whether they will get their crops harvested or not.

Major Projects and Accomplishments
of the Year

Project 1. Agronomical Crop Pests

A. Cotton Insect Pests

The Extension Agronomist, Robert L. Matlock, cooperating with the Extension Entomologist and research agencies of the Bureau of Plant Industry and the College of Agriculture, put on a series of "Cotton Production" meetings in Maricopa, Pinal, Pima, Graham, Greenlee, and Yuma counties. These meetings were to impress upon the cotton growers the importance of a good seed bed, good seed, correct irrigation, and control of insects. The meetings were attended by about 200 of the better cotton farmers of the state.

During June a meeting on control of cotton insects was held at Parker, Yuma County, with Mr. Moody. Visits were made to fields to show how to identify the injurious insects, and an informal meeting was held at night at the Colorado Indian Reservation. A total of 9 cotton growers attended this night meeting.

A series of four meetings were held in Graham County during the month of August. At these meetings demonstrations were given to 30 different cotton growers on how to correctly sweep for injurious cotton insects and how to identify the harmful insects.

The weekly cotton insect news letter was issued starting on June twenty-sixth. The starting date for 1945 was about two weeks later since the season was about that late. These reports were sent out each week to leading newspapers of the state, radio stations, and all cotton gins, and others interested in cotton insect control. This weekly report was helped a great deal by reports from Entomologists of the Bureau of Entomology, Cotton Investigations, as they gave us definite insect records that could be used. The weekly reports as issued, are found elsewhere in this report.

In evaluating the results we find that about 2,300,000 pounds of dust for control of cotton insects were used during 1945. We find that the insects being poisoned were mostly of the Hemipterous type and that the poisons used were chiefly a mixture of Paris Green and Sulphur. The amount of Paris Green ranging from $7\frac{1}{2}\%$ to 15%. The formula containing 15% Paris Green seemed to give best results.

During the season several insecticide companies attempted to force the Extension Entomologist to recommend the use of the new insecticide DDT. No recommendations were made and the writer still feels that he was correct in not doing so.

The work by a member of the Agricultural Division of the Bureau of Entomology was done mostly in a study of bees and DDT. The Extension Entomologist each week asked all cotton growers using dust to please notify any beekeepers near fields being dusted.

A disease, unknown to the writer or members of the Plant Pathology Department of the University, appeared on cotton in Graham County. It caused spotting of the lint and abnormal opening of the bolls.

The results of cotton insect control were pointed out to the writer by County Agent Henness. Two fields, one dusted and one undusted, were examined in October. The field that was undusted had cotton only on the bottom portion of the plant, while the field dusted six times with a Paris green-Sulphur dust mixture had cotton from the top to the bottom of the plant.

B. Alfalfa Seed Insects

Alfalfa seed insects, especially Lygus and stink bugs, cause great losses of seed each year in Arizona. Some tests and demonstrations were worked out in Yuma County with County Agent Robert Moody. In addition to the Lygus, grasshoppers have been causing injury in both Maricopa and Yuma Counties to the alfalfa seed by destroying the seed pods.

A test set up on the farm of Mr. W. Whittman, near Yuma, Arizona, was as follows: A field of some 80 acres was selected to test a 10% Sabadilla dust in Pyrax ABB and a 5% DDT dust in some diluent. The check field was to consist of 20 acres and the dusted areas of 30 acres each. The dusts were applied at 5 A. M. on June 17th. The insect counts are listed below and are indicative of the results:

Lygus per 100 Sweepings
Average of 600 Sweepings Per Plot

	Pre-dust		12 hours		24 Hours		36 Hours		48 Hours		60 Hours		75 Hours	
	A	N	A	N	A	N	A	N	A	N	A	N	A	N
Check	58	159	60	237	82	357	94	335	62	310	62	216	77	241
10% Sabadilla Dust	60	169	1.5	27	.815		2.5	26	1.7	31	8.3	31.7	6	34
5% DDT Dust	62	170	41	149	23	104	40	100	11	46	40	105	16	81

These figures show that the Sabadilla dust gave the best control. The temperatures were about 115 degrees F. during day, and 75 degrees F. during night. Further work in that area, by County Agent Moody, showed yields of 185 pounds of seed on checks, and 400 and above on dusted fields, Sabadilla being the dust used.

During July and August the large bird grasshopper caused serious injury to maturing alfalfa seed. The grasshoppers migrated from the desert into the alfalfa fields. Many arsenical and flourine dusts were tested with varying results.

During August some field tests for control of stink bugs were set up at the farm of Mr. Pat Dunn, Roll, Yuma County, Arizona. The alfalfa was in pre-bloom stage and dust materials were applied with a Root Power Blower duster. The following materials were applied to acre plots:

Dust No. 1. 15 pounds Paris Green and 85 pounds 325 mess conditioned sulphur dust.

Dust No. 2. 10 pounds Paris Green, 25 pounds Calcium Arsenate and 65 pounds of a diluent.

Dust No. 3. 10% Sabadilla dust.

Dusts number one and two, applied at rate of 25 pounds per acre, while dust number 3 was applied at the rate of 40 pounds per acre.

	No. 1 Dust			No. 2 Dust			No. 3 Dust			Check		
	Aug. 16	17	21	Aug. 16	17	21	Aug. 16-17-21					
Lygus	16	15	16	16	20	35	1	1	2	70	92	110
Stink Bugs	8	8	10	10	8	16	8	2	4	20	22	36
Alfalfa												
Worms	8	5	2	10	2	1	16	35	25	110	130	165

These small scale tests show possible value of Sabadilla dust. The temperatures around 110 degrees.

It is a very definite fact that control of alfalfa seed insects is very important. Lack of research work is very outstanding and should be corrected. The writer and County Agent Moody, of Yuma County, intend to conduct further tests during 1946.

C. Alfalfa Tree Hopper (Alfalfa Girdler)

The Alfalfa Tree Hopper or Girdler was reported causing serious injury in both Cochise and Graham Counties. At the request of County Agents Mark Bliss, and S. L. Owens, a mimeographed sheet on suggested cutting schedules was issued late in the season of 1945. A copy of these suggestions will be found in this report.

D. Flax Insects

No reports of injuries by insects to flax were made. Some thrips injury was noticed in some fields. Farmers continue to follow early planting of seed in the fall.

Project 2. External Parasites of Domestic Animals

With the prospects of meat rationing being ended sometime during 1945, the writer continued to look to quality animals for post-war times. A further attempt was made all year to educate both livestock and dairy producers about the necessity of controlling external parasites of animals. Working with the County Agents, Dairy Specialist, Veterinarian of the Experiment Station, and Livestock Specialist, some excellent progress was made.

A. Screwworm

By keeping in close contact with Mr. Babcock, Entomologist, Bureau of Entomology and Plant Quarantine, the writer was able to determine the presence of the screwworms. The program is well sold in Arizona and practically every rancher keeps Smear 62 on hand. By the good work of the Arizona Cattle Growers in their news letters, cattle growers may receive Smear 62 by writing the Secretary of the organization. During 1945 very few screwworms were reported.

B. Ox Warble (or Cattle Grub) and Cattle Lice Control

During January checks were made on cattle dipped in Apache County twice for lice and possibly grub control. Examinations showed at least 50 percent control grubs in cattle dipped twice in Rotenone -- wettable sulphur dip.

A check of work in Navajo County, by County Agent Creighton showed 80% kill with one spraying of rotenone and wettable sulphur. The examinations made by looking at sprayed animals of Mr. Hansen at Joseph City, Arizona, showed that a second spray should be applied at once. On this same trip a talk was given to Northern Arizona Cattlemen's Association meeting, Holbrook. The writer talked about the necessity for controlling external parasites of cattle.

During February the writer checked up on two dairy herds in Pima County that were treated in November 1944 for grub control. The dairymen had used the retenone-wettable sulphur wash. With only one treatment the results were very interesting.

A conference was held with Dr. E. W. Laake, Texas, Dr. Pistor, Veterinarian of the University, and Mr. Pickrell, Director of Extension Service. Dr. Laake wished us to eliminate sulphur from our program. He could not show us that his method was cheaper or better than what we used.

A visit to the Cowan Ranch, Cochise County, Arizona, during March 1945 with County Agent Bliss, showed a new type sprayer being used for lice control. The machine was in two parts---the spray tank and the pumping plant. Over 100 nozzles in the steel trailer tank were used to spray the cattle for about 50 seconds. The spray material was used over and over. The cost of equipment was \$6000.00, charge for spraying (1 time) 50¢. Equipment was very heavy and full of so called "bugs". Cows in this spray tank were more worried than when a dipping vat is used. This sprayer, under present condition, is not at all satisfactory as it is too costly and frightens the cattle very much.

In November 1945 arrangements were made with Mr. Rogers, Apache County Agricultural Agent, and Mr. Francy of Vernon, Arizona, to dip several hundred head of livestock in a DDT dipping solution. Fifty pounds of 50% wettable DDT were secured from Stauffer Chemical Company. A mixture of $2\frac{1}{2}$ pounds of the 50% DDT and 10 pounds of wettable sulphur was added to each 100 gallons of water. The cattle were dipped on November fifth and belonged to Mr. Francy and Mr. Willhelm. The cattle were examined on November 24th and some of the worst infested cattle were still infested with live lice. A further check is to be made in January to see what results were secured.

Several projects on grub and lice control were worked out with 4-H Club boys and girls, which will be reported under 4-H Club Project.

Working with Dairy Specialist, Ralph Van Sant, Dairymen were urged to control grubs and lice in order to produce more milk. Several articles on this project of grubs and lice were written by the writer and are enclosed with the Dairy Herd Improvement Report. These are found elsewhere in this report.

In Apache County we find two more dipping vats erected, and one rancher maintained that dipping meant at least \$3.50 increased value per head. These figures show the value of dipping. Chillcott Ranch operators feel that dipping gave good control of lice and at least 80% of the grubs were controlled.

The folder W-29 "Control of Cattle Grubs" is being revised and reprinted as demand for this folder is very great. An article for 4-H Club external parasite demonstration was prepared and sent to all County Agents.

In evaluating results of grub and lice control we find both ranchers and dairymen "interested" in their control. It is figured that at least 35 percent of the dairy cattle were treated for grubs and lice. It is estimated that at least 50,000 head of cattle were dipped in the state for lice control and many small herds were sprayed or dusted for grub control in all counties of the state. In Apache county some ranchers are dipping just before they move the stock to the summer range, and these operations will be closely watched. To show how the work is drawing attention, Tovrea's Packing Company of Phoenix, have secured copies of our dipping vat and arrangements have been made with them to run a series of tests for control of lice on feed pen cattle. With the end of the war and a certain demand for quality cattle this work must be pushed.

C. Goat Lice

As previously reported, southern Yavapai County produces a large poundage of mohair from Angora goats. In the past, most ranchers have used arsenical dips, however, by using rotenone-wettable sulphur mixture the loss has been reduced.

Working with County Agent Mc Leron, Mr. H. H. Brown, Texas Gulf Sulphur Company, and Mr. Jack Medd, Skull Valley, Arizona, a demonstration on control of goat lice has been under way for several years. During May about 2800 goats were dipped in the conventional rotenone-wettable sulphur dip. About 20 were dipped in a wettable DDT solution containing 2 pounds of 50% wettable DDT. A check of the goats twenty-one days later showed good results with both materials. The experiment was to be repeated during October, but due to a mix up in dates we did not assist with the dipping. The materials for the dippings were furnished by Texas Gulf Sulphur Company and the University of Arizona Agricultural Extension Service. It is hoped that the experiment can be picked up again in 1946.

In evaluating the results it is evident more goat raisers are using our suggestions each year.

D. Dog Ticks

Dog ticks continue to be a problem. With a shortage of nicotine for spraying shrubs the ticks are increasing on the dogs as well as in the homes. Several manufacturers in the Phoenix area produce excellent baths for control of ticks on the dogs.

Project 3. Household Insects

Interest in control of household insects and pests has been on the increase as the demand for the Extension Entomologist to give demonstrations has been on the increase. During the year demonstrations

were given in Pima, Pinal, and Navajo Counties to Home Demonstration Club Leaders of these counties. In Navajo County, working with Home Demonstration Agent Cook, two demonstrations on controlling household pests were given at Woodruff and Joseph City before 59 people. In Navajo County the writer assisted County Agent Creighton in determining an infestation of insects in several homes of Holbrook, as being the Mexican or Poultry bed bug. The infestation had driven several families out of their homes.

A demonstration was given in Pima County to the Leader's Council. This meeting was the kind that reaps results, as a wider distribution of methods will be secured. With the assistance of Home Demonstration Agent Bentley, and County Agent Blackledge, an excellent demonstration was prepared and delivered.

During May 3 demonstrations on "Household Insects" were given at Coolidge, Eloy, and Casa Grande. The writer, assisted by Miss Cannedy Home Demonstration Agent, was able to give some very instructive demonstrations on how to control various pests of the household. At the three meetings fifty-nine (59) women were present and the interest shown indicated the need for such work.

Evaluating the results secured, the writer feels that the demonstrations in the three counties have accomplished a great deal. As stated in a previous report, with air conditioning and central heating systems, the household insects are on the increase, and the demand for information will be greater. The writer has a series of demonstrations set up for Maricopa County for February 1946. During the year a mimeographed sheet on "Household Insects" was revised and issued. Some 500 copies were made. Other counties are also making demands for the work. It is hoped to secure the printing of a circular during 1946.

Project 4. Vegetable Crop Insects

A. White Potato Insects

During 1945 the white potato problems in the lower elevations, particularly Yuma, Maricopa, and Pinal counties, were rather severe. The chief problems were diseases of all kinds. In Yuma County rugose mosaic, wilts, rhizoctonia, ring rot, and other diseases caused losses as great as 75%. In Maricopa and Pinal Counties many fields were almost a total loss, because of one or more of the diseases above. Some fields were rather heavily infested with plant lice in Pinal and Maricopa counties, yet the injury was not very great. The potato Pysllid was no problem at all. However, some fields were infested with leafhoppers in small numbers. Applications of dusting sulphur gave good control of those leafhoppers present. In Maricopa County a test planting of seed tubers from the U. S. Experiment Station, Greeley, Colorado were tested on the farm of John Jacobs. This test was in cooperation with Mr. H. Tate, Extension Horticulturist, and Mr. Powers, Assistant Agent, Maricopa County. The test was chiefly for scab resistant characters. This is reported by Mr. Tate. The test was also repeated at Flagstaff, by Mr. Tate and County Agent Lueker.

During July 1945 the writer, with Mr. Moody, County Agricultural Agent of Yuma County, visited the University of Arizona Agricultural Experiment Station, near Yuma. We found a serious infestation of ring rot and fusarium wilt in potatoes certified by the Arizona Fruit and Vegetable Standardization Group. Over 90 percent of the tubers were rotten.

During March 1945 a meeting was held with eight (8) potato growers of Flagstaff, at the request of County Agent Lueker. Special stress was made on the purchase of good seed potatoes. During the year a mimeographed article was sent to potato growers, suggesting that they purchase only good seed tubers.

Evaluating the results, it is evident that the need for purchasing good clean seed is still the number one problem. Farmers realized more than ever that clean seed must be purchased. In all parts of the state ring-rot is still the big problem, and not until serious losses had occurred did the growers realize what we had been preaching.

B. Lettuce, Couliflower, Cabbage, and Broccoli Insects

During the fall of 1945 lettuce was severely injured by field crickets, as it came through the soil, then as the lettuce started to grow the plants became heavily infested with cabbage loopers, imported cabbage worms, diamond back moth, beet army worms, and a Prodenia sp. The crickets were controlled with poisoned baits. The plants were dusted with calcium, calcium arsenate-paris green mixture, Cryolites, Sabadilla, and DDT. The controls were very poor and discouraging. Most of the poisons were applied by airplane and many reports of dusting when the wind was blowing were reported. A heavy loss of honey bees was also reported during this period. During the early months of 1945 aphids caused some injury to lettuce, cabbage, broccoli, and with the shortage of nicotine this injury was greater than it should have been.

Evaluating the results, it is evident that the shortage of nicotine caused losses and that it may also be a factor during 1946. It is hoped that rotenones will be available by 1946 in order to allow a dust that can be used on these vegetables after they start to head. It is thought that better control of these insects may be secured with the airplane if dusts are applied when winds are not blowing.

C. Cantaloupe and Watermelon Insects

The cucumber beetles continue to cause injury to cantaloupes, watermelons, and honeydew melons, when they first come through the soil. Applications of an arsenical dust at this time, by ground dusters, has given excellent controls. When large quantities of rotenone return to the market they may be substituted.

Due to shortage of nicotine some fields of melons suffered from injury by the aphids.

D. Corn Earworm Control

The sweet corn acreage is on the increase in Maricopa County and the injury by the corn earworm continues to be very severe. No marketable corn can be harvested unless control measures are practiced.

Working with Assistant County Agent, Powers, of Maricopa County, a field test, for control of the corn earworm Heliothus Armigera Hubn. on sweet corn, was set up on the farm of Bill Katich near Phoenix. The test was set up to test oiling, clipping, and dusting with a 10 percent DDT dust. The results were as follows: straight oil, 15.7 percent ears injured; clipping, 9.7 per cent ears injured; DDT, 31.8 per cent ears injured; and check, 50 percent ears injured. The results show that oiling or clipping are the best methods to use in Arizona at the present time. A cheaper and better control should be worked out as the present labor is very unsatisfactory for applying the oil correctly.

E. Home or Victory Gardens

The Home or Victory Gardens were pushed during 1945 by the Agricultural Extension Service as a whole. The Maricopa County Agricultural Agent's office, working with Radio Station KOY, put on a weekly program called "KOY Garden". This program was headed by Assistant County Agricultural Agent Powers. Each week some member of the Extension Service would give a program on garden problems. The writer was on about six of the programs and gave pertinent facts on insect control.

Assistance was also given to agents in other counties of the state when it was needed.

F. Tomato Insects

During 1945 the vegetable weevil Listroderes obliquus appeared in many parts of Maricopa County. The insect was first found in Phoenix on tomatoes. A home gardener reported destruction of tomato plants in an unusual way. A visit revealed the vegetable weevil. Many hundreds of tomato plants were destroyed in the county by this insect. It is hoped that it will not get into the celery planting.

The tomato russet mite continued to show up in other parts of the state. In Cochise County it did considerable damage unless controlled. Application of sulphur or a mixture of a stomach poison and sulphur gave good control.

The western tomato blight or yellows, the disease "curly top" spread by the beet leaf hopper to tomatoes, was very serious during 1945. In Yavapai, Coconino, Graham, and Navajo counties many plantings were 100 percent loss. Those plantings that were covered with a cheese cloth cover until after fruit was well set, showed only a small percentage of loss. The writer still cannot understand how shading eliminates the insect.

The tomato hornworm and pinworm caused some injuries in the state, especially in Maricopa and Yuma counties. Application of Cryolite seemed to work well.

G. Celery Insects

During April 1945, over 1200 acres of celery were planted in beds for later replanting. During August and September the plants were moved to field beds. The weather during the transplanting was extremely hot and adverse for such plantings.

Late in September and early in October the growers started loosing plants and examination revealed about 1 to 5 percent were infected with a virus of a yellows strain, however, the greatest loss was from poor transplanting, burn from fertilizer, unusually high temperatures, and improper cultivation. During November the celery leaf tear appeared and caused considerable damage. Applications of cryolite and some cyanide by airplane failed to give desired results, and a pyrethrum dust mixture applied by ground dusting machinery, at the suggestion of the writer, gave excellent results. The dust was applied in this manner--one dusting followed by another, at the rate of 30 pounds per acre per application.

H. Mung Beans

Several hundred acres of mung beans were infested with garden webworms of several species. An application of 10 percent Sabadilla dust gave excellent control of the worms.

I. Onion Thrips

Observations made in an onion seed field in Cochise County that had been dusted with 5% DDT dust, showed excellent control. The DDT dust had been applied by airplane.

J. Vegetable Weevil

The vegetable weevil appeared in Maricopa County during the early spring of 1945 in rather alarming numbers. It is hoped that it will not spread and become a pest to the commercial crops of this area.

Project 5. Orchard Insects

A. Dicotyledonous Fruit Insects

1. Thrips on Apples

During 1945 the worst infestation of thrips ever recorded appeared in apples in Yavapai and Coconino counties, and caused almost a complete loss in many orchards. The thrips started feeding on the buds just after they had started swelling, and if not controlled, the buds would turn brown and never open into a bloom. One grower made three applications of a nicotine sulphate spray of 3/4 pint 40% nicotine sulphate, 1/2 pint ammonia water, 1 gallon commercial oil emulsion to 100 gallons of water, at five day intervals, that helped a great deal, and he secured some fruit.

He was bothered with another problem--failure of certain varieties to pollinate correctly. Examination showed plenty of bees but poor pollinator trees, coupled with extremely high temperatures and high winds. A DDT spray of oil and the wettable types used, gave very poor results. The oil gave a severe burn to the trees sprayed.

In 1946 some more tests are to be conducted in Coconino County with County Agent Lueker, to determine exact procedure to follow to insure control of the thrips.

2. Codling Moth

With a very short apple crop the codling moth infestation was very high and injurious. Sprays as a whole did not give the results desired, and the chemically treated bands did not seem to be very effective. Examinations of several orchards showed very poor coverage of spray materials.

A test with a wettable DDT spray was conducted in Cochise County with County Agent Bliss. The results, however, were not very promising.

Evaluating the results and failures, we find a very definite need for a better spreader for the arsenical sprays. A better chemically treated band, or spray method, used in the Pacific Northwest should be tested. A spray schedule when set up should be followed as nearly as possible.

3. Woolly Apple Aphis

The woolly apple aphis in 1945 was very active, and the demand for parasites very numerous. During 1945, parasites were distributed from Coconino County, Frank Pendley orchard, to Yavapai, Cochise, and Gila Counties. During August the writer took County Agents Bliss, and Armstrong to the Oak Creek Canyon area and showed how the parasite had established itself in the orchard of Frank Pendley. It is hoped that the parasite will become established in Cochise County and can then be transplanted to Graham County.

4. Giant Grubworm

The giant grubworm was reported in one young peach orchard in Yavapai County.

5. The Peach Twig Borer and Other Peach and Apricot Pests

Assistant County Agricultural Agent, Powers, of Maricopa County, continues to get good results with his growers. Peaches and apricots free of worms are very plentiful on the local markets.

In the higher elevation counties, the twig borer continues to be a pest, unless control measures are carried out.

The peach mosaic continues to bother peach growers in Cochise, as well as other counties of the higher elevations. The Bureau of Entomology and Plant Quarantine, is making a planting of peaches in the Salt River Valley, for some experimental work for control of the peach mosaic by a possible spray schedule. The experiment is to be located on the Bartlett-Heard Ranch near Phoenix. The writer is assisting with the work as much as possible. Some spray experiments for control of vectors of peach mosaic, are to be conducted on the farm of Mr. Grissel in Cochise County.

B. Citrus Insects

During March 1945, Mr. Woglem, and Mr. Lewis, Entomologists with Citrus Exchange, with offices at Whittier, California, spent three days in Maricopa County with Assistant County Agent Powers, and the writer. The check up was to determine when to start spraying for control of citrus thrip. At the same time, we were assisting Mr. Patrick, of Phoenix, get a new sprayer duster set up for use in this area this season. After a three day study, it was suggested that spray applications in the spring should start when three-fourths of the petals on the south side have fallen.

In Yuma County, examinations of some citrus orchards, with Mr. Van Horn, and County Agent Moody, indicated that some thrips were becoming resistant to tartar emetic.

In Maricopa County, it was found that where orchards had been sprayed for three years or more, some resistance to tartar emetic was developing. However, with a shortage of nicotine, most growers continued to use tartar emetic.

The fall spraying, or late summer spraying for the new growth, was studied by Mr. Powers, Mr. Patrick, and the writer. It was decided that the sprays on oranges, lemons, and tangerines should be applied when the growth first starts. This spraying is very important, as it protects the injury of the much needed leaves.

In Maricopa County, several groves were dusted with straight dusting sulphur. The recommendation, by Mr. Mc Gregor, calls for three applications. These applications must be applied at the correct time, or the controls will be very unsatisfactory.

The writer assisted growers in Maricopa and Yuma counties in securing sugar from the OPA for their sprays.

Several small infestations of scale were found on ornamentals from California. However, workers from State Entomologist's office quickly eradicated the possible source, and prevented its spread.

In evaluating the results, we find the need for a further study of correct time for applications of sprays for citrus insect control. A study of the value of DDT in both spray and dust form is needed.

C. Grape Insects

The grape leafhopper control measures in Arizona were looking very bad, especially with no pyrethrum available. However, with the release of a certain amount of DDT the picture changed. Shell Oil Company came in and put on several tests with a DDT oil spray that gave 100 percent control of the hoppers. Most of the materials were applied with conventional sprayers, however, at Tal-Wi-Wi ranch, near Phoenix, one application was made with a fog machine of the Todd Ship Company. The writer did not see the application, but reports by others indicated a kill for about seven rows at the time. This demonstration was attended by Dr. Harry Dietz, Chief Entomologist, Du Pont Ne Mours Company, and Dr. Roy Hansberry of the Shell Oil Company.

Evaluating the results, it seems that DDT applied with a conventional sprayer or a spray-duster type will give good control of the grape leafhopper. Further work is needed before the fog type machine will be satisfactory.

Project 6. Stored Grain Insects

No work was done on these insects during 1945.

Project 7. 4-H Club Activities

During January, the writer worked with 4-H Club Leader Paul Brown of Maricopa County, on control of cattle grubs and lice. A demonstration was given at the farm of Mr. Terrell near Phoenix. There were 47 4-H Club boys and girls present, and the writer gave a demonstration on how to use a dust, scrubbing method with liquid and brush, and a method with hose and brush. In the dusts, equal parts of 5% rotenone and sulphur were used. For the other two methods a mixture of 5 pounds of 5% rotenone, 10 pounds of wettable sulphur in 100 gallons of water was used. The pictures on the opposite page show some of the demonstration. The boys and girls were gathered to learn how to judge beef cattle.

During February a motion picture on insects, put out by Du Pont, was shown to the Lavene school of Maricopa County. At the same time the writer gave a talk to the 4-H Club members of the Lavene school, on insects.

In April the writer, working with Mr. Brown of Maricopa County, assisted in training a 4-H Club demonstration team of the Roosevelt school, on cattle grub and lice control. The team was composed of a boy and girl. The pictures on the following page show some of this work. The team went to the 4-H Club Fair of Maricopa County, and won the prize for having the best demonstration for Juniors.

EXTENSION ENTOMOLOGIST DEMONSTRATING TO
4-H CLUB BOYS AND GIRLS HOW TO
CONTROL CATTLE GRUBS AND LICE



4-H CLUB DEMONSTRATION TEAM
SHOWING CATTLE GRUBS AND LICE CONTROL



The writer was on the staff of the summer camp for 4-H Clubs of the entire state, which was located in the Payson area--the Boy Scout Camp known as Camp Geronimo. About 100 4-H boys and girls were in attendance, and the writer had 14 of them in his nature class. The boys and girls were taught how to collect, preserve, mount, and identify many insects. The field trips proved very interesting. At the stunt night a playlet entitled, "I am an Insect and My Experience with 4-H Club Members" was presented by the 14 members.

During October two demonstrations on how to control cattle grubs were given to 4-H Club members of the Laveen School. The dust and spray methods were used. The leader, Mr. Spires, and 4-H Club Leader Paul Brown of Maricopa County, were also present.

A demonstration outline for control of external parasites of cattle was prepared and sent to all agents.

It is hoped that by next season some insect clubs can be started.

Project 8. Cooperative Projects with the Bureau of Entomology and Plant Quarantine

A. Grasshopper Control

The grasshopper control program in Arizona is handled in two ways, the voluntary farmer program, and the Government paid program. The voluntary program is handled by the Extension Entomologist, acting as State Grasshopper Leader, with the County Agents of each county. The Grasshopper Control Division also furnishes a State Supervisor who assists the State Leader. The State Leader also appoints a County Leader for any county not having a County Agent. In the cultivated areas of the state the program is carried on by the farmers spreading the bait. On certain range lands where the grasshopper infestations are deemed of interstate nature, a paid program is sometimes conducted. There is also a paid program at times on some of the Indian Reservations. When there is a paid program, the Grasshopper Control Division expects the State to match each dollar that they spend. This is usually handled by the State Entomologist of the Arizona Agricultural and Horticultural Commission. At the present time there is no state appropriation available for use in Arizona. It is hoped that the voluntary program will gain impetus in Arizona and that the farmers will realize the importance of baiting their hoppers.

During 1945 the grasshopper populations were very heavy in Apache, Coconino, Maricopa, Pinal, and Yuma counties in alfalfa and cultivated crops. Late in the season a heavy population of several different species showed up in Santa Cruz County. In Maricopa County, we found over 500 tons of dry bait used, however, the program was far from being a success. Many farmers failed to poison hoppers, why, no one knows, and those neighbors who poisoned were forced to use much more poison as self protection. Farmers must realize that each and every farmer must spread bait if they wish to control the hoppers. At the start of the season unsatisfactory results were secured with baits. At the suggestion of

Dr. Parker, of the research Division, the sodium fluosilicate was increased from 4 to 6 pounds per 100 pounds of ingredients and the bran and sawdust to a 50-50 mixture. In some areas sodium arsenite was used. It is evident that a concerted effort must be made to educate the growers more and more on the necessity of a county wide control. In Maricopa County three elevator type mixers were made according to a sample sent in by the Grasshopper Control Division. The machines mixed over 500 tons of bait in Maricopa County. In Yuma County, another mixer was made. These mixers did a wonderful job.

The amount of materials used in Arizona for grasshopper baits is as follows:

<u>Total Tons of Dry Bait Used in Arizona - 1945</u>					
County	Bran	Sawdust	Cottonseed Sod.Arsenite		Sod. Fluosilicate Pounds
			Hulls	Gallons	
Apache	25	36	0	700	2400
Coconino	11.25	11.25	0	21	0
Cochise	2.8	0	1.2	0	700
Navajo	2.5	0	0	35	0
Maricopa	287.85	280.00	0	2142	48076
Pinal	4.75	0	1.25	0	1600
Pima	1.5	1.5	0	0	1200
Yavapai	1.5	0	0	15	0
Yuma	<u>90.00</u>	<u>78</u>	<u>0</u>	<u>24</u>	<u>13000</u>
Totals	427.15	406.75	2.45	2937	66976

The fall survey for 1945 was made by the state Supervisor, Mr. A. E. Frazier.

Evaluating the results of the controls for 1945, we find 104,253 acres of crop land and 1200 acres of range land were baited. The baits were all mixed by local county mixing stations, at an average cost of \$4.00 per ton. The results of controls were very conflicting. However, where baits were spread well and more than one baiting used, good controls were secured. Early in the season poor results were secured. Why? No one can answer. It is evident that more research is needed, also a great deal of educational work is most necessary. The latter program should be pushed all winter.

Miscellaneous

During the season of 1945 the writer gave talks to Rotary Clubs of Holbrook, Yuma, and Wickenburg, as well as, several cattlemens' associations on "Entomology". Many members of these organizations are vitally interested in insect problems.

Throughout the year radio talks were given over radio station KTCU, Tucson, KSUN, Bisbee, and KOY, Phoenix. Several of the talks were

on the Arizona Farmer "Dinner Bell" program, while several were on KOY "Garden" program. These talks were on various insect problems, grasshoppers, external parasites of livestock, and vegetable pests.

At the request of the University of Arizona authorities, a morning in June was spent with Mr. William Bray, Superintendent of Buildings at the University. He showed me all of the termite infestations and methods of combat. It was found that some of the injury was different from that usually found, and that some research work is needed. It was further suggested to Mr. Bray, and Director Pickrell that they convey to the Board of Regents, through the President, that all future buildings of the University should be constructed to conform with specifications for termite prevention set up by the Bureau of Entomology and Plant Quarantine, in a publication that was secured for him. A folder on "Termites" is in the press.

A severe elm scale infestation appeared on the elm trees in the Yavapai Court House lawn. The infestation looked very severe early in the season, but for some unknown reason the infestation almost disappeared during the late summer of 1945.

During April, Mr. Harold B. Powers, Assistant County Agricultural Agent, Maricopa County, and the writer spent several days in southern California looking over the citrus and celery work. At Riverside we contacted several of the leading research workers in entomology, plant pathology, citrus culture, agronomy, and the Director. It was very profitable in many ways. In Los Angeles County, Joe Ryan, worker of the Agricultural Commission, showed us the celery production at Venice, from planting to harvesting. With an increase of celery acreage in Arizona we needed to know some of the problems. We also spent a portion of a day at the Date Experiment Station at Indio. A visit to the Bureau of Entomology and Plant Quarantine, Truck Crop Insects Laboratory, at Alhambra, we found Roy Campbell's information very helpful.

With the release of DDT scheduled for early September, an article on "DDT" and its "Uses" was released early in that month. It was the idea that this information would be of use to those attempting to use DDT for control of various insects. This article is found elsewhere in this report. Some further reports were released on the use of the "Aresol Bomb" and other information on DDT will be as it becomes available.

On November 29th and 30th the writer attended the meeting of State Grasshopper Leader's Committee in Denver, Colorado. The work in Arizona was reported and the research work will be broadened. The meeting will help the writer carry on a better program in the future.

In Post-war Planning the writer has endeavored to point out the need for control of external parasites of livestock. This need will be reflected in a demand for quality beef in the near future, and animals infested will not produce quality beef.

The writer assisted with local war chest campaign as well as the Red Cross Campaign. This work was done mostly during off hours and evenings.



ANT CONTROL DEMONSTRATION, GRAHAM COUNTY

A series of demonstrations on control of the large Agricultural ant, were conducted in Graham County with Mr. S. L. Owens, County Agent. These demonstrations were given in several parts of the county. Carbon bisulphide was used as the killing agent. About 85% of the applications were complete. The control of these ants is very important in that county.

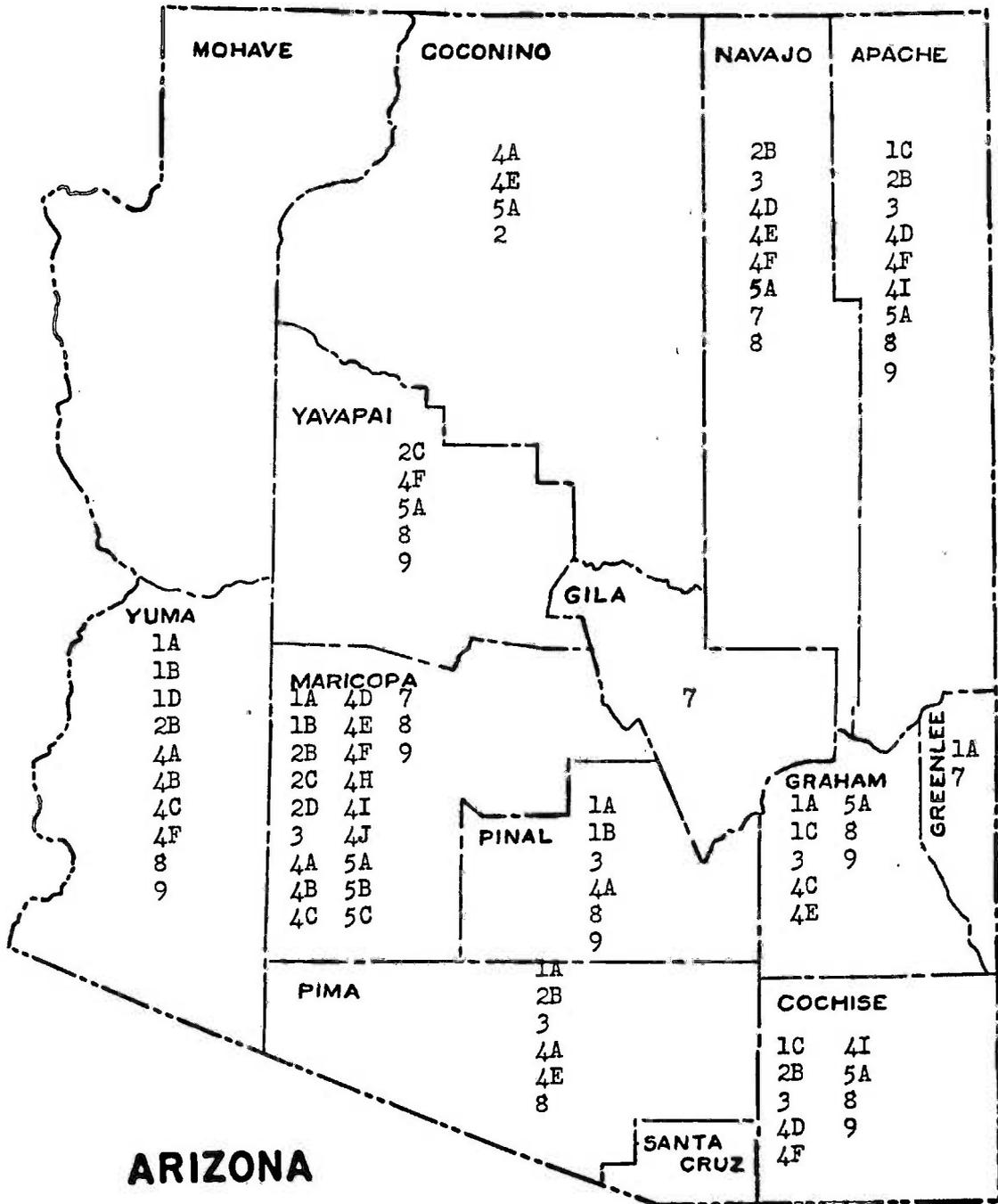
STATISTICAL REPORT

Days in the field	189
Days in the office	110
Agricultural Agents visited	17
Home Demonstration Agents visited	7
Demonstration meetings held	25
Attendance	475
Articles for Newspapers	9
Letters written	369
Farm and ranch visits	410
Circular letters	16
Other meetings pertaining to projects	26
Attendance	802
All other meetings	4
Attendance	125
Radio addresses	9

STATISTICAL PROJECT SUMMARY BY COUNTIES
NUMBER OF VISITS TO EACH COUNTY
PROJECT NUMBER

County	1A	1B	1C	1D	2A	2B	2C	2D	3	4A	4B	4C	4D	4E	4F	4G	4H	4I	4J	5A	5B	5C	6	7	8	9	
Apache						5								2											4	2	
Cochise			1		1				1				1		1			1		5						3	1
Coconino										4				2						5						2	
Graham	4		1						1			1		2						1						2	1
Gila																									1		
Greenlee	1																								1		
Maricopa	10	3			2	5	10	3	5	10	3	5	20	5	5	2	3	6	2	16	3			6	20	7	
Navajo					2			2					1	2	1					2					2	2	
Pima	2				2				1	1				1												3	
Pinal	7	1							2	1																4	1
Yavapai						4									2					2						1	1
Yuma	3	6		1	1						4	2	1		2											6	1

Project 1A	Cotton Insects	Project 4E	Home or Victory Gardens
Project 1B	Alfalfa Insects	Project 4F	Tomato Insects
Project 1C	Alfalfa Treehopper	Project 4G	Celery Insects
Project 1D	Flax	Project 4H	Mung Bean Insects
Project 2A	Screwworm	Project 4I	Onion Thrip
Project 2B	Cattle Grub and Lice	Project 4J	Vegetable Weevil
Project 2C	Goat Lice	Project 5A	Deciduous Fruits
Project 2D	Dog Ticks	Project 5B	Citrus Insects
Project 3	Household Insects	Project 5C	Grape Insects
Project 4A	White Potato	Project 6	Stored Grain Pests
Project 4B	Lettuce, Couliflower, etc	Project 7	4H Club Activities
Project 4C	Cantaloupe & Watermelon	Project 8	Grasshoppers
Project 4D	Corn Earworm	Project 9	Miscellaneous



SUMMARY

If Arizona intends to continue to produce cotton, the insects must be controlled in a profitable manner. During 1945 over 2,000,000 pounds of cotton dust were applied to cotton for control of Hemipterous Cotton insects, with rather pleasing results. There is still an important need for an insecticide that will give a better control of the stink bugs. Again this year, the airplane was used by many for applying the dusts. In some instances it was found that the dusts were not applied according to recommendations. In many instances, the dusts were applied during the middle of the day when winds were very strong. The results were that many bees were killed and that poor applications of dust were made. Farmers must be further shown that it is important to purchase the right dust material and that it is applied when no wind is blowing. During 1945 the dust mixture of 15 pounds Paris Green and 85 pounds of dusting sulphur was found to give good results. DDT and sabadilla look very promising for control of the cotton insects. Sabadilla looks very effective for control of both Lygus and stink bugs, while DDT is not as effective against stink bugs.

Alfalfa seed insects, especially Lygus and stink bugs, caused considerable injury in both Maricopa and Yuma counties. In some areas of Yuma County a large bird grasshopper, Shistocerca shoshone, caused considerable damage to the seed crop just prior to harvesting. Field tests conducted by the writer and County Agent Moody of Yuma County, showed that a 10% Sabadilla dust would give good controls of Lygus and stink bugs, and give good increase in yield of seed. The DDT dust was not as promising as the Sabadilla this season. Indications were that the higher the temperature the greater the effectiveness of the Sabadilla and the reverse with DDT. Many growers in Yuma County used 10% Sabadilla dust with profitable increases in yield. The alfalfa butterfly also caused severe losses in the state. The field tests however, are only indicative and point the need for research.

The alfalfa treehopper, or girdler, caused considerable injury in Cochise and Graham counties, and should be studied during 1946.

External Parasites of Cattle are becoming of greater importance in Arizona and ranchers and cattle feeders are realizing that they must control them if they are to produce quality beef. In Apache County some more dipping vats were built and County Agent Rogers now has vats in practically all parts of the county. During 1945 about 50,000 head of cattle were dipped, sprayed, or dusted for control of grubs and lice. In Maricopa and Pima counties the county Agents pushed the use of rotenone-sulphur mixtures for control of grubs and lice on dairy cattle. The writer had two articles in the fall of 1945, in the Arizona Dairy Herd Improvement monthly report on this work. The writer now has Tovrea's Packing Company of Phoenix, interested in building a vat and controlling the parasites. It is hoped to set up some tests where weights of treated and untreated cattle can be secured. A need for more definite information on DDT on flies and lice is of great importance. It is the desire of the Extension Entomologist that all ranchers

and feeders will realize the importance of control of the external parasites and do something about it. The control of screwworms, by Smear 62 continues to be used by practically all ranchers. This is brought about by cooperation of the Secretary of the Arizona Cattle-men's Association during the season in offering to send out the material to any ranchers.

The control of Goat Lice continues to be of importance. The value of DDT needs to be worked out.

Dog Ticks have increased, due to the shortage of nicotine, which is used for cleaning up the infested yards.

Household Insects continue to be of great importance. As pointed out last year, the air conditioning, central heating systems, and wall-to-wall carpeting are making the homes ideal for moths, carpet beetles, and such to live in. The demand for demonstrations on control of household insects, has been great during 1945 and looks very promising for 1946. Many housewives have been greatly disappointed in DDT in the home for control of household insects.

Vegetable Crop Insects have been very numerous during 1945 and no doubt the shortage of nicotine, rotenone, and pyrethrums have been felt. White potato insects were not so harmful, but diseases of all kinds almost wrecked the entire potato deal. Starting with Yuma and continuing into Maricopa and Pinal counties we found severe infestations of rhizoctonia, wilts, mosaics and ring rot. The Extension Entomologist attempted to point out in the early spring the importance of purchasing the seed tubers early and purchasing only good stock. Emphasis was placed on this by sending out a circular letter.

Lettuce and Cabbage etc. was hard hit by crickets when the plants first sprouted, but apple-peel baits gave good results. During the fall some 22,000 acres in Maricopa and Yuma were hard hit by cabbage worms--- three species---corn earworm, beet armyworms, and a Prodenia sp. These insects were dusted with arsenicals and fluorines, with arsenicals being in the majority. Many fields were dusted three and four times, with poor to good results. Poor results often came from dusts not being applied correctly. In many instances the dusts were applied during the middle of the day when high winds were blowing. This type of dusting killed many bees and also caused complaints from dairymen. Emphasis must be stressed on when to apply dusts if good results are to be secured. An attempt should be made to locate and use some insecticides that are not so harmful to bees and livestock.

Cantaloupes and Watermelons continue to be attacked by cucumber beetles---several species---just as the plants push through the soil. A band of arsenical dusts applied by ground dusters has given good results.

The Corn Earworm continues to be very harmful to sweet corn. Tests conducted by H. B. Powers, Assistant County Agent, Maricopa County, and the writer showed that DDT was not as effective as the pyrethrum-oil mixture applied to individual ears. A need for a cheaper control than the present oil is needed.

The Home or Victory Garden work was given great emphasis by radio station KOY in Phoenix. The writer was guest speaker several times during 1945. Other counties were also assisted.

Tomato Insects were very injurious during 1945. In the lower elevation counties, especially Maricopa, the vegetable weevil appeared in great numbers and destroyed many plants. This insect must be watched very closely. The tomato russet mite continues to be very injurious unless controlled. It did considerable damage in Cochise County during 1945. The western tomato blight or yellows, spread by the beet leafhopper, caused heavy losses in the higher elevation counties during 1945 unless plants were covered as reported by the Extension Horticulturist.

Celery Insects are appearing with the increased acreage of celery in Maricopa County. Red spiders and webworms caused considerable injury. Some virus diseases appeared in small numbers. Greatest loss was due to improper planting and lack of knowledge on growing celery.

Onion Thrip appears to be controlled by a DDT dust. The vegetable weevil, previously mentioned, may cause serious losses to commercial growers if it spreads. A close watch for this insect should be made during the early months of 1946.

The Orchard Insects were again very active in Arizona during 1945. The controls of some of the insects, especially thrip, was hindered by the shortage of nicotine. Again this season the chemically treated bands for codling moth failed to give very good results. Spraying schedules for codling moths also failed to give the results desired. Observations by the writer indicate the need of a better spreader for the arsenicals being used. The thrips appeared early in great numbers on apples and in many instances did not allow the apples to open their blooms. One grower secured fair results with three applications of a nicotine-oil spray at 5-day intervals. The use of DDT did not look too promising. The problem needs a close study and some tests have been arranged for 1946, with a grower in Coconino County. The Codling Moth was very active as the fruit was thin and spray coverages poor. DDT used as spray did not look too good. Some work with spreaders is greatly needed. The Woolly Apple Aphis was very active in all parts of the state. Another effort was made to distribute the parasite from Coconino County to Yavapai, Gila, and Cochise Counties. A visit to the Frank Pendley orchard, in Coconino County, by County Agents Armstrong, Bliss, and McLernon, and Horticulturist Specialist, Tate, showed how the parasites were cleaning up the woolly apple aphis. This parasite was first established by specimens sent in by workers of the Bureau of Entomology and Plant Quarantine at Yakima, Washington.

The Peach Twig Borer continues to be very injurious to all stone fruits unless it is controlled. The peach mosaic is also troublesome in some areas. Some research work is to be started in Salt River Valley by Bureau of Entomology and Plant Quarantine workers.

The Citrus Thrips continue to be a problem on citrus, and further observations are needed to determine the number of sprays to apply each year, also to determine if resistant strains of thrip are appearing where tartar emetic has been used for several seasons. There is a definite need for some work with DDT sprays and dusts.

Grape Insects. It appears that a DDT-oil spray will give excellent control of the grape leafhoppers when applied with a conventional type of sprayer, a spray duster type, or the fog machine. The latter may have some good points but further study is needed on this type of machine.

The 4-H Club Activities were increased during the year and the writer hopes that more progress will be made during 1946. A great deal of time was spent with control of external parasites of livestock and some excellent results secured. Demonstrations were given to several groups on how to control cattle grubs and lice. One demonstration team helped and won the County Prize for the best Junior demonstration team at the Annual County 4-H Club Fair. The Extension Entomologist was also on the staff of the State 4-H Club Camp and gave instructions on Nature during the entire ten day program. It is hoped that the 4-H Club insect manual will be completed soon.

The Grasshopper Control program in Arizona is handled by the Extension Entomologist as the State Grasshopper Leader. The program in Arizona was very active during 1945 in Apache, Coconino, Maricopa, Pima, Pinal, and Yuma Counties. Over 800 tons of dry baits were spread by farmers during 1945, and still the writer would not call it a successful program. The baits did not give best results. Why? This question is just about a \$64 one. However, we do know that some failures were due to improper spreading of bait. There is a decided need for more research and plenty of educational work. The farmers must be shown the importance of all growers controlling the hoppers and the importance of spreading baits correctly and not just one time. In Arizona ~~we find~~ 105,253 acres of crop land and 1200 acres of ranch land baited. This is big business and should be looked upon by the growers in the same manner. The egg surveys by State Supervisor A. E. Frazier, indicate another bad infestation in all counties infested during 1945, and possibly some new areas in Cochise, and Santa Cruz counties. In other words, farmers must get ready for grasshoppers during 1946.

OUTLOOK

The Agricultural outlook for Arizona is very bright, however, a great deal is dependent upon the central part of the state receiving some of the Colorado River water. The increased population still demands more food, and Arizona still has to import both poultry and dairy supplies in order to meet demands. As stated in previous reports, the topography and climate of the state afford a year-round production of some variety of vegetables and fruits, thus affording host plants for insects in the higher elevations during one part of the season, and in the lower elevations during the other seasons. Many insects find favorable breeding conditions in the native desert vegetation during the winter and spring. When the desert vegetation dries up, the insects move into the cultivated areas, and at times become injurious. The future of cotton depends a great deal upon the control of the insects and labor. The latter is one of most serious problems that confronts all Arizona Agriculture at the present time.

The state of Arizona, being the baby state of the Union, does not have but a limited amount of research data available. The Extension

Entomologist has been materially aided by results secured by workers of the Bureau of Entomology and Plant Quarantine, who are conducting experiments for control of cotton, alfalfa, and vegetable insects, and grasshoppers. The University of Arizona Agricultural Experiment can help post war agriculture by starting some research in Entomology. Arizona being one of the leading winter vegetable producing states has many problems with insects that need to be worked with.

It appears that many winter vegetables of Arizona will suffer during the early part of 1946 by lack of nicotine for control of aphids or plant lice. It is hoped that pyrethrum and rotenone products will increase and help the problem some.

With all of the problems confronting Arizona Agriculture, there is still a great promise for the future.

COOPERATIVE EXTENSION WORK
IN
AGRICULTURE AND HOME ECONOMICS
STATE OF ARIZONA

University of Arizona,
College of Agriculture and
U. S. Department of Agriculture
Cooperating.

Agricultural
Extension Service.

DAIRY HERD IMPROVEMENT NOTES
by
W. R. Van Sant,
Poultry and Dairy Specialist.

FEBRUARY 1945

There were four thousand two hundred and seventy-one (4271) cows in one hundred and one (101) herds, in Dairy Herd Improvement Associations in Arizona during the month of February 1945, with an average of eight hundred and twenty-two (322) pounds of milk and thirty-two and five tenths (32.5) pounds of butter-fat per cow.

SCREWORMS

by
J. N. Honey
Extension Entomologist.

Very shortly, screwworms will be on the increase and all dairymen should be certain to treat all wounds with Smear 62. All branding, dehorning, navel or other type of wounds should be treated as soon as possible after they occur, or are found, with the above mentioned material.

The control of the flies now will reduce the number for the rest of the season, which is more favorable for their rapid reproduction.

The objective of Smear 62 should always be two-fold. First, to protect the animals susceptible to screwworm attack; second, and of equal importance, to prevent the development of adult flies to attack more animals.

GRASSHOPPERS

by
J. N. Honey
Extension Entomologist

Be on the watch for grasshoppers this spring. Poison when they are about half grown. Do not wait until the hoppers can fly, as they are difficult to kill at that stage. Use poison bait that is available through your County Agent. Follow directions in spreading the bait. Control them, as they may destroy many tons of good dairy feed.

STRIPPING*

To strip or not to strip is the question Dr. George H. Hopson discussed recently in "Certified Milk", suggesting that dairymen build up a herd of cows that do not require stripping.

Dr. Hopson says many cows milk out quickly and completely and should not be stripped. First-calf heifers and young cows, if properly milked, seldom require this extra attention.

The need for stripping is best determined by an inspection of the udder. When the lower part of the udder becomes soft and flabby it is an indication that the gland is nearly empty. If the teat cups start to crawl this is another indication that the animal is about through milking.

At this time the operator should examine the quarters. If the glands are empty, the teat cups should be removed immediately and the animal considered milked dry. If a small amount of milk is locked in the lower gland sinuses it is well to pull down slightly on the teat cup assembly with one hand, using the other hand to massage the quarters. The manner in which machine stripping is done is important. The pull of the teat cups and massaging of the quarters should be simultaneous with the pulsations. The stripping act should take only a few seconds.

If the cows are hand stripped, three or four hand squeezes on each teat should be sufficient. Prolonged stripping is entirely unnecessary and may lead to the objectionable habit of cows giving large amounts of strippings.

In better milking herds the average stripping weights are from .1 to .5 lb per cow. Cows giving a pound or more strippings should be considered incompletely milked. Incomplete milking is an indication of something wrong in the milking routine. It should not be accepted as a necessary evil, but investigated and corrected.

Low vacuum will cause cows to give excessive strippings. Liners not at proper tension, or in poor repair, and leaky and worn pulsators may be the cause. Irritations of the skin, such as chapping, long neck warts or cow pox lesions, are painful and may cause a cow to "hold up" her milk. Faulty preparation of the cow for milking is often the cause of incomplete milking. In some cases, dairymen may be using too many units, which makes it impossible for the milker to get back to the first unit applied when the cow is finished.

* Taken from Dairy Digest February 1945

W. R. Van Sant
W. R. Van Sant,
Poultry & Dairy Specialist

DAILY HEAD IMPROVEMENT ASSOCIATION
HEADS AVERAGING THIRTY POUNDS BUTTER FAT
OR OVER
FEBRUARY 1945

MARICOPA COUNTY

OWNER	BREED	NO. COWS	AVG. MILK	AVG. FAT	NAME	HIGH COW	
						MILK	FAT
1	RH & RJ	31	1006	37.2	Helen	2007	30.3
2	GH	96	1138	39.2	No. 91	1784	67.8
4	GH	11	653	31.9	No. 91	1971	80.8
5	RJ	48	756	39.1	C. V. Beauty	1103	67.1
7	RH	58	1159	39.1	Speck	2036	69.2
10	GH	28	943	32.7	Dolly	1528	65.7
11	R & GH	25	1087	38.1	Vesta A,	1803	75.6
12	RJ	32	702	35.8	Cora	1444	72.2
13	RJ	21	681	34.4	Daisy	1226	58.3
15	RA	33	980	41.1	Fluffer	1694	71.1
16	GH	74	790	31.6	Pee Wee	1492	56.7
19	R & GG	97	730	34.6	No. 74	1632	57.1
20	RH	4	1169	45.2	Lady May	1736	72.9
21	GH	17	750	30.7	B 17	1506	48.2
24	R&GH&RJ	28	306	30.4	Gerda	1416	60.6
25	R & GG	49	741	35.5	Sue	1621	63.2
26	R & GH	53	1161	38.5	Cheater	2012	63.4
27	Mixed	58	824	31.2	Bawley	1370	69.2
28	R & GH	28	1117	35.3	Bosco	1013	47.4
29	RJ	23	753	40.5	Joyce	1213	31.6
30	RH	27	1014	33.0	No. 273	2135	70.4
31	Mixed	16	772	37.5	Kay	1243	69.8
32	GG	25	875	35.5	No. 11	1498	52.5
34	GH	28	1153	33.7	Anna	2167	34.5
35	RH	15	965	37.1	Linda 2nd	1372	70.4
38	R & GJ	70	644	33.2	No. 101	1500	67.5
41	Mixed	7	1063	38.3	No. 12	1750	49.0
42	GG	29	756	30.9	Blondie	1400	49.0
43	R & GG	29	887	35.8	No. 9	1310	51.1
46	GH	58	799	30.7	No. 37	1506	58.7
47	Mixed	15	918	32.1	Teats	1353	62.9
49	R & GH	19	782	30.5	Cream	1478	73.9
50	GH	30	1034	39.0	nuth	1542	64.8
51	RH	5	1098	34.2	Pensy	2036	55.0
52	R & GH	108	1066	36.8	No. 115	2144	70.7
52A	R & GH	20	1221	40.2	No. 236	2209	31.7
54	R & GH&G	187	832	31.2	No. 1	2360	66.1
58	CG & J	15	768	40.4	Willie	1201	63.6
59		31	892	33.0	Red	1134	62.4
60	GH	40	950	33.9	No. 22	2096	79.6
61	R & GH	46	1075	34.9	Horney	1372	59.0
68	RJ	95	755	41.0	Totsy	1243	69.8
72	G & RH	23	835	30.5	Lucy	1260	44.1
73	R & CG	13	329	35.7	Stompton	1027	45.2
74	R & GG	15	322	33.7	Lucy	1097	41.7
75	GH	16	647	31.6	No. 43	1061	47.8
76		15	987	34.4	No. 14	1204	49.3
77	RJ	11	653	31.9	Chermer	307	46.1

Herds over thirty pounds cont'd.

OWNER	BREED	NO. COWS	AVG. MILK	AVG. FAT	HIGH COW		
					NAME	MILK	FAT
79		50	939	32.8	No. 30	1537	53.7
81	mixed	34	347	30.6	Jean	1391	59.8
82	R & GH	57	983	35.4	Spitfire	1453	55.2
83	GJ	22	897	37.6	Bossy	1022	53.0
84	R & GH	30	1185	38.1	Rio Grande	1853	66.6
86	R & GH	279	964	32.3	No. 5486	1652	72.7
87	GH	46	932	31.0	Luna	1411	62.1
94	R & GH&G	644	972	31.9	Maude	1114	54.6
96	R & GG	35	802	31.6	No. 20	1333	61.1
100	Mixed	7	1244	35.5	Piebe	2260	65.5

PINAL COUNTY

102	RH	52	1506	54.4	Martha	2153	96.9
104	GH & GC	60	946	35.0	Nellie	1722	70.6
105	RH	12	1233	36.4	Julia	1456	64.1
106	Guernsey	10	768	35.0	Sally	1108	57.2
107	R & GH	59	836	32.6	L. O. 21	1996	79.3
108	R & GH	57	1011	36.6	Jennie	1436	74.7
109	RG	6	743	33.2	Arttis	302	39.7
115	RH & RG	59	936	34.3	No. 129	1162	60.4

SANTA CRUZ VALLEY

116	R & GG	77	763	34.2	Agnes	1347	74.1
118	R & GG	77	725	35.7	Star	1221	64.8
122	Mixed	11	1117	47.7	Heffie	1862	70.3

AVERAGE PRODUCTION FEBRUARY 1945

COUNTY	NO. HERDS TESTED	NO. COWS TESTED	AVE. MILK PER COW	AVE. FAT PER COW	COWS AVE.	
					40 50 lbs. B. fat	50 lbs. or more B.Fat
Maricopa	86	3593	809	32.1	561	263
Pinal	9	350	1001	37.1	52	61
Santa Cruz Valley	6	328	770	32.4	50	25

STATE AVERAGES

101	4271	822	32.5	663	354
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3-17-45
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COOPERATIVE EXTENSION WORK
IN
AGRICULTURE AND HOME ECONOMICS
STATE OF ARIZONA

University of Arizona
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P. O. Box 751
Phoenix, Arizona

Agricultural Extension
Service

FRUIT INSECTS

by

J. N. Roney
Extension Entomologist

APPLE INSECTS
STEPS IN CONTROLLING CODLING MOTHS
CHEMICALLY TREATED BANDS

During the season of 1944 several growers received bands that did not kill the codling moth larvae at all. The bands this season can be secured in Phoenix, as a local seed store has made arrangements to obtain some made in the state of Washington. See your County Agent at once if you desire some of this material. The use of chemically treated bands is an essential step in the control of the codling moth.

The bands, when applied around the trunk of a well scraped tree, with the corrugated portion next to the trunk of the tree, will trap a great number of the larvae and kill them. The bands should be eighteen (18) to twenty-four (24) inches above the ground level. In applying the band be certain to pull the wrap tight and overlap the ends about an inch to allow the fastening of both ends with the same staple or tack.

CAUTION--Do not place bands where a band was located the previous year as you may injure the trunk of the tree by the chemicals from the band. Apply the bands late in May or early June, and remove in the fall, as soon as the fruit is harvested. Never band real young trees.

BAIT TRAPS

In some apple growing regions, bait traps have been used in codling moth control. The bait is a fermented liquid of one (1) yeast cake in one (1) part of molasses (not corn syrup) and ten (10) parts of water. The above mixture is placed in shallow pans and then suspended near the tops of trees. The bait serves to help determine the abundance of moths for the purpose of prop-

one half ($\frac{1}{2}$) pint of 20 - 40 Ammonia water to the standard arsenical spray previously mentioned. It may be necessary to use nicotine spray several times during the season.

PEACH AND APRICOT INSECTS
PEACH TWIG BORER

The peach twig borer causes severe losses to peaches and apricots in Arizona, unless sprays are applied. One application of arsenate of lead two (2) to three (3) pounds per hundred (100) gallons of water, applied just as the blooms are in the pink stage will control the worm. Do not apply when tree is in full bloom.

POWDERY MILDEW OF APPLES

In some orchards of the state powdery mildew has become very injurious. How can it be controlled? The most effective applications are the "prepink" and "pink". Later sprays will keep foliage clean, and when these are combined with systematic pruning of mildewed shoots that appear, there will be a noticeable reduction in the mildew infection the following season.

SPRAY SCHEDULE

"Prepink" -- little leaves separating just enough to expose bud cluster.

"Pink" -- Just before blossoms open.

Materials to use -- lime - sulphur.

$2\frac{1}{2}$ gallons to 100 gallons of water, or use

Wettable sulphur 6 to 10 pounds per 100 gallons water.

A 325 mesh conditioned dusting sulphur may be used if a power duster is available. The lime-sulphur or wettable sulphur may be used with lead arsenate spray--use one (1) pound hydrated lime to each one hundred (100) gallons of water if lime-sulphur is used. The wettable sulphur may be used without addition of lime. In using wettable sulphur make a paste out of the sulphur, then add to spray tank, keeping the material well agitated as it is added.

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2-26-45

COOPERATIVE EXTENSION WORK
IN
AGRICULTURE AND HOME ECONOMICS
State of Arizona
P.O. Box 751
Phoenix

by
J. N. Roney, Extension Entomologist

WHITE POTATO SEED TREATMENT

- I. Secure good clean seed tubers at all times.
- II. In cutting use rotary knife, revolving in hot water if possible; if not available, endeavor to put knife in a disinfectant whenever a bad tuber is cut.
- III. If seed is to be treated, use mercuric chloride, according to Extension Circular No. 67. If rhizoctonia is to be controlled the seed should be soaked by placing tubers in a pile, moistened, and covered with wet sacks for twelve (12) hours or more. High Plain Potato workers do not suggest the use of organic mercury.
- IV. Plant only clean tubers.
- V. Seed treatment will not cure scab

4-13-45
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COOPERATIVE EXTENSION WORK
IN
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DAIRY HERD IMPROVEMENT NOTES
by
W. R. Van Sant
Poultry and Dairy Specialist

OCTOBER 1945

There were 4020 cows in 100 herds tested in D. H. I. A. in Arizona during the month of October with an average of 828 pounds of milk and 32.1 pounds of butter-fat per cow. This is an increase of 85 pounds of milk and 3.7 pounds of butter fat per cow over September. Also, an increase of 12 herds, 18 pounds of milk and .5 pounds of butter fat per cow over October of 1944.

Maricopa County had 3476 cows in 86 herds, averaging 814 pounds of milk and 31.6 pounds of butter fat per cow. This is an increase of 79 pounds of milk and 3.6 pounds of butter fat per cow over September 1945.

Pinal County had 264 cows in 8 herds averaging 984 pounds of milk and 35.9 pounds of butter fat per cow. This is an increase of 149 pounds of milk and 4.6 pounds of butter fat per cow.

Santa Cruz Valley Association had 280 cows in 6 herds averaging 858 pounds of milk and 36.0 pounds of butter fat per cow. This is an increase of 119 pounds of milk and 5.9 pounds of butter fat per cow over September.

NEW HERD BOOKS

During the past several years, the Bureau of Dairy Industry and individuals working in the D. H. I. A. have accumulated data for improving the program. After compiling these data, a new D. H. I. A. Herd Book has been prepared by the Bureau of Dairy Industry. This new Herd Book will be available for use in Arizona within the next thirty to sixty days.

At a recent meeting, the Board of Directors of ~~Yuma~~^{Yuma} Association approved of the use of the new Herd Book and changed the entire program. Like anything new, there may be some criticism of the new book and program. However, we are sure that the new program is a definite improvement and the information obtained will be more valuable to the dairymen.

It will require several months to make a complete change, and obtain all of the necessary information for the new Herd Book. It is hoped that every dairyman will cooperate with the testers and give all the assistance that they can to make the D. H. I. A. program more successful.

CATTLE GRUBS

by

J. N. Roney
Extension Entomologist

Cattle grubs have started to appear in the backs of dairy cattle in the Salt River Valley. The eggs for these grubs were laid on the hairs of the legs last spring, by the heelfly. From the eggs hatched small grubs which entered the leg and traveled up the loose muscle tissue of the legs and the belly to the esophagus, where they fed until a short time ago. From the esophagus they moved rapidly to the subcutis of the back region and there they make a hole in the skin or hide of the animal. After making this exit hole they settle down in the back, just beneath the hole, and here the grubs remain for six to eight weeks, growing in size all of the time. This grub causes the big lumps in the back of the cow.

At the end of the period mentioned in the previous sentence the grubs emerge from the back, fall onto the ground, and work their way under a stone or the soil. In this resting place the grub pupates or transforms into a heelfly in about eight to ten weeks.

WHAT IS THE DAMAGE DONE BY GRUBS?

1. The heelfly disturbs the dairy cow in the spring and may cause her to fall off in production of milk as much as ten to twenty-five percent.
2. The continued running of the cows may cause them to lose their calves.
3. The grub causes a loss of thirty-one million pairs of shoe soles each year, as the sole leather comes principally from the back area.
4. With need for more milk, at the present time, it is advisable to control these grubs.

HOW DO WE CONTROL GRUBS?

In order to control cattle grubs we must kill the grub--not the heelfly. The heelfly is so scattered that it is almost impossible to control it at the present time.

The cattle grubs may be controlled in the Salt River Valley, by treating the cattle during the period from November 15th to December 30th. What do we suggest? You may use either a dust or a liquid. If a dust is desired you may mix one part of a 5% rotenone powder with one part of wettable sulphur. Place the contents in a container, shake well to mix, then punch holes in the top of the container. Now sprinkle the dust mixture over the back of the animal, at the same time rubbing it into the hair with your hand. It takes only a small amount to do the job.

If a liquid is used, you may mix one pound of 5% rotenone powder, two po of wettable sulphur in twenty gallons of water. The liquid may be scrubbed into the back with a scrubbing brush or it may be applied with a sprayer, capable of producing 200 to 400 pounds of pressure. Use just enough of the liquid to thoroughly wet the back of the animal. The scrubbing and high pressure open the grub holes and let the insecticide enter and kill the grubs.

How many treatments are needed? If the grubs are bad, it may take two or three applications, at thirty day intervals, to do the job. The extra treatments are needed as all heelflics are not hatched at the same time.

Control the grubs -- make more milk, more good leather, and better cattle in all respects.

In addition to the cattle grubs, some dairymen may be confronted with lice. What do they do? They seldom cause death, except in very severe infestations, but they do definitely cause lowered vitality, slow growth, and in producing cows, a reduction in milk.

HOW DO WE CONTROL LICE

Lice may be best controlled by dipping. If only a few animals are to be treated, they may be sprayed or dusted with a wettable sulphur and rotenone mixture. The dust mixture should consist of one pound of 5% rotenone powder, plus nine pounds of wettable sulphur or 325 mesh conditioned dusting sulphur. If the animals are dipped or sprayed use the following:

10 pounds 5% rotenone powder
100 pounds wettable sulphur
1000 gallons of water

HOW MANY TREATMENTS NEEDED?

It will take two and sometimes three treatments to get the job done. If only two treatments are necessary, apply the second seventeen to twenty-one days after the first. If three treatments are needed, make the second ten days after the first, and the third seventeen to twenty-one days after the second. All portions of the animal's carcass must be treated.

CAN WE USE DDT?

It is not suggested at the present time. More research is needed.

W. R. Van Sant
W. R. Van Sant
Poultry & Dairy Specialist

DAIRY HERD IMPROVEMENT ASSOCIATION
HERDS AVERAGING
THIRTY POUNDS BUTTER FAT OR OVER
OCTOBER 1945

MARICOPA COUNTY

<u>OWNER</u>	<u>BREED</u>	<u>NO. COWS</u>	<u>AVG. MILK</u>	<u>AVG. FAT</u>	<u>HIGH COW NAME</u>	<u>LBS. MILK</u>	<u>LBS. FAT</u>	<u>NO. COWS 40-50 F</u>	<u>NO. COWS 50 UP</u>
1	RH&RJ	36	1084	36.3	Joy	2008	70.3	9	4
4	GH	78	1103	36.7	No. 93	1587	55.5	22	7
5	RJ	26	769	36.5	Jane	1354	56.8	5	4
7	RH	61	1086	37.5	Timmie	1531	56.6	20	7
8	Mix	56	783	30.6	No. 26	1280	58.9	7	4
10	GH	21	972	38.2	Betsy	1435	66.0	2	6
11	R&GH	28	1022	32.9	Patty B	1748	57.6	6	2
12	RJ	36	894	42.0	Princess	1153	63.8	7	12
13	RJ	12	788	40.0	Sweetie Pie	1035	46.6	9	0
15	RA	35	790	32.9	Flakie	2024	70.8	10	1
16	GH	81	853	34.4	Horns	1643	65.6	18	6
19	R&GG	80	741	35.4	No. 30	1584	85.5	16	10
20	RH	8	1122	35.8	Mabel	1389	45.8	5	0
24	RJ&R&GH	34	914	32.6	Tek	1698	59.5	6	1
25	R&GG	33	979	42.2	Princess	1488	71.4	6	10
26	R&GH	55	918	31.2	Girl	1572	53.4	6	2
28	R&GH	23	1072	38.0	Lou	1804	61.3	4	6
33	R&GJ	102	614	31.2	No. 46	833	58.3	13	8
35	RH	13	830	32.0	Alice	1088	45.7	3	0
38	R&GJ	56	635	34.5	No. 119	1171	79.6	9	8
43	R&GG	21	1046	44.2	Rooks	1450	58.0	7	6
46	GH	35	839	33.2	Spike	1603	60.9	10	2
48	GH	14	765	30.9	Bess	1181	47.2	2	0
50	GH	20	1150	42.8	Ruth	1441	60.5	8	6
52	R&GH	109	820	31.1	No. 63	1447	78.2	11	5
54	R&GH&G	168	902	32.6	No. 377	1615	75.9	29	14
53	GG&J	10	600	33.8	Nigger	1236	66.7	0	2
60	GH	40	953	32.4	No. 22	1348	52.6	7	3
61	R&GH	47	1073	35.3	Scab	1848	68.4	7	7
68	RJ	87	857	42.4	Edith	1305	70.5	22	25
69	Mix.	76	852	30.2	No. 150	1504	67.7	6	3
70	RJ	8	532	31.8	Taxpayer Rose	644	40.5	2	0
73	R&gg	11	750	32.2	Crooked Horn	806	45.9	3	0
75	GH	18	729	37.6	No. 7	1194	62.1	5	3
77	RJ	14	731	37.8	Dunburry	926	50.0	5	1
79		86	914	37.6	No. 91	1667	66.6	24	8
84	R&GH	19	1356	43.6	Norma	1999	85.9	9	5
86	R&GH	174	926	31.6	No. 5948	2133	78.9	25	14
87	GH	43	1160	42.2	Marian	1326	80.3	9	12
90	Mix	45	926	36.6	Hazel	1001	51.1	13	2
98	GH	7	835	31.8	Cherry	1156	45.1	3	0
99	GH	37	1014	34.2	No. 027	1249	50.0	3	1
100	RH	5	1421	47.0	Mae	1928	59.8	0	3
150	R&GH	33	1033	35.0	Fanny	1742	59.3	7	3
153		66	715	31.4	Vina	1401	78.4	14	5
154		22	951	30.5	Snokey	1767	53.0	4	1

PINAL COUNTY

<u>OWNER</u>	<u>BREED</u>	<u>NO. COWS</u>	<u>AVG. MILK</u>	<u>AVG. FAT</u>	<u>HIGH COW NAME</u>	<u>LBS. MILK</u>	<u>LBS. FAT</u>	<u>NO. COWS 40-50 F</u>	<u>NO. COWS 50 UP</u>
101	Mix	63	847	31.0	No. 19	1587	55.5	7	4
102	RH	16	1349	47.2	Josephine	1609	70.8	4	7
104	GH&GG	61	1053	39.8	Lena	1969	70.9	18	12
105	RH	14	1252	45.9	Julip	1717	72.1	1	6
106	G	15	684	32.2	Sue	1063	57.4	2	1
108	R&GH	51	1160	39.0	Cora	1962	70.7	11	8
109	RG	16	893	37.7	Bonnie	1857	61.3	3	2

SANTA CRUZ VALLEY

<u>OWNER</u>	<u>BREED</u>	<u>NO. COWS</u>	<u>AVG. MILK</u>	<u>AVG. FAT</u>	<u>HIGH COW NAME</u>	<u>LBS. MILK</u>	<u>LBS. FAT</u>	<u>NO. COWS 40-50 F</u>	<u>NO. COWS 50 UP</u>
115	RH&RG	26	982	40.2	No. 42	2062	80.4	3	8
116	R&GG	76	888	39.2	Grace	1520	73.0	17	9
118	R&GG	71	872	40.5	Molly	1860	83.7	15	14
121	Mix	54	781	33.0	Nigger	1621	63.0	11	3
122	RJ&GH	6	1193	39.6	Sybil Girl	1042	50.0	2	1

COUNTY AVERAGES

	<u>NO. HERDS TESTED</u>	<u>NO. COWS TESTED</u>	<u>AVG. MILK PER COW</u>	<u>AVG. FAT PER COW</u>	<u>COWS AVG. 40-50 F.</u>	<u>COWS AVG. OVER 50 F.</u>
Maricopa	86	3476	814	31.6	525	261
Pinal	8	264	984	35.9	46	41
Santa Cruz Valley	6	230	858	36.0	52	36

STATE AVERAGES

<u>NO. HERDS TESTED</u>	<u>NO. COWS TESTED</u>	<u>AVG. MILK PER COW</u>	<u>AVG. FAT PER COW</u>	<u>COWS AVG. 40-50 F.</u>	<u>COWS AVG. OVER 50 F.</u>
100	4020	828	32.1	623	338

COOPERATIVE EXTENSION WORK
IN
AGRICULTURE AND HOME ECONOMICS

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HOUSEHOLD INSECTS

by
J. N. Roney

Extension Entomologist

There are many insects that are pests of the household and some of these insects are rather difficult to control. The chief insects in Arizona that the house wife has to contend with are the housefly, cockroach, bedbug, silverfish, ants, clothes moths, and insects injurious to cereal foods.

The housefly is a pest in more ways than one. They annoy us, they spread diseases, they spot our walls as well as many other things. The housefly breeds in piles of stable manure, kitchen refuse in garbage cans and barrels and many other places where decaying materials are present. Control of the housefly in the home may be secured in many different ways. Once they get into the house the use of fly sprays should give good control. It is best to keep the windows well screened and closed in order to prevent its entrance, also endeavor to destroy all of the breeding places that it would be likely to find. An old method often used is a mixture of formaldehyde (40 per cent) and water. A teaspoonful in a teacupful of equal parts of milk or water slightly sweetened and set about the room will kill many. Flies may also be captured by sticky paper and screened traps.

The cockroach is one of the most annoying insects that infests the house and causes more worry to the housewife than most any of the insects. There are several species of the cockroach in the state of Arizona and they vary in both size and color. Some of the roaches may be very small, while others may be very large and they will vary from almost white to a very dark brown or black in color, and in some instances may have bands of different colors on the abdomen. The roaches hide in the day time and come out and feed mostly at night. The life cycle of the roach varies considerably and some investigators find that some of the species may take 12 months to complete their life cycle however, some species may take only half that long. The adult roach lays its eggs in a leathery capsule, which the mother carries for some days partly extruded from her body. She often glues the capsule finally to some object, but sometimes merely drops them here and there. The capsules contain from 16 to 50 eggs, depending upon the species involved.

To control the cockroach one should use as a watchword the small word persistence. The insects are very smart about the food that they eat and will shy away from many foods that are placed out to attract them. There are several insecticides that may be used to control the roaches. The most universally used poison is Sodium Fluoride in either pure or mixed forms. The various colored powder may be distributed with a small dust gun by blowing it into the cracks in the wall or pantry or it may be placed on small pieces of paper and placed out at night where the roaches are working. The roaches seem to be susceptible to this poison, and may be exterminated if you remember the word that was mentioned at the first of the paragraph. CAUTION, Sodium Fluoride is deadly poison to humans and domestic animals. Pyrethrum powders and sprays and powdered borax will also aid in

exterminating the insects but it will take a little more time and also the insecticide must come in contact with the insect in order to kill it.

The Bedbug is a pest in most parts of the world where man has chosen to dwell. The bedbug belongs to the same order of insects as the stink bug, squash bug and similar sucking type of insects. They have the power of producing a "buggy" odor. The bedbug is spread by laundries, trunks and handbags from one place to another. Bedbugs deposit their eggs in cracks and crevices of the building or furniture in groups of 40 to 50, and they hatch in from 7 to 10 days and many mature in 5 to 6 weeks. There may be three to four generations a year in a well heated house. The bedbug can be controlled by several different methods. Thorough cleaning of infested beds and washing off with boiling hot water will kill them if the furniture will allow same. Many fly sprays sprayed on beds will control them after several applications. If an entire room is infested, secure a fumigant and fumigate house thoroughly. See your county or home demonstration agent about detailed requirements.

The silverfish is very common in the home of almost every Arizonian, especially is this true since we have air conditioned our homes. It is not a moth, nor is it closely related to the moth. It is also known as a "fishmoth", "silver witch", "sugar fish", and "bristle tail". The silverfish prefers warm, moist situations, like the bathroom. It is a lover of starched clothing, laces, curtains, wall paper, books and many other household articles. The eggs hatch in 6 to 10 days in summer but may rest 2 months before hatching in cooler weather. The adult may live long periods without food. Control: a bait composed of the following gives best results--Oatmeal 1 3/4 cupfuls, white arsenic 1/4 teaspoonful, granulated sugar 1/2 teaspoonful, and salt 1/4 teaspoonful. Sodium fluoride may be substituted for white arsenic. Mix the oatmeal, white arsenic, sugar and salt (dry) then moisten mass and mix thoroughly to blend. Thoroughly dry bait to prevent mold, then grind into small bits and scatter about. Place about a teaspoonful of the bait in each of several small boxes and place near haunts of silverfish. The above amount of bait will treat several houses. **GREAT CARE SHOULD BE USED IN KEEPING POISON BAIT AWAY FROM CHILDREN.**

Clothes moths are all introduced species that came over with our forefathers from the European countries. These insects have been known by the human race for thousands of years, for they are referred to several times in the Bible. In Isaiah (50:9) we find the following lines, "Lo, they all shall wax old as a garment; the moth shall eat them up."

In the United States we find two species very common in clothes, and they are the webbing clothes moth and the case-making clothes moth. It is a well known fact that the moths themselves do not injure clothes or other fabrics. It is the small worm-like larvae which hatch from eggs that have been deposited by the moths. With the air conditioning and central heating systems of many Arizona homes, we may find these insects present throughout every month of the year. Control measures. There are no easy or quick methods of keeping out clothes moths. Watchfulness is the most important thing to do.

It has been proven time after time that sunlight and air are one of our best controls of moths. Before storing materials for the summer they should be hung out in the air and sunlight. All materials should be clean and stored in containers with a supply of paradichlorobenzene or naphthalene flakes. The materials to be stored should be stored in containers or closets that are as tight as possible

Materials used for controlling clothes moths are paradichlorobenzene, naphthalene flakes, a mixture of ethylene-dichloride 3 parts, and carbon tetrachloride 1 part. For a trunk of 5 cubic feet one can use 4 tablespoonsful of the above mixture in a shallow dish in the top of the trunk as the gas is heavier than air.

Never use gasoline or solvent materials unless the greatest care is taken. Standard specifications should be used when solvent material is used.

Air stored materials in sunlight as often as possible.

Carpet Beetles. Several species of carpet beetles are active in Arizona. All are small insects and rather hard to locate by the housewife. The young, larvae or grubs, of these beetles are the ones that cause the injury. The beetles commonly breed in the cracks of floors and parts of the lower walls. They feed principally on woolen lint and hairs which collect in these cracks and places. The most commonly spoken of beetle is the Buffalo Carpet Beetle or bug. The beetles feed in "over-stuffed" furniture, carpets and the like. Air conditioning and central heating systems make conditions ideal for their reproduction. Control measures are the same as for clothes moths.

Ants are very numerous and pestiferous in all parts of the world. Ants are known as social insects since they live in colonies, or communities, where every individual works for the good of the entire colony and not for itself alone. There are several different species varying in color and size in Arizona.

Methods of control: Ants are very suspicious of foods and traps. Before placing out any poison be certain that they are feeding on the bait material used. Endeavor to determine if the ants are feeding on grease or sugar bearing materials; then use bait accordingly. Tartar emetic works good with either sweet or grease feeding ants. Mix 1 part tartar emetic to 20 parts of honey or roll a piece of fat bacon in the powder. There are also many ant poisons that are sold commercially that give excellent results. Endeavor to keep kitchen clean of crumbs and other foods that attract the ants.

Cereal insects: There are at least half a hundred insects attacking stored grains and grain products. These insects range from small weevils of various shapes to flour and Indian meal moths. If the insects become general in the kitchen one may have to have the house fumigated by a commercial fumigator. If only a few packages of the materials are infested, they may be controlled by placing materials and containers in oven with temperature of 125° to 140° F. for several minutes. All of the insects will be killed and by sifting the materials in coarse wire, the insects will be sifted out. It is best to watch closely for insects; don't keep grain products too long.

COOPERATIVE EXTENSION WORK
IN
AGRICULTURE AND HOME ECONOMICS
State of Arizona
P.O. Box 751
Phoenix

University of Arizona
College of Agriculture and
U. S. Department of Agriculture
Cooperating

Agricultural Extension
Service

4-H CLUB DEMONSTRATION
ON
CONTROL OF EXTERNAL PARASITES
OF
LIVESTOCK
by
J. N. Roney
Extension Entomologist

County Agent or Leader:

Now that we are gathered here we shall attempt to demonstrate the control of some livestock insects by using some of you 4H Club members.

County Agent or Leader:

Here is an animal that is infested with four kinds of insects.

First Member:

I can see some little black insects crawling here on the brisket. What are they called?

Second Member:

Mr. Leader, those are what we call cattle lice.

County Agent or Leader:

John, you are correct in your identification. Can you tell me any more about it?

Second Member:

Yes, cattle lice live only on the cows. The small eggs hatch in 17 to 21 days, and the young lice suck blood from the cows. They seldom cause death, yet they prevent the animals from gaining weight.

Third Member:

Where is the best place to look for cattle lice?

County Agent or Leader:

A good question. They appear first on the brisket and between the hind legs. They seem to be worse during the winter months.

First Member:

What is the best and cheapest way to kill the lice?

Second Member:

I know that, Mr. Leader. Dipping the cattle in a vat of some poison.

Third Member:

I thought it was dangerous to use a poison on animals.

County Agent or Leader:

The poison we used is not harmful to the cattle, but does kill the lice. We use a mixture of 10 pounds of 5% rotenone, 100 pounds of wettable sulphur in 1000 gallons of water in the vat. The cattle are then dipped twice at 17 to 21 day intervals, as the first dipping will not kill the eggs and they will hatch in 17 days to 21 days.

Third Member:

Can lice be controlled with a dust?

First Member:

It depends upon the kind of cow. If the animal will stand still you can rub a dust mixture of equal parts 5% rotenone and wettable sulphur into the hair on all parts of the body. This will give good control of the lice. Two treatments, though, are needed as with the dipping.

Second Member:

When is the best time to dip?

County Agent or Leader:

Since the worst injury is during the winter, dipping is usually done in the fall of the year.

First Member:

How about arsenical dips?

County Agent or Leader:

They are deadly poison and if not used correctly many animals will be lost. By the way, can anyone tell me what causes these bumps on this animal's back?

Second Member:

They are bots, I believe.

First Member:

No, they are the results of the "heel Fly".

County Agent or Leader:

They are cattle grubs that hatched from the egg laid by the heel fly. This bump is caused by this large grub (squeezing one from its back). Does anyone know how the grub got into the back?

Third Member:

Sure. The egg was laid there and then hatched the grub.

County Agent or Leader:

No, you are wrong this time. The "heel fly" laid the eggs on hairs of the leg. The eggs hatched in a short while and the small grub bored into the leg of the cow. The grub then works its way slowly up the leg and across the belly to

the gullet. It remains here until a short while before it appears as a lump on the cow's back. It moves from the gullet to the back very rapidly. It remains here in the back 4 to 6 weeks, getting bigger all of the time. When full grown, it pops out and falls to the ground, where it remains for several weeks changing into another "heel fly".

Second Member:

Why are we so interested in the grub instead of the fly?

County Agent or Leader:

We cannot at the present control the flies, but we can have fewer flies by killing the grubs in the backs.

First Member:

I know that part. (have materials available). Either spray or dust the back of the cows with a spray composed of 5 pounds of 5% rotenone, 10 pounds of wettable sulphur to 100 gallons of water, or a dust of equal parts of 5% rotenone and wettable sulphur. Two treatments at thirty day intervals are needed as all of the grubs do not come up at the same time. Spray material may be scrubbed into the back with a scrubbing brush with good results.

County Agent or Leader:

Who knows anything about screw worms?

Third Member:

I don't know much about them but Dad uses Smear 62 for them whenever he brands or dehornes.

County Agent or Leader:

Screwworm flies deposit their eggs in any wound, and will cause serious infection if not controlled. The Smear 62 is our best remedy at the present time. How do we control ear ticks.

First Member:

With my dog I just pick them out.

Second Member:

I saw a cow boy using an oil can in a cow's ear once and he said it was for ear ticks.

County Agent or Leader:

That is correct. The oil can contains a mixture of equal parts of crude cottonseed oil and pine tar oil. The ticks go deep into the ears, then the spout of an oil can serves well to put the oil into the ear.

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ALFALFA TREEHOPPER
(Alfalfa Girdler)

By
J. H. Roney
Extension Entomologist

The small green wedge-shaped insect that destroys many alfalfa plants by girdling the stem just above the ground level, has been very injurious to alfalfa in Cochise and Graham Counties during 1945. This insect previously caused serious losses in the Verde Valley of Yavapai County in 1939.

Dr. H. G. Johnston, former Extension Entomologist working with Mr. E. S. Turville, County Agent of Yavapai County at that time, and J. R. Marston, Entomologist, Phelps Dodge Corporation, found the insect injury could be greatly reduced by a cutting schedule. The first cutting in the Verde Valley being made about April 30th, the second June 10th, the third July 16th -17th, the fourth August 23rd -26th, and the fifth October 3rd - 4th.

By cutting on the above dates the results were as follows: The first cuttings showed no injury. The fourth cutting was delayed by rain and showed some injury, however at thirty-five days, no injury was present. The fifth crop showed some injury at thirty-eight days, which was probably due in part to the additional population built up during the delayed fourth cutting.

Dr. Johnston states that if a schedule of harvesting hay crops at approximately thirty-five day intervals, with delayed irrigations following each cutting, is practiced, the damage caused by these insects can be largely eliminated at no additional cost to the grower. It is also suggested that light renovation of the field be made after each cutting if possible, just prior to irrigating.

It is possible that a schedule similar to the one used in Yavapai County may work in Cochise and Graham Counties.

October 23, 1945
150 Copies.

AGENDA
for
COUNTY AGENTS CONFERENCE
FLAGSTAFF, ARIZONA
September 12-14, 1945

J. N. Roney
Extension Entomologist

Project: GRASSHOPPER CONTROL

Agencies Involved

Bureau of Entomology and Plant
Quarantine, Division of Grass-
hopper Control.
Extension Entomologist, State
Leader.
County Agents.

Agreements of Understanding

Between Counties and Grass-
hopper Control Division

Grasshopper Control Division Duties.

- A. Furnish Bran, Sawdust, Cottonseed Hulls, and Poisons.
- B. A Supervisor to Assist State Leader.
- C. Models of mixing and spreader equipment.
- D. In paid programs, will furnish mixer, spreading equipment and trained personnel.

State Leader Duties.

Extension Entomologist assisted by Supervisor of Grasshopper Control.

- A. Egg survey.
- B. Nymphal Survey.
- C. Adult Survey.
- D. Determine extent of infestation.
- E. Requisition all bait materials.
- F. Keep reports of how materials are used, and results secured.
- G. See that the materials are stored correctly.

County Agent Duties

- A. Furnish adequate storage for all materials.
 1. County funds.
 2. Farm Bureau or local organizations.
- B. Furnish adequate mixing equipment.
 1. A mixer devised by Grasshopper Control Division is suggested.
Built by County or other funds.
 2. Hand mixer very poor.
 3. Let no materials out unless mixed.
- C. Hold educational meetings with farmers to point out necessity of spreading at correct times. Assistance by State Leader and Supervisor is available.
- D. Records of Materials
 1. Weekly mixing station records to be sent in as instructed.
 2. Prompt receipt of shipments of bait materials.
 3. Annual report.
 4. These reports must be sent in or the State Leader is put on the spot.

Insecticides

I. New

- A. DDT - recent mimeographed sheet.
- B. Sabadilla
 - 1. What is it?
 - 2. Insects controlled
 - a. Lygus
 - b. Stink Bugs
 - c. Squashbugs
 - 3. Availability
- C. 666 = P
 - 1. What is it?
 - 2. Insects controlled
 - 3. Availability
- D. Thiocyanates.
 - 1. What are they?
 - 2. How used? Combinations, rotenones, and pyrethrum.
 - 3. Insects controlled.
 - 4. Availability.

II. Old.

- A. Calcium Arsenate.
 - 1. Insects controlled.
 - a. All chewing insects except Mexican Boll-weevil.
 - 2. Will it burn plants?
 - 3. What strength to use?
 - 4. Availability.
- B. Paris Green.
 - 1. Insects controlled.
 - a. Many chewing insects.
 - 2. Will it burn plants?
 - 3. What strengths commonly used?
 - a. 5 to 20% with sulphur or inert material.
 - 4. Availability.
- C. Lead Arsenate.
 - 1. Insects controlled.
 - a. Many chewing Insects
 - 2. Will it burn plants?
 - 3. What strength commonly used?
 - a. Usually 1 part to 4 to 6 parts of a carrier in dust.
 - b. In spray 2 to 3 pounds per 50 gallons of water.
 - 4. Availability.
- D. Flourines
 - 1. Sodium Fluosilicate, Sodium Fluoride, Sodium Fluoaluminate (Cryolite).
 - 2. Insects controlled.
 - a. Household and field insects (chewing type).
 - 3. Availability.
- E. Nicotines
 - 1. Nicotine sulphur dusts or sprays.
 - 2. Insects controlled.
 - a. Practically all sucking insects.
 - 3. Availability.
- F. Rotenones
 - 1. Powders containing 5% rotenone usually available.
 - a. Dusts
 - b. Sprays
 - c. Dips

2. Insects controlled
 - a. Many sucking and chewing insects on plants.
 - b. Livestock insects, lice and grubs.
 - c. Non-poisonous to warm blooded animals.
3. Availability.

G. Pyrethrums

1. Dusts and liquid form.
 - a. Strictly a contact poison.
2. Insects controlled
 - a. Sucking insects, few chewing by contact only.
3. Non-poisonous to warm blooded animals.
4. Availability.

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SUGGESTIONS ON USE OF DDT

by
J. N. Roney
Extension Entomologist
September 4, 1945

With the announcement that DDT, a new insecticide, would be released to the general public in a few days, many calls on its uses have been received by all County Agents, and entomologists. It is, therefore, the object of this article to give some pertinent facts that were released on August 22nd by the Agricultural Research Administration of the United States Department of Agriculture, giving a report of work done by the Bureau of Entomology and Plant Quarantine and various state Agricultural Experiment Stations. The article will also give a report of some work being done in Arizona.

The knowledge and practical uses of DDT insecticides in Agriculture, and around the home, is still far from complete. We note that several million pounds have been used by the Army, Navy, and Public Health Service for control of disease carrying insects. However, it should be noted that these organizations spread this insecticide with trained technicians and on specific insect problems.

DDT is suitable for use as an insecticide only when properly prepared. It is not easy to make a DDT dust from the straight technical DDT powder. Many insecticide firms are equipped to grind it with talc, clay, sulphur, pyrophyllite, and other materials into fine powders that contain DDT in various strengths. Some of the dusts have wetting agents added that make the DDT mix with water. DDT by itself is only slightly soluble in water, but it can be dissolved in various petroleum oils, in xylene, or other solvents for making spray solutions or emulsions.

DDT is very powerful since it usually takes only from 1/10 to 10 percent of it in dusts or sprays to do the work.

Persons desiring to use DDT are cautioned by the Bureau of Entomology and Plant Quarantine that insecticides containing DDT will be suited to some of their needs, but not to all of them. Entomologists point out that DDT is not effective against all insects and that it is much slower in action against others than many of the poisons now used. The proper formulas for many pests have not been worked out as yet.

DDT is harmful to honeybees and to other beneficial insects, as are several other insecticides. Used indiscriminately, DDT may interfere with the adequate pollination of important food or seed crop plants. It may also destroy many beneficial insect parasites and predators that ordinarily keep certain injurious pests under control.

DDT is highly toxic to fish and certain other cold blooded animals, but is much less poisonous to warm blooded animals. Under some conditions insect-feeding birds have been destroyed. DDT is poisonous to warm-blooded animals when considerable amounts are eaten. No effective methods for removing DDT residues from plants or produce have been worked out.

In oil solutions or emulsions, DDT is readily absorbed through the skin of men and animals. Persons using it in this form are warned to take special precautions to avoid repeated or prolonged exposures to the material in oil solutions. This is especially true in buildings.

Despite these precautions and the present uncertainties attending its use, the entomologists say that DDT will have an important place in insect control along with other materials already in use. Until more complete information is available they suggest that persons having DDT insecticides try them on only a portion of a crop until it is certain that they will do the job.

Below are some suggestions and results secured by various workers in the county:

FLIES AND MOSQUITOES

A 5% DDT suspension made of wettable DDT powder and water may be applied as a spray to any surfaces where flies and mosquitoes are observed to rest. In many parts of the nation, places sprayed with the above solution kill flies in one to three hours. In Arizona the results have been very conflicting. However, around Phoenix, during the hot summer months, it has not proven very effective. The above spray is made by dissolving 2.5 pounds of 50 percent water-dispersible DDT in three (3) gallons of water. A 5% solution may be necessary early in the season. This solution leaves a white residue on objects being sprayed that might be objectionable.

The use of a kerosene solution (7 ounces of technical DDT dissolved in 1 gallon of kerosene) has worked in many areas. However, it is pointed out that this spray is a fire hazard. In applying these sprays use a coarse or wet-spray nozzle. When water or oil evaporates the DDT remains and acts as a residual insecticide that kills flies and mosquitoes and other insects by contact. Use about one (1) quart of spray for each 250 square feet of surface. In Arizona oil sprays have given very poor control of flies and mosquitoes.

The oil sprays should not be used on animals and they are not recommended for general use in buildings. They offer an opportunity for DDT to be absorbed by the skin.

HOUSEHOLD INSECTS

Results of both sprays and powders for control of cockroaches, fleas, and ants have been both good and bad. There is a need for more work with these insects. In Arizona sprays have been very poor on cockroaches. On some ants the kerosene sprays have worked, while on others--no results. The 5% powder is not very effective.

LIVESTOCK PESTS

Control of the screwworm and the heel fly (grubworm) is not very promising. The control of cattle lice looks very promising, however further work is needed before it can be recommended. The control of ticks has been conflicting and further research is needed.

FRUIT INSECTS

In both Arizona and California an oil spray of DDT atomized has proved very successful in controlling the grape leafhoppers on grapes.

DDT has been used for control of many citrus insects, however it is not to be recommended at the present time.

Experiments for control of codling moth are under way in Arizona and look promising. In some states when combined with the common insecticides better results have been secured. It does not control aphids or plant lice, orchard mites, and some other insects. The water dispersible powder at the rate of $\frac{1}{2}$ pound to 1 pound per 100 gallons of water has given best results. There is a definite need for more research work on this problem.

VEGETABLE INSECTS

DDT in dust and spray form, and as an aerosol, will kill a number of common insect pests of vegetables. It has not controlled the Mexican bean beetle, the tobacco or tomato hornworm, the turnip aphid, the melon aphid, the red spider, and the tomato russet mite. Some injury has been caused to squash, pumpkin, melons and other cucurbits, and it should not be used on them. It looks very promising for control of several potato foliage insects.

In Arizona it does not control the corn earworm. It does help some when used in combination with oils that are commonly used.

A 2% DDT dust in pyrophyllite, talc, clay, or sulphur looks very promising for control of cabbage worms. However, due to poisonous residue it should not be applied after the plant starts to head.

SUGAR BEET SEED CROP

In Arizona the Division of Truck Crop Insects, Bureau of Entomology and Plant Quarantine, have found a 5% DDT pyrophyllite dust to be very effective for control of Lygus bugs when feeding on sugar beet seed plants. It should be applied at the rate of 30 pounds per acre per application. For more detailed information write to Division of Truck Crop Insects, Bureau of Entomology and Plant Quarantine, Rt 6 Box 708, Phoenix.

CEREAL AND FORAGE CROP

In some parts of the nation the DDT dust has been very effective for control of Lygus bugs on alfalfa seed. However, in Arizona, especially in the Yuma area, the results have not been very promising, however results in some areas are promising. It did not have any effect on the grasshoppers that were present. DDT has also looked good for control of chinch bugs, alfalfa weevil, and other insects in other parts of the country. More experiments are needed before recommendations can be made.

COTTON INSECTS

DDT for control of cotton insects has been both encouraging and discouraging. It is not effective on the boll weevil, cotton leafworm, and may cause an increase in aphids and red spiders. In Arizona it looks rather promising for control of Lygus bugs and other sucking insects. It is still in the experimental stage and cannot be recommended at the present time.

SUMMARY

DDT carries the usual poison label, therefore, it must be handled with care. DDT may be purchased from local insecticide companies. DDT is not an insecticide that will control all insects. DDT may be very poisonous to humans if not used correctly. Persons using DDT should use it according to directions given by competent people. Further research work is needed with DDT before recommendations can be made for many insects.

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DAIRY HERD IMPROVEMENT NOTES

by
W. R. Van Sant
Poultry and Dairy Specialist

August 1945

There were four thousand and twenty-nine (4,029) cows in ninety-nine (99) herds tested in Dairy Herd Improvement Associations in Arizona during the month of August with an average of seven hundred and sixty-one pounds (761) of milk, and twenty-eight and seven tenths (28.7) pounds of butter fat per cow.

Maricopa county had thirty-five hundred and seven (3507) cows in eighty-six (86) herds on test, averaging seven hundred and forty-two (742) pounds of milk and twenty-eight and two tenths (28.2) pounds of butter-fat per cow.

Pinal County had two hundred and fifty-seven (257) cows in eight (8) herds on test, averaging eight hundred and eighty-one (881) pounds of milk and thirty-two and eight tenths (32.8) pounds of butter-fat per cow.

Santa Cruz Valley had two hundred and sixty-five (265) cows in five (5) herds on test, averaging seven hundred and forty-four (744) pounds of milk, and thirty-one and one tenth (31.1) pounds of butter-fat per cow.

SUGGESTIONS FOR USE OF DDT BY DAIRYMEN

by
J. N. Roney
Extension Entomologist

DDT contains the usual poison label that is on all packages containing a poison, therefore, it must be used with care.

According to the Agricultural Research Administration of the United States Department of Agriculture, the Bureau of Entomology and Plant Quarantine, and State Agricultural Experiment Stations have found some very interesting things that we should know.

Flies in Houses, Barns and Out-buildings

A residue left by a spray containing DDT is probably more effective against house or stable flies than any of the various treatments. In some areas this residue of the DDT on the walls or ceilings, has remained effective for control of flies for several weeks. This has not been true in most of Arizona. A DDT suspension made of wettable DDT powder and water may be applied as a spray to any surfaces where the flies frequently rest. The flies usually die in one to three hours. The spray is made by placing 2.5 lbs. of 50% water-dispersible DDT

in 3 gallons of water. The use of a kerosene solution (7 ounces of technical DDT dissolved in 1 gallon kerosene) has also been found to be very effective, but when used at this dosage may become a fire hazard. Oil sprays should not be used on animals, and they are not recommended for general use on buildings. They offer an opportunity for DDT to be absorbed by the skin. Water sprays made of wettable DDT powder or suspensions remain on the surfaces treated and kill the animals. This spray leaves a white residue and may be objectionable. The same spray works for mosquitoes in some areas of the country.

Lice and other Livestock Insects

Up to the present time no proper dilutions of DDT are yet to be suggested for control of cattle lice. Some very promising results have been secured and further work is necessary. Against the heel fly, and screwworm DDT does not look promising at all. The results for control of ticks are still very conflicting.

Dairy Feed

Any grains or forage that are to be fed to livestock should not be treated with DDT. Remember DDT is a poison and that it should be used with care. It will not kill all insects, and kills many beneficial insects. Consult your County Agent for additional information on the use of DDT.

W. R. Van Sant

W. R. Van Sant
Poultry & Dairy Specialist

DAIRY HERD IMPROVEMENT ASSOCIATION
HERDS AVERAGING
THIRTY POUNDS BUTTER FAT OR OVER
AUGUST 1945

MARICOPA COUNTY

<u>OWNER</u>	<u>BRFED</u>	<u>NO. COWS</u>	<u>AVG. MILK</u>	<u>AVG. FAT</u>	<u>HIGH COW NAME</u>	<u>LBS. MILK</u>	<u>LBS. FAT</u>	<u>NO. COWS 40-50 F.</u>	<u>NO. COWS 50 UP</u>
7	RH	61	878	30.8	Timmie	1414	55.1	7	2
8	Mix	50	708	30.4	No. 52	1314	57.8	4	4
10	GH	20	902	31.8	Speck	1680	57.1	4	1
11	R&GH	23	1028	35.1	Beauty	1584	54.9	5	2
12	RJ	30	975	45.0	Princess	1383	68.5	5	12
15	RA	33	727	31.8	Blue Lady	1411	62.1	5	1
16	GH	84	876	33.5	Bonnie	1349	58.0	16	3
18	RG	18	790	35.2	Marlene	1029	46.0	5	0
20	RH	6	1076	37.1	Dutchess	1426	45.6	3	0
22	RG	20	706	33.4	Roselind	1023	45.9	4	0
25	R&GG	23	785	33.2	Correen	1324	51.6	1	1
43	R&GG	15	889	36.0	Rooks	1651	59.8	1	2
46	GH	51	799	30.0	No. 18	1125	54.0	7	1
47	Mix	11	803	32.9	Q ueen	1193	45.2	3	0
50	GH	16	740	30.1	E. R.	723	42.3	1	0
56	Mix	30	856	35.6	Bonnie	1218	52.3	9	1
60	GH	42	882	32.1	No. 96	1658	59.7	8	2
68	RJ	80	797	37.7	Carrie	1360	65.3	28	7
69	Mix	78	805	30.1	No. 65	1590	68.4	5	3
70	RJ	9	615	30.2	Cynthia	812	38.1	0	0
75	GH	17	746	35.3	No. 12	1361	58.5	4	2
76	--	25	952	33.2	No. 91	1500	49.4	4	0
77	RJ	14	728	33.6	Gipsy	1026	55.4	1	3
79	GH	77	915	32.2	No. 64	1274	47.1	11	0
81	Mix	45	928	34.5	No. 7	1519	57.7	12	3
* 84	RH.	13	1210	39.9	Lola	1757	56.2	3	1
87	GH	30	1003	34.7	Chubby	1243	58.4	8	2
90	Mix	46	795	31.0	Gladys	1048	44.0	4	0
91	Mix	58	840	33.6	No. 84	1639	65.5	13	2
100	RH	5	1206	39.8	Star	1513	49.9	3	0
150	R&GH	38	936	30.6	Fanny	1729	62.1	4	3
151	RH	3	908	33.1	Rosie	1587	55.5	0	1
154	--	23	1065	35.4	Dopey 1st	1218	47.5	8	0

*Correction. July report should read as follows:

84	RH	15	1368	42.2	Tulip	1819	65.4	5	3
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-4-
CASA GRANDE ASSOCIATION

<u>OWNER</u>	<u>BREED</u>	<u>NO. COWS</u>	<u>AVG. MILK</u>	<u>AVG. FAT</u>	<u>HIGH COW NAME</u>	<u>LBS. MILK</u>	<u>LBS. FAT</u>	<u>NO. COWS 40-50 F.</u>	<u>NO. COW 50 up</u>
102	RH	19	1069	39.8	Josephine	1789	67.9	4	4
104	GH&GG	55	1161	40.2	Kitty	1456	59.7	15	10
106	Guer.	11	775	31.2	Stella	803	40.2	1	0
108	R&GH	46	1050	37.5	No. 69	1894	62.5	12	5
109	RG	14	738	31.2	Bonnie	1398	47.3	2	0

SANTA CRUZ VALLEY

116	R&GG	77	683	30.1	Sandra	1296	62.2	3	1
118	R&GG	70	759	37.5	Jill	1094	55.8	18	5
121	Mix	46	831	30.4	White Flank	1352	60.9	4	2

COUNTY AVERAGES

<u>COUNTY</u>	<u>NO. HERDS TESTED</u>	<u>NO. COWS TESTED</u>	<u>AVG. MILK PER COW</u>	<u>AVG. FAT PER COW</u>	<u>COWS AVG. 40-50 LBS F.</u>	<u>COWS AVG. 50 LBS. F UP</u>
Maricopa	38	3507	742	28.2	317	78
Pinal	8	257	881	32.8	40	19
Santa Cruz Valley	5	265	744	31.1	27	8

STATE AVERAGES

99	4029	761	28.7	384	105
----	------	-----	------	-----	-----

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POPULATIONS OF HEMIPTEROUS
INSECTS ON COTTON

by
J. N. Roney
Extension Entomologist
June 26, 1945

This is the start of a weekly report of injurious cotton insects of Arizona. It is hoped that it will be of a benefit to all concerned. The report will be authentic since all data is taken from records made by workers of the Bureau of Entomology and Plant Quarantine, the University of Arizona Agricultural Extension Service, and men capable of recognizing the insects.

The recommendations for 1945 will be the usual $7\frac{1}{2}$ pounds of Paris Green and $92\frac{1}{2}$ pounds of 325 mesh conditioned sulphur for most of the state, however, in the Salt River Valley and Pinal County a dust of 15 pounds of Paris Green and 85 pounds of 325 mesh conditioned sulphur gave best results in 1944 and is suggested. When this formula is applied a burn may occur if the plants are too wet, however, no injury was reported in 1944.

In the Salt River Valley area the following counts were reported: Goodyear area south of Chandler showed 17.3 injurious insects per 100 sweepings on stub cotton, with only 1.8 insects on planted cotton. In the Litchfield Park area early planted cotton showed 5.5 injurious insects per 100 sweepings. These are the only counts from Maricopa County.

In Pinal County at Sacaton stub cotton showed 25 to 35 injurious insects per 100 sweepings, while planted cotton showed only 5.5 per 100 sweepings. In the Casa Grande Valley the counts were 1.0 injurious insect per 100 sweepings.

In Pima County, Cortaro Farms, the counts by Mr. Curtis showed an average of 2.0 injurious insects per 100 sweepings.

In Graham County sweepings have not started but cotton is making good progress.

The indications are that the injurious insects are present in alternate host plant fields and each farmer should watch his cotton and apply only when needed. Dusts should be applied when 6 to 8 injurious insects per 100 sweepings are present. Dusting should be continued at 7-day intervals until the count is below 6 injurious insects. Apply dusts when no winds are blowing.

If you intend to dust and bees are near your cotton, please endeavor to notify the bee keeper before dusting.

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POPULATIONS OF COTTON INSECTS
IN ARIZONA

by

J. N. Roney, Extension Entomologist
July 2, 1945

The past week many calls have come in about the use of D. D. T. for control of cotton insects. In order that every cotton farmer may understand the situation, I shall quote a telegram from the chief of the Bureau of Entomology and Plant Quarantine, which I received Saturday June 30th, "INFORMATION REGARDING USE OF D.D.T. FOR CONTROL OF COTTON INSECTS NOT SUFFICIENT TO JUSTIFY RECOMMENDATION FOR COMMERCIAL USE WILL BE CONSIDERED BY WPB ONLY ON RECOMMENDATION BY STATE OR FEDERAL RESEARCH AGENCY AND ON CERTIFICATION BY WFA THAT NO OTHER EFFECTIVE MATERIAL AVAILABLE AND FOOD OR FIBER CROPS CANNOT BE PROTECTED WITHOUT USE OF DDT INSECTICIDES". The above telegram should answer all questions about D.D.T. for cotton insects.

The Division of Cotton Insect Entomologists, Extension Workers, and other Entomologists find that injurious Hemipterous insects are rather plentiful on stub cotton but not so many are being found on planted cotton.

The counts in alfalfa for June 29, 1944 were 107 Lygus insects per 100 sweepings. While on June 28, 1945 we find 318 Lygus insects per 100 sweepings. These figures show that the populations are much greater than a year ago. Each farmer should watch his fields closely.

In Maricopa County we find that the following records were made, per 100 sweepings:

	<u>STUB</u> <u>COTTON</u>	<u>PLANTED</u> <u>COTTON</u>
Goodyear (South of Chandler)	29.0	3
Mesa	2.0	3
Scottsdale	----	3
Peoria	----	2
Merinette	4.8	2
Litchfield	----	7

In one field in the Litchfield area, 18 injurious insects per 100 sweepings were recorded.

In Pinal County the insect counts ranged from 0 to 15 per 100 sweepings. The greatest numbers were found around the Eloy region.

In Pima County (Cortaro Farms) we find the counts ranging from 0 to 8 per 100 sweepings, with Lygus species predominating.

In Graham County the insect counts are practically nothing at the present time.

Dust when counts justify, apply the materials correctly if you wish to receive benefits.

CAUTION: NOTIFY OWNERS OF BEES NEAR ANY OF YOUR FIELDS WHERE YOU INTEND TO DUST.

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WEEKLY HEMIPTEROUS COTTON INSECT REPORT
by
J. N. Roney, Extension Entomologist

JULY 9, 1945

During the past week injurious hemipterous insects increased considerably in some areas. The writer also noticed several stub fields that were rather heavily infested with the cotton leaf perforator. The insects counts in alfalfa and weeds still remain very high and about ten times greater than during 1944.

The insect counts in various parts of Maricopa County averages for 100 sweepings over cotton are:

	<u>PLANTED COTTON</u>	<u>STUB COTTON</u>
*Goodyear (South of Chandler)	16.3	6.5
*Buckeye	25	0
Mesa	5.5	0
Waddell	12	15
Litchfield Park	10	0

*Practically all stub cotton in this area dusted. Count last week 29 for stub cotton. Buckeye counts ranged from 15 to 60 injurious insects per 100 sweepings.

The insects counts in Pinal County continue to be rather low as a whole. Twenty-two (22) fields swept in Casa Grande, Coolidge and Eloy districts showed counts ranging from 0 to 4 per 100 sweepings. Farmers should keep a close watch of their fields.

The counts in Pima County (Cortaro Farms) show the counts ranging from 0 to 5 insects per 100 sweepings.

In Graham County the insect counts still remain too low to report.

WHENEVER DUSTING NEAR BEES CONTACT THE OWNER BEFORE DUSTING, IF POSSIBLE. Dust when wind not blowing and apply correctly.

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WEEKLY HEMIPTEROUS COTTON INSECT REPORT

by
J. N. Roney
Extension Entomologist
July 16, 1945

The injurious cotton insects continued to increase in practically all of the cotton producing counties of the state of Arizona. The counts of Lygus bugs in alfalfa fields was over five times greater than at the same date in 1944. Cotton as a whole is fruiting heavily, however, in some places it is shedding. It is much later than a year ago at this time.

Maricopa County records averages from 100 sweepings over the tops of the cotton plant, as follows:

	<u>Stub Cotton</u>	<u>Planted Cotton</u>
<u>Goodyear(South of Chandler)</u>	32.0	21.0
<u>Mesa District</u>		8.0
<u>Experimental Farm Mesa</u>		14.0
<u>Buckeye</u>		40.0
<u>Litchfield Park</u>		20.0
<u>Marinette</u>	30.0	25.0

Pinal County The insect counts are also on the increase with the population ranging from 2 to 15 injurious insects per 100 sweepings. The Eloy area shows the highest counts with Coolidge and Casa Grande showing some fields that are nearly ready for dusts.

Pima County The injurious bug counts show a range from 0 to 6 per 100 strokes of the sweeping net. Aphids are becoming very serious in S X P Cotton at Cotaro Farms.

Graham County Cotton is making good progress but the insect counts are now becoming great enough to warrant some poison applications. The counts range from 0 to 22 injurious insects per 100 sweepings. The highest injurious counts are around Solomnsville.

Greenlee County Sweeping at Duncan range from 0 to 2 insects per 100 sweepings.

DDT dusts are known to cause heavy increases of aphids, and decreases of beneficial insects. This is one of the reasons for the material not being commercially suggested at the present time.

Don't forget to notify any beekeepers that are near fields of cotton being dusted.

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WEEKLY HEMIPTEROUS COTTON INSECT REPORT

by
J. N. Roney
Extension Entomologist
July 23, 1945

Injurious hemipterous cotton insects were high in nearly all cotton fields observed in Maricopa County. Mr. W. A. Stevenson, Bureau of Entomology and Plant Quarantine research worker states, "Injurious insect populations have reached the point where dusting will pay in practically all cotton fields in the Salt River Valley. Several applications (probably 4 or 5 or more) will be required due to migration from alfalfa. Do not be discouraged if after the first applications the populations do not drop suddenly. The insects will continue to migrate to cotton and, too, the increase in yields from dustings have not always correlated with the decrease in insects." The insects are on the increase in all other counties of the state and should be watched very closely.

Maricopa County. Regular sweeping over cotton top, with an average of 100 sweepings per record, are as follows:

	<u>Stub</u>	<u>Planted</u>
Goodyear (South of Chandler)	22	44.0
Mesa	0	9.0
Buckeye	0	10 to 80
Mesa (Expt. Station)	0	6 to 18
Litchfield Park	0	40.0

Pinal County. The records in this county range from 0 to 25 injurious insects per 100 sweepings. The counts around Coolidge averaged about 6 injurious bugs. Around Casa Grande and Eloy the counts averaged about 16 per 100 sweepings. Many farmers are dusting and many more should dust.

Pima County. The counts range from 0 to 8 injurious insects on the Cortaro Farms. Aphids are fairly general on long staple cotton at Marana and controls are under way.

Graham County. The insects showed an increase in this county. The counts range from 3 to 13 per 100 sweepings. Farmers should watch their fields very closely.

Yuma County. Observations in Yuma county (Parker area) showed only one field with counts large enough to warrant dusting. This was adjoining an alfalfa seed field that was drying up. The counts ranged from 0 to 18 injurious insects with 90 percent being the Lygus species.

Rain is interfering with dusting operations, however, growers are applying dusts as often as possible. Endeavor to apply when wind is not blowing.

NOTIFY ANY BEEKEEPER WITH BEES NEAR COTTON TO BE LUSTED.

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WEEKLY HEMIPTEROUS COTTON INSECT REPORT

by
J. N. Roney
Extension Entomologist
July 30, 1945

Salt River Valley injurious cotton insect populations, on a whole, remain very high in all fields observed. Weather has been hot and sultry with considerable rainfall in various areas. Cotton, generally, continues to fruit heavily, however, some fields are shedding badly. Fields should be watched very carefully.

Sweepings on both stub and planted cotton in the Goodyear and Mesa areas showed a slight decrease in injurious insects counts while Buckeye and Litchfield districts showed an increase. Mesa cotton fields showed an average of 8 injurious insects on planted cotton, with a low of 5 and high count of 35 per hundred sweeps.

Maricopa County: Regular sweepings over cotton tops, averages per 100 sweeps, as follows:

	<u>Stub</u>	<u>Planted</u>
Goodyear (South of Chandler)	21.3	26.3
Mesa	0	5 to 35
Buckeye	0	15 to 120
Mesa (Exp. Station)	0	6.5 to 21.5
Litchfield Park	0	45.0

Pinal County: Averages from thirty (30) fields swept showed a range from 1.5 to 35.0 injurious insects per 100 sweeps. A heavy blowing rain in the Eloy district apparently checked the aphid infestation which was building up there. This district also showed a greater amount of shed than other parts of the county.

Pima County: Cotton fields are fruiting heavily with very little shed up to this date. Aphid infestation at Marana is increasing, ranging from 16 - 90 aphids per square inch of leaf surface.

Graham County: Safford and Solomnsville areas are experiencing an increase in injurious insects. Several of the growers are dusting with Paris green-sulphur mixture.

Dusting, principally by airplane, is well under way throughout the state. However, work has been hindered some by rains. Dust when wind is not blowing.

IMPORTANT: BEFORE DUSTING NOTIFY BEEKEEPERS WITH BEES NEAR COTTON TO BE DUSTED

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WEEKLY HEMIPTEROUS COTTON INSECT REPORT

by
J. N. Roney
Extension Entomologist
August 6, 1945

Cotton was aided and injured in some parts of the state by heavy rains. Many fields showed heavy shedding following the rains. Cotton leaf perforators appeared in some fields in damaging numbers.

The Salt River Valley showed little change in cotton insects as a whole, however, stink butts showed an increase in many fields. Dusted fields showed a definite drop in insect populations.

The counts per 100 sweepings in various parts of the Salt River Valley are:

	<u>Stub</u>	<u>Planted</u>
Chandler (Goodyear Area)	56	82.0
Mesa		36.0
Buckeye (Increase in Stink Bugs)		55.0
Expt. Station (Mesa)		15.0
Litchfield Park Area (Lygus and Stink Bugs)		45.0

Cotton leaf perforators in some stub cotton north of Litchfield Park.

Pinal County: A severe infestation of the cotton leaf perforator has shown up south of Eloy. Some plants have been severely ragged by the small worms. Other insect records in Pinal County show the counts ranging from 2 to 20 injurious insects per 100 sweepings.

Pima County: (Cotaro Farms) Aphids continue to appear but recent rains may have lowered counts. Heavy rains will kill many aphids. Counts in cotton fields range from 2 to 10 injurious insects per 100 sweepings. Dusting operations were to start as soon as rains permitted.

Graham County: Heavy rains fell in Graham County during the week. Some fields were severely injured. Several fields observed that had been injured several weeks ago by hail. The insects counts ranged from 2 to 36 injurious insects per 100 sweepings near alfalfa fields east of Safford. Long staple cotton showed the largest number of bugs. Two fields near Pima, and near alfalfa, showed 3 to 12 injurious insects per 100 sweepings. Many farmers would profit by dusting at an early date if rains hold up.

NOTIFY ANY BEEKEEPERS THAT HAVE BEES NEAR WHERE YOU ARE DUSTING

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WEEKLY HEMIPTEROUS COTTON INSECT REPORT

by
J. N. Roney
Extension Entomologist
August 13, 1945

Many cotton fields continue to show a severe shed that may be caused by the weather combined with insects. The Lygus spp. showed a decrease in many fields. However, stink bugs continued to increase. Rains continued to fall in many sections of the state. Cotton bollworms (not pink bollworms) are showing up in some fields.

The insect records for averages of 100 sweepings in Maricopa County are as follows:

	<u>Stub</u>	<u>Planted</u>
Chandler (Goodyear Area)	35	114
Mesa		12
University Farm (Mesa)		25
Buckeye		45
Litchfield Park		45

Pima County:

Cortaro farms are now dusting their entire acreage. The counts reached 18 to 20 injurious insects per 100 sweepings. Cotton bollworms and aphids are rather numerous in some fields.

Sweepings in the Midvale region show 14 injurious bugs per 100 sweepings.

Graham County:

Rains continued to fall in the Safford Valley and considerable shedding has been noticed. Counts range from 1 to 35 injurious insects per 100 sweepings. The heaviest counts were found in long staple fields, and near alfalfa fields.

County Agent Rogers, of Chavez County, New Mexico, picked up a leaf worm in his county on August 7. A close watch should be taken for this insect in the Safford Valley.

IMPORTANT: NOTIFY BEEKEEPERS WHO HAVE BEES NEAR WHERE YOU ARE DUSTING

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WEEKLY HEMIPTEROUS COTTON INSECT REPORT

by
J. N. Roney
Extension Entomologist
August 20, 1945

Practically all cotton fields throughout the cotton growing areas of the state are fruiting quite heavily, with about a normal shed. However, some fields are shedding badly. Some open bolls are appearing in stub cotton. The weather continues hot and sultry, with scattered showers. A slight decrease in Lygus spp population was noted in most fields.

Maricopa County:

A general decrease in injurious insect counts was noted this week, with a marked decrease in some areas.

Goodyear area shows the largest decrease with a drop of 15 injurious insects on stub cotton, and 72 on planted cotton, from last week's counts. This week's count being 20.3 injurious insects per 100 sweeps on stub cotton, and 42.6 in planted cotton.

In the Mesa area sweepings averaged 18 injurious insects per 100 strokes of the net.

Lygus spp populations remain high in the Litchfield Park district, and pentatomids increased over last week in most cotton fields.

Buckeye area Lygus spp infestation decreased during the week with slight change in pentatomid population.

Pinal County:

Cotton is making very good progress with considerable number of open bolls in the earlier planted fields. The injurious insect counts show a decrease in most parts of the county, but there is a marked increase in fields which were planted later, and are located near large alfalfa acreage. The shed is about normal.

Pima County:

Injurious insect counts are fairly low on Cortaro Farms cotton, ranging from 2 to 8 per 100 strokes.

Midvale area fields show 9.5 injurious insects per 100 strokes.

Graham County:

Sweepings in this county range from 1.0 to 14.0 injurious insects per 100 sweeps. The cotton is developing rapidly with a small amount of shed as yet.

IMPORTANT: NOTIFY BEEKEEPERS WITH BEES NEAR FIELDS TO BE DUSTED, BEFORE DUSTING

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WEEKLY HEMIPTEROUS COTTON INSECT REPORT

by
J. N. Roney
Extension Entomologist
August 27, 1945

Weather conditions have been ideal for cotton. The Lygus spp. continued to decrease in practically all fields. The stink bug populations remained about the same.

In Maricopa County the counts, per 100 sweepings, were as follows:

	<u>STUB</u>	<u>PLANTED</u>
Chandler (Goodyear Area)-----	3.5	11.0
Mesa-----		6.0
Mesa Experiment Station-----		5.0
Buckeye-----		5.0
Litchfield Park-----		14.0

Pinal County

In Pinal County the counts are higher than Maricopa County. Most fields show counts high enough for dusting. The counts range from 7 to 25 injurious insects, per 100 sweepings, in all areas.

Pima County

Cortaro farms records show the insect counts running about 15 injurious insects per 100 sweepings. Some bollworms and aphids causing damage in spots.

In the Midvale region the counts run about 24 injurious bugs per 100 sweepings.

Graham County

The sweeping counts range from 0 to 21 injurious bugs per 100 sweepings in the Solomonville area. The counts elsewhere are lower.

BE SURE TO KEEP BEEKEEPERS INFORMED ABOUT YOUR DUSTING PROGRAM.

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WEEKLY HEMIPTEROUS COTTON INSECT REPORT

by
J. N. Roney
Extension Entomologist
September 4, 1945

Cotton insect conditions, especially hemipterous insects, show very little change. In some areas of the state the cotton bollworms (not the pink bollworm) are causing severe injury. The cotton leaf perforators and beet armyworms are also causing injury to some fields of cotton.

The insect reports from various parts of the state are listed in the following paragraphs:

<u>MARICOPA COUNTY</u>	<u>STUB</u>	<u>PLANTED</u>
Chandler (Goodyear area)	8	10
Mesa		6
Experiment Station (Mesa)		5
Buckeye Area (mostly creontiades & stinkbugs)		8to20
Litchfield Park area		17

Note in the Buckeye area some beet armyworms are causing injury to many cotton squares, and bolls.

PINAL COUNTY

Cotton is maturing rapidly in some areas. The injurious insect counts still show some fields with as many as 47 injurious insects per 100 sweepings. The average for the county being 17.

PIMA COUNTY

Dusting continues at Cortaro farms. At midvale, south of Tucson, the counts run about 23 per 100 sweepings. About 1000 acres of cotton south of Tucson are heavily infested with the cotton bollworm. Calcium arsenate at the rate of 20 pounds per acre, has been applied. Cotton bollworms may be controlled with basic copper sulphate at the rate of 20 pounds per acre.

GRAHAM COUNTY

The insect counts are very low--ranging from 1 to 4 injurious insects per 100 sweepings. A few leafworms have been picked up in places, however not enough to cause any alarm.

REMEMBER THE BEE KEEPER WHEN DUSTING.

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WEEKLY HEMIPTEROUS COTTON INSECT REPORT

by
J. N. Roney
Extension Entomologist
September 10, 1945

As a whole the hemipterous injurious cotton insects are decreasing, however, cotton leafperforators and bollworms are causing injury in some areas of the state.

Maricopa County

The injurious insect record averages for 100 sweepings from fields, are as follows:

	<u>STUB</u>	<u>PLANTED</u>
Chandler (Goodyear Area)	5	10
Mesa		8
Expt. Station Mesa		6
Buckeye		10
Litchfield Park		6

Some cotton bollworms were found in fields at Chandler, Mesa, and Buckeye.

Pinal County

The hemipterous cotton insects showed counts averaging about 15 per 100 sweepings. Cotton leaf perforators and bollworms infesting some fields.

Pima County

Cortaro farms the counts of insects are about 8 insects per 100 sweepings on the checks. Some cotton bollworms are showing up.

Approximately 1250 acres near Sahuarita have been dusted for control of a severe infestation of the cotton bollworm. In addition to this 100 acres at Flowing Wells and 500 at Marana were also dusted for the cotton bollworm. In some fields severe injury was caused by bollworms before controls started.

Graham County

The insect counts continue to be low. County Agent Owens reports a few leafworms to be present, however not enough to cause much injury.

REMEMBER YOUR BEEKEEPER WHEN DUSTING

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WEEKLY COTTON INSECT REPORT
by
J. N. Roney
Extension Entomologist
September 18, 1945

The hemipterous cotton insect infestations for 1945 are practically at an end, as these insects can do very little damage from now until cotton is picked. In some instances where cotton is late, and a dusting program was started quite a while ago, control measures may be beneficial. Especially for cotton bollworms, beet army worms, and cotton leaf perforators.

Cotton picking is in progress in Pima, Pinal, and Maricopa counties. Cotton bollworms continue to be a menace in parts of Pima and Pinal counties. Beet army worms are causing some injury in Maricopa, Pinal, and Pima counties. The cotton leafworm is present in Graham county but the infestations are too late to cause any injury of note.

BEEKEEPERS HAVE APPRECIATED YOUR COOPERATION.

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Memo to Extension Workers:

AEROSOLS FOR CONTROL OF HOUSEHOLD INSECTS

Now that the public can secure the same type of aerosol and dispenser that was used by our armed forces, you may have many questions to answer. The dispenser, which has become known as the aerosol "bomb", is a container that holds an insecticide, dissolved in a liquified gas under pressure. When a valve is opened, the sudden change in pressure allows the insecticide to disperse into the air in the form of a fog or fine mist.

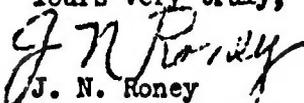
The production of insecticidal aerosols is covered by a patent assigned to the Secretary of Agriculture. Several firms have been licensed to use this invention and are offering one-pound dispensers for sale. These bombs are licensed to be prepared according to standards set up by the Department of Agriculture. The formulas now most commonly used by these manufacturers contain 3 percent DDT and a suitable amount of purified pyrethrum extract, which were adopted by our armed forces during the latter stages of war for killing different insects, especially flies and mosquitoes.

The entomologists advise that aerosol insecticides are most valuable for killing household insects such as flies, sandflees, mosquitoes, and moths, when they are in the flying stages. The minute particles of the insecticide, when released into the room, float for some time into all parts of room. Flying insects coming in contact with these particles are killed. Tightly closed rooms give best results.

Aerosols are not very effective against crawling insects like bedbugs, dog ticks, and cockroaches. It is not suggested for killing the egg or larva stages of clothes moths, carpet beetles, or meal moths. The latter are protected by the materials or products that they infest, and the insecticide does not come in contact with them. Aerosols do not act like fumigants. Aerosols are not recommended as a means of applying insecticidal residues on surfaces for killing household insects. The fine particles are not well suited for this purpose.

The experiments with aerosols have shown them to present no health or fire hazard when used as directed. You should not use it in a room where canaries or gold fish are present. Allergic people may be affected by the aerosol.

The standard one-pound aerosol dispenser contains enough material to treat 150,000 to 250,00 cubic feet.

Yours very truly,

J. N. Honey
Extension Entomologist

DDT Story Still Better

WITH DDT, 3,434 pounds of seed cotton to the acre.

With "standard mix" paris green and sulfur, 2,783 pounds.

With no insect control treatment, 2,415 pounds.

These are figures from the insecticide trials conducted in 1944 by the U. S. Bureau of Entomology and Plant Quarantine at the University of Arizona's Mesa Experimental Farm.

The dusting there was done by hand. Results were essentially the same as those of a machine-dusting test on the Joe Hodges farm near Buckeye. In both cases the outcome agreed fairly well with the airplane-dusting experiment at Goodyear Farms (Arizona Farmer, Feb. 24).

Three other poisons were tried last year under supervision of W. A. Stevenson, entomologist in charge of the

For the benefit of the entomologically minded, it might be explained that *Lygus hesperus* was the predominant pest for which this dusting was done. Other injurious insects were the big and little green stinkbugs (*Chlorochroa sayi* and *Thyanta custator*), the brown cotton stinkbug (*Euschistus impectiventris*), and the western cotton plant bug (*Creontiades femoralis*).

Bureau's cotton pest investigations in Arizona. One of them, basic copper arsenate, may have possibilities.

But there is nothing in the 1944 statistics to upset a statement made by Stevenson at the Mesa Farm field day, in November. On that occasion he said:

"DDT is the most promising insecticide we have."

Every Mesa Farm and Hodges test was replicated six times. Dust was applied seven times, at the rate of 20 pounds to the acre. Now for the details.

Plots treated with the standard mixture of 92.5% sulfur and 7.5% paris green yielded at the rate of 2,783 pounds.

Plots treated with 85% sulfur and 15% paris green yielded 3,055 pounds.

Plots treated with a dust one-third basic copper arsenate and two-thirds sulfur yielded 2,909 pounds.

Plots treated with 10% calcium arsenite and 90% sulfur yielded 2,718 pounds.

Plots treated with DDT and sulfur yielded 3,434 pounds.

Check Plots, untreated, yielded 2,415 pounds.

It should be explained further that the proportion of DDT used varied from 2 to 4%. In fact, the first two applications were only 2% with no sulfur, just inert pyrophyllite. The last five were with 4% DDT, 36% pyrophyllite, 60% sulfur. A decidedly better kill was obtained with the stronger dust.

Anybody who wants to take the time can calculate that the gain from dusting with the DDT combinations was 1,018 pounds; with 15% paris green it was 640; with basic copper arsenate, 494; with 7.5% paris green, 368; with calcium arsenite, 303.

Acre blocks were measured off at the Hodges place. There the yield for the standard mix was 2,905 pounds; for DDT, 3,060 pounds; for the untreated checks, 2,509. This represented a gain of 551 pounds seed cotton for DDT, of 396 for paris green and sulfur.

In the Hodges cotton patch a try-out was also given di-nitro-creosol, 1% with 99% inert matter. Plots so treated yielded 22 pounds less per acre than the checks, probably because of a slight burning. Di-nitro-creosol, therefore, is definitely out.

The Mesa report may indicate that the growers ought to use a dust that is 15% paris green, until DDT comes on the market. Stevenson, however, is not so sure.

"We are not making any recommendations on the strength of one season's work, and that is all we have to go on," he says. "When we double the percentage of paris green in the standard mix, we are getting right to the point where there is danger of burning. This time we got by without any injury to the plants, but we might not be so lucky next time."

Likewise, the basic copper arsenate evidence is regarded as inconclusive.

Stevenson expects to be furnished with enough DDT to repeat his 1944 trials, and there's a bare possibility they can be enlarged a bit.

Onion Thrips Die Of DDT Dusting

BELIEVE it if able, but onion thrips are got by DDT.

The official announcement isn't out yet, but it looks as though a control has been found for this hard-to-reach pest which costs onion growers millions of dollars yearly in bulb and seed production.

Some of the evidence is right here in Salt River Valley, on a West Indian School road tract where Van E. Romney and Orin A. Hills have a number of test plots in connection with their beet pest investigations. They planted a few rows of onions, just for observation. Part of them were dusted with DDT, the rest left untreated. The dividing line is plainly visible. Where the thrips were killed, the onions are large and vigorous. Across the line, they are comparatively puny.

The U. S. Bureau of Entomology has real onion thrips trials under way at Alhambra, Calif., and Twin Falls, Ida. Just the other day Roy E. Campbell, in charge at Alhambra, wrote to Hills that DDT looks "very promising."

One reason why onion thrips have never been controlled satisfactorily is that they crawl down between the leaf bases where they can not be reached by insecticides. But DDT evidently does reach them.

Calcium Arsenate Bad For Bees—Less Danger in DDT

BEES don't seem to be affected when Arizona cotton and alfalfa are dusted with DDT. They are weakened some, but colonies are not killed out, when the "standard mix" of 92.5% sulfur and 7.5% paris green is applied to control crop pests. If calcium arsenate is substituted for the paris green, however, many bees are poisoned and whole colonies may be destroyed.

These are preliminary findings of S. E. McGregor, sent to Arizona last year by the U. S. Bureau of Entomology and Plant Quarantine to observe the effects of arsenical insecticides on bees. After he came and set up headquarters at the U. of A., a little DDT was released for experimental use; considerably more has been available this year. So he has also been able to discover little or no evidence that it does them any harm.

Since DDT seems certain to be the major insecticide in the postwar world, McGregor has been instructed to give it major attention. In early September he left for the Presidio district of Texas, where a large cotton acreage was to be treated with DDT for pink bollworm control. Upon his return he will resume his work in Maricopa, Pinal and Pima Counties.

Kept on Gathering Honey

His most striking test was made in the Marana area. There he set a beehive on a scale and recorded its weight daily. In 22 days it gained 45 pounds, although a 10% DDT dust had been twice applied by airplane to a nearby field of SxP cotton. Another field close by had been dusted two or three times with "standard mix."

Hives were set out in a cotton field just before the cotton was dusted with DDT, and it didn't seem to do a thing to the bees. There was a strong drift over an apiary of 127 hives just outside the field, and nothing happened.

In a Chandler alfalfa field McGregor

or found bees "working strong" just after a dusting with 4% DDT. In a Gila Bend cotton patch he saw bees knocked down by swirling dust, but they soon got up and flew away. They could have died later, but McGregor thinks it unlikely that there could have been any serious loss. Certainly they showed none of the "delirium tremens" exhibited by flies that have come in contact with DDT.

McGregor has even hand-dusted hive entrances with no result other than annoyance to the bees.

Beware the Arsenate!

With regard to arsenicals, McGregor's most significant finding probably is that calcium arsenate is far more poisonous to bees than the copper arsenite called paris green. Why this is so, he does not pretend to say. Last year he saw hives killed out when a certain proprietary prepara-

tion was spread for cotton leaf perforators. This was 9.45% tricalcium arsenate and 0.82% calcium arsenite; total pure arsenic, about 5%.

Almost exactly the same amount of pure arsenic was applied when growers stepped up their "standard mix" to 15% paris green, which a good many of them did in 1944. Yet, 15% paris green merely weakens colonies—a more marked weakening than follows 7.5% paris green.

Use of the proprietary was discontinued when McGregor told the distributors what he had observed. He has not seen a single hive killed out this year.

As for drift of arsenical-sulfur dusts over apiaries, McGregor can't find that it does any damage.

Sulfur can be ignored so far as bees are concerned. McGregor has hung around for days after citrus groves were dusted with 100% sulfur, without finding a dead bee or even a sick one. Furthermore, he has become convinced that sulfur is not a bee repellent. They pay no attention to it.

Grasshoppers, Real Menace for 1945

THIS is going to be about the worst grasshopper year that Arizona has had for a long time. And the U. S. Bureau of Entomology and Plant Quarantine, on which we must depend for free bait, is not happy about it. Farmers, farm organizations and officials are moving to insure a better brand of co-operation which will not only wipe out infestations as fast as they appear, but also keep the Bureau interested in continuing to help Arizona fight grasshoppers.

Hindsight tells us now, without any Bureau reminder, that we should have been more alert in 1944. Too much was left to the county agents and to the extension entomologist. Farmers did not take enough individual responsibility—or initiative. Little

pressure was brought to bear on neighbors who chose to ignore the whole grasshopper problem.

So many hoppers were harbored in unbaited fields, and so many females laid so many eggs, that Maricopa, Pinal, Yuma, Graham and Apache Counties are in for trouble. Infestations will be so large that they will rapidly spread to adjoining areas unless prompt steps are taken.

Community committees are now being organized to take those steps.

Wakeland's Anxiety

Concern of the Bureau was evidenced soon after the annual egg survey was made under direction of Extension Entomologist J. N. Roney, in his capacity as grasshopper control

leader for Arizona. Dr. Claude Wakeland, head of the Bureau's grasshopper division, came to Phoenix. Here he was joined by A. E. Frazier, one of his fieldmen who is assigned to Arizona. They conferred with the Commission of Agriculture and Horticulture, with State Entomologist Louie Lauderdale sitting in. They talked to County Agent John O'Dell and, of course, to Roney. They met officers of the Arizona Farm Bureau Federation and its executive secretary, I. M. Clausen. They threshed things out with individual farmers.

Result was that the seriousness of the situation was impressed upon a number of persons most able to do something about it. Dr. Wakeland is a soft-spoken man and not given to voicing threats; but everyone who met him got the idea that he thought Arizonans could have put on a more aggressive, united grasshopper battle in 1944. If enough of the free bait had been spread at the right time, there would have been only the usual scattered light infestations of several years past.

To put it bluntly, we let our grasshoppers get away from us and build up to the point where they can make a real comeback. Nobody who was here 10 to 15 years ago needs to be told what that would mean. Before Uncle Sam began providing free bait, wide slices of our most fertile valleys were devastated. Farmers were next thing to helpless.

California's Set-up

There is no such thing as eradication of grasshoppers, but California has come the closest to it of any state, according to Dr. Wakeland. He laid this to community committees set up under the leadership of their county agricultural commissioners. Those commissioners are there to deal with insect pests and plant diseases, and the county agents don't have to worry about grasshoppers.

In Arizona we have no commissioners and distribution of free bait must be done through the county agents. They can't go out and spot infestations and force farmers to act. Everything has been on a voluntary, individual basis, and some individuals haven't proved very voluntary.

The Farm Bureau is taking the lead in setting up local committees for Arizona. It is intended to have perhaps ten or a dozen groups ready to function by the time the young hoppers begin to emerge in numbers. The committees will see that every infestation is controlled completely, not just in spots.

Something else needed is more bait mixing stations. With gas and tires

so scarce, it would be a real hardship for farmers to drive their trucks long distances for bait. In Maricopa, for instance, it is planned to have stations at Buckeye and Gilbert as well as at the county agent's building in Phoenix. Yuma County will probably need stations for Roll-Wellton and South Gila Valley. Pinal will likely need two, at Casa Grande and Florence.

Financing some of these stations may offer problems, but so many farmers are determined to reverse the grasshopper trend that they will work out the money end. The charge for bait is to be 35 cents a sack, which barely covers the cost of labor and sack. All materials are provided at Federal expense.

Ample bait is again assured. There may be some difficulty about getting it transported, but enough is already on hand for a vigorous campaign. Maricopa County, which used 247 tons in 1944, is assigned 300 tons. The Bureau has allotted 20 tons to Apache County, 5 to Coconino, 5 to Navajo, 5 to Pima, 10 to Pinal, 5 to Yavapai, 50 to Yuma, 75 to the San Carlos reservation, 50 to the Navajo reservation, 5 to the Fort Apache reservation.

Education Needed

Some demonstrations in grasshopper control may be put on by Frazier and Roney. It would seem that the technique ought to be well understood by this time, but there are still farmers who need education. They do not realize how important is time of application. Bait should be spread around daylight, before the pests start to feed. If it's spread after they have gorged themselves, they will pretty much ignore it until next feeding time—and by then it has dried out too much to be appetizing.

This applies to crops other than alfalfa, which presents special difficulties. In green alfalfa, grasshoppers do feed more or less all day and they like the succulent young stuff better than any bran-sawdust-sodium fluosilicate mixture. Nor is it easy to tempt them when the alfalfa has become mature. Best way yet found to handle them is to leave a swath or two untouched by the mower and let them all concentrate in that. When they have eaten off all the leaves they will take the bait readily.

Early and Late Hatches

Some farmers are fooled because we have two distinct grasshopper species in Arizona, which hatch at different times. First there is the little red-leg *Melanoplus mexicanus*, which begins its spring hatch about Feb. 24 and continues to May 2, with the nymphs reaching their peak around April 23. Later comes the big *Melanoplus differentialis*, which starts to hatch around April 9 and keeps it up until June 8, with the peak coming approximately May 29.

It is a great mistake, therefore, to think that the grasshopper danger is over after the *mexicanus* swarm has been poisoned. *Differentialis* is still to come, and probably in greater numbers. A pod laid by a *mexicanus* female contains 12 to 24 eggs, while there are 60 to 65 eggs in a *differentialis* pod.—E. D.

Tips and Warnings on DDT

Condensed from an article by
J. N. RONEY
(Extension Entomologist)

WITH the announcement that DDT would be released to the general public, many inquiries about it are being received by county agents and entomologists. This article will give some pertinent facts released on Aug. 22 by the Agricultural Research Administration of the U. S. Department of Agriculture. Work being done in Arizona will also be reported.

Knowledge about the use of DDT in agriculture and around the home is still far from complete. Several million pounds have been used by the Army, Navy and Public Health Service for control of disease-carrying insects. It should be noted, however, that those agencies spread the insecticide with trained technicians and on specific problems.

DDT is suitable for use as an insecticide only when properly prepared. It is not easy to make a DDT dust from straight technical DDT powder. Many firms grind it in various proportions with talc, clay, sulphur, pyrophyllite and other materials. Some dusts have wetting agents added that make the DDT mix with water. DDT by itself is only slightly soluble in water, but it can be dissolved in

petroleum oils, xylene, or other solvents for making spray solutions and emulsions.

DDT is so powerful that it usually takes only 0.10 to 10% in dusts or sprays to do the work.

Entomologists point out that DDT is not effective against all insects and that it is much slower in action against others than many of the poisons now used. The proper formulas for many pests have not been worked out.

DDT is harmful to honeybees and to other beneficial insects. Used indiscriminately, DDT may interfere with the pollination of important food or seed crop plants. It may also destroy insect parasites and predators that ordinarily keep certain injurious pests under control.

DDT is highly toxic to fish and certain other cold-blooded animals, but is much less poisonous to warm-blooded animals. Under some conditions insect-feeding birds have been destroyed. DDT is poisonous to warm-blooded animals when considerable amounts are eaten. No effective method for removing DDT residues has been found.

In oil solutions or emulsions, DDT is readily absorbed through the skin. Persons using it in this form are warned to take special precautions to avoid repeated or prolonged exposures to DDT in oil solutions, especially inside buildings.

Despite the present uncertainties, entomologists say that DDT will have an important place in insect control. Until more complete information is available, it is suggested that persons trying DDT insecticides use them on only a portion of a crop until it is certain the job is being done.

Flies and Mosquitoes

A 5% DDT suspension of wettable DDT powder and water may be sprayed on any surface where flies and mosquitoes are observed to rest. In many parts of the Nation, this kills flies on one to three hours. In Arizona the results have been conflicting; around Phoenix it has not proved very effective in the hot summer months. This spray is made by dissolving 2.5 pounds of 50% water-dispersible DDT in three gallons of water. This solution leaves a white residue on objects sprayed.

In Arizona, oil sprays have given very poor control of flies and mosquitoes. A kerosene solution (7 ounces technical DDT dissolved in 1 gallon of kerosene) has worked in many areas. It is a fire hazard, however.

In applying these sprays, use a coarse or wet-spray nozzle. When water or oil evaporates the DDT remains to kill insects by contact. Use about one quart of spray for each 250 square feet of surface.

The oil sprays should not be used on animals and they are not recommended for general use in buildings. They offer an opportunity for DDT to be absorbed by the skin.

Household Insects

Results of both sprays and powders on cockroaches, fleas and ants have been both good and bad. In Arizona, sprays have had little effect on cockroaches. On some ants the kerosene sprays have worked, on others—no results. The 5% powder is not very effective.

Livestock Pests

Control of the screwworm and the heel fly (grubworm) is not very promising. Control of cattle lice looks promising, but further work is needed. Reports on control of ticks are conflicting and more research is also needed there.

Fruit Insects

In both Arizona and California an atomized oil spray of DDT has proved very successful in controlling grape leafhoppers on grapes. DDT has been used for control of many citrus insects but is not to be recommended yet.

Experiments for control of codling moth are under way in Arizona. In some states better results have been had when DDT was combined with common insecticides. It does not control aphids, orchard mites, and some other insects. The water-dispersible powder, half a pound or one pound to 100 gallons of water, has worked best.

Vegetable Insects

DDT as dust or spray, or as an aerosol, will kill a number of vegetable pests. It has not controlled the Mexican bean beetle, tomato hornworm, turnip aphid, melon aphid, red spider, and tomato russet mite. Some injury has been caused to squash, melons, pumpkins and other cucurbits, and it should not be used on them. It looks very promising for control of several potato foliage insects.

In Arizona it does not control the corn earworm. It does help some when combined with oils that are commonly used.

A 2% DDT dust in pyrophyllite, talc, clay or sulphur looks very promising for control of cabbage worms. Because of residue it should not be applied after the plant starts to head.

In Beet Seed Fields

In Arizona the Division of Truck Crop Insects, Bureau of Entomology and Plant Quarantine, has found a 5% DDT-pyrophyllite dust to be very effective for lygus when feeding on sugar beet seed plants. It should be applied at the rate of 30 pounds per acre, per treatment. For more detailed information write to the Division at Rt. 6, Box 708, Phoenix.

Cereals and Forage

In some parts of America the DDT dust has been very effective on lygus bugs in alfalfa seed fields. In Arizona, especially in the Yuma area, the results have not been very favorable. It did not affect the grasshoppers that were present. Elsewhere in the Nation, DDT has looked good for control of chinch bugs and alfalfa weevil.

DDT for cotton insect control has been both encouraging and discouraging. It is not effective on the boll weevil or cotton leafworm, may cause an increase in aphids and red spiders. In Arizona it looks rather promising for control of lygus and other sucking insects.

Summary

DDT carries the usual poison label, therefore must be handled with care. DDT may be purchased from local insecticide companies. DDT will not control all insects. DDT may be very poisonous to humans if not used correctly. Persons using DDT should handle it according to directions by competent people. Further research is needed before recommendations can be made for many insects.

Mysterious DDT

IT will kill pink bollworms but not boll weevils. It will kill thrips but not aphids. It will kill lygus but not the cotton leafworm. It will kill citricola scale but not red scale.

For flies, fleas, bedbugs and mosquitoes, DDT is almost a "specific" poison. To cockroaches it is no more lethal than sodium fluosilicate or several other materials now used for roach control and not with too much success.

Why is DDT so deadly to some insect pests and why does it affect others not at all, or only slightly? Every entomologist in the U. S. would like to know. They would also like to know just what it is that DDT does to the insects it does affect. They can only observe results, can only surmise what bodily function is upset. Supposedly it paralyzes the nerves.

It's a contact poison, not a stomach poison. Maybe it would do them harm if they ate it, but they don't like the stuff and there's nothing to gain by persuading them to eat it. Any warm-blooded animal, such as man, would have to take in an enormous dose to do any harm—far more than could possibly be obtained by consuming food or feed treated with DDT for insect control. There hasn't yet been enough time to find out whether there is any cumulative effect from eating small quantities over a long period.

Crazy With DDT

Let an insect—a beetle, say—come in contact with DDT, and what happens? First, it "goes crazy," hops and flops around frantically. (This is another reason why DDT is sometimes called "double delirium tremens.") Then it quiets down for a time. Next, it tries to walk but is unable to co-ordinate its legs and staggers about like a drug-store cowboy who has lost one of his boot-heels in Nogales. This probably winds up with the bug flat on its back, unable to get back on its feet. There it dies.

All this takes just a little while in the case of flies, mosquitoes and others that are extremely susceptible. For many more it may take as much as 24 or 36 hours. There are reports that ants are very, very slow to die. Because of these variations, and human impatience, laymen generally are likely to reach some wrong conclusions when DDT finally comes on the market.

On March 20, 1945, the Agricultural Research Administration, in the Department of Agriculture, issued a short report on two years of DDT testing. Included was a list of 30 pests to which the new insecticide had been found "especially toxic" and "definitely more effective than those currently used." These are the codling moth, cabbage looper, catalpa sphinx, cotton bollworm, cotton flea-hopper, eastern tent caterpillar, elm bark beetle, green-striped maple worm, gypsy moth, horn fly, Japanese beetle, lygus and four other kinds of sucking bugs, mimosa webworm, pine sawfly, pink bollworm, spruce budworm, velvetbean caterpillar, vetch bruchid, white-fringed beetle, mosquito, bedbug, three kinds of lice on men, house fly, and flea.

Old Enemies Succumb

Arizona has about two-thirds of these. It does not have the Japanese beetle and white-fringed beetle, probably because they just haven't yet traveled this far. They are among the most destructive pests that ever invaded the American continent, and about as hard as any to combat.

Since the Research Administration list was compiled, it has been found that DDT affords complete control for onion thrips. Nothing ever tried before did the onion thrip enough damage to mention above a faint whisper.

The insects against which DDT has shown "little or no effect," are set down by the R. A. as the boll weevil, California red scale (adults), cattle grub, cotton aphid, cotton leafworm, Florida red scale, Mexican bean beetle, orchard mite (2 kinds), parlatoria scale, plum curculio, red spider, sugarcane aphid, and sugarcane borer.

DDT is "about equal to other materials now in use" for the corn earworm, diamondback moth, European corn borer, cockroach, grasshopper, imported cabbage worm, oriental fruit moth, potato leafhopper, silverfish, and several pests which attack stored grain.

DDT Fog Still Slays Pests

ANOTHER round of tests in Arizona and California has been completed, and now the "Todd insecticidal fog applicator" is going into commercial production. The first two units off the assembly line will be delivered some time this fall to Arizona buyers, Col. Dale Bumstead and the Miller-Johns Co.

The fog spewed out by the re-modeled machine proved fatal to leafhoppers in Arizona, to citrus thrips in California, and presumably to alfalfa worms as well.

Readers of Arizona Farmer will recall that the fog generators tried out here in May were military models. They were built to convert oil into a mist that would screen ships and

troop movements. Although the fog killed a number of crop pests when DDT was mixed with the oil, it was obvious that the device could be made much more suitable for agricultural use.

The two that were brought out from New York in August by Frank K. Steinrock, Todd Shipyards Corp. sales manager, were larger and heavier than the originals, with different controls. They worked much better, but the two mechanics with Steinrock decided that some further changes ought to be made.

A change was made in the DDT concentration, too. The May trials were with a 1.2% solution; in August that was doubled.

Myriads Massacred

May fogging practically wiped out the leafhoppers in Col. Bumstead's grapes at Tal-wi-wi, west of Peoria. By August they had built back to a very heavy infestation. In one 40-acre block they were too thick to be counted and were estimated at 1,000 to 1,200 per vine. A day after one fogging, it was almost impossible to find any live leafhoppers. The insects were fairly numerous throughout the Tal-wi-wi vineyards; all were fogged and the infestation brought down to one that laymen pronounced "of no importance." Dr. Charles T. Vorhies and Dr. L. P. Wehrle, from the University of Arizona, observed the treatment and will soon issue a written report.

From Salt River Valley the fog machines were taken to Riverside, Calif. There the same fog was applied to 10 acres of oranges, swarming with thrips of a strain which had built up immunity to tartar emetic. Four men later searched for an hour and could find only five or six thrips.

It had been hoped to try the DDT fog on Arizona alfalfa seed fields for lygus control, but the time was right between seasons when there were not enough pests to bother about. But the machines were taken north to Modesto, Calif., to see what could be done about green worms in alfalfa. Beyond a report that it was too bad for the worms, nothing is known here of the outcome.

Great Boon to Cattle

At Tal-wi-wi the plan is to fog citrus and grapes as often as the pests become numerous enough to make it worth while, and to fog all livestock regularly in order to keep down flies. This may not be oftener than once in five or six weeks, or even less after the fly population in that part of the country has been permanently reduced.

Two lots of Herefords, 120 and 180 head, were fogged in May by rounding them up in the field and driving the generator around them. At the time the horn flies were very bad and many a steer had solid black masses on his back or flanks, many inches across. These pests disappeared almost at once, and the weight gain rate rose as soon as the cattle could sleep and graze in comfort. Six weeks later, when those animals went to the feed pens, there were almost no horn flies on them and very few stable flies.

In later summer all the Bumstead purebred Hereford herd was sprayed with "Dynol," a water-soluble form of DDT. A pound and a half of the material was dissolved in 100 gallons of water, and about a pint was applied to each animal. They have been free of flies ever since. The same solution was sprayed over the corral fences, and now it's death for a fly or mosquito to alight there.

Jess Watt, Tal-wi-wi superintendent, is well satisfied with the Dynol treatment. He does not expect, however, to use it when a Todd fog applicator is added to the regular ranch equipment. Fogging is too easy and fast.

War's End Brings Farms Ample DDT

PLENTY of DDT for farmers now. Plenty of household DDT by Nov. 1.

Such is the word brought to Arizona by William J. J. Francis, sales manager of the Agricultural Chemicals Division of the Pennsylvania Salt Co.

Although Pennsylvania Salt is only one of about 30 DDT manufacturers, it is the only one that has so far placed any of the insecticide on the Arizona market. Francis was in this territory within less than a week after the war's end brought the cancellation of all restrictions on civilian sales of DDT. Prior to that time, 98% was reserved for military use.

Pennsylvania's wholesale outlet for the Southwest is Arizona Fertilizers, Inc. That concern is now supplying DDT dust, mixed in different proportions for different purposes with common inert carriers—usually pyrophyllite. The policy is not to supply the concentrate for dusting, unless the customer can show that he has proper facilities for mixing.

Making a proper spray mix, however, is much simpler. It is recommended that the user simply buy the concentrate and mix it himself with the other ingredients.

Francis predicts that by Nov. 1 anybody can go to any drug store and obtain ready-mixed DDT sprays and powders for household use.

DDT for Lice

Works as Powder or as Water Spray in Montana

By J. C. TAYLOR

DR. H. B. MILLS, head of the entomology department at Montana State College, says that DDT has proved to be effective, safe and practical for ridding both beef and dairy cattle of lice.

Fall is the best time to treat cattle for lice because it is during the first cool days of autumn that the lice begin to multiply. Delaying until cattle are severely infested with lice makes it a tougher job to get rid of the pests and also harm will be done to the cattle.

If only a few cattle are to be treated, you can do it by hand using a 2% DDT dust. It takes about an ounce of the 2% DDT dust for each animal. However, if larger numbers of cattle are to be treated, the use of a sprayer—preferably a power sprayer—is recommended. In spraying the cattle, use four pounds of wettable DDT in a 50% dust to 100 gallons of water. This wettable DDT mixes readily with water and about one-half gallon of spray is needed for each animal.

Never use a DDT spray mixture of oil or kerosene for livestock. Used in an oil mix, the DDT can be absorbed into the skin of the animal. Humans, too, must be careful in handling DDT sprays containing oil. That's why the wettable DDT mixed in water is recommended for spraying cattle for lice.

Cotton Meetings In Five Counties

COTTON growers in five Arizona counties will have a chance to hear and argue about the problems that they face in 1945, all the way from planting seed to picking labor.

Which is to say that Extension Agronomist Bob Matlock has arranged a series of eleven meetings where he and other specialists will meet the farmers and talk over what's what.

Matlock himself will be at all the sessions, to talk about classing work, seed certification and mechanical pickers. Extension Entomologist J. N. Roney is also to make the entire tour, carrying the latest news about insect control. Either C. J. King or E. H. Presley will be at each meeting to discuss lint improvement. Karl Harris will be at some of them to speak on irrigation. Somebody from the county AAA committee will always be there to explain about crop insurance. If H. R. Baker is not able to go all around and tell about labor prospects, the subject will be covered by the county agent. Charley Hobart will be in on all Maricopa County meetings, at least.

The series opens at Tucson, Feb. 10. Then the show moves to Maricopa County for this schedule:

Feb. 13, 10 a. m., Western gin at Gilbert.

Feb. 13, 1:30 p. m., Rittenhouse gin,

Feb. 14, 10 a. m., Farmers Mutual gin at Chandler.

Feb. 14, 1:30 p. m., Bennett Bros. gin at Peoria.

Feb. 15, 10 a. m., Acme gin at Buckeye.

Feb. 15, 1:30 p. m., Boswell gin at Litchfield Park.

In the meantime Pinal County will have been covered with a night meeting in Coolidge, Feb. 13. One is scheduled for Parker on Feb. 16. Graham County gatherings are set for Feb. 26 and 27, with places undetermined.

Sabadilla, DDT, Kill Cotton Bugs

A combination of DDT for lygus, sabadilla for stinkbugs, may be the U. S. Bureau of Entomology recommendation for cotton insect control after this season. The old paris green and sulphur mixture may drop to a secondary place, or even lower, in the estimation of entomologists.

W. A. Stevenson, who is in charge of the Bureau's cotton pest control investigations in Arizona, has not stated positively that recommendations will be changed. But when he made a preliminary report on 1945 results, at the Mesa Farm Field Day, he thought it quite likely that a change was in the offing.

Of course, this cotton harvest is

by no means over. Stevenson's opinions could be based only on bug counts and appearance of the cotton. He was pretty sure, however, that the final figures will be in favor of DDT and sabadilla, especially in combination.

Tests have included hand dusting at the Mesa Farm, plane dusting in the Buckeye district. Both DDT and sabadilla brought down insect populations more decidedly than the mixture of 92.5% sulphur, 7.5% paris green, which has been in general use since 1938. DDT is more effective on lygus, while sabadilla kills more stinkbugs. Stevenson's present opinion is that Arizona's high summer temperatures decrease the toxicity of DDT and make sabadilla more deadly.

Grasshoppers to Be Plentiful in Many Farm Areas

YES, there'll be grasshoppers in Arizona this year. Swarms of them in some districts, in other areas far too many for farmers to rest easy.

Results of the annual grasshopper egg survey have been announced by Extension Entomologist J. N. Roney, and his news is not exactly on the cheery side. It means that farmers must be ready to act as soon as the hoppers start to hatch. That won't be long now, in the southern counties.

But slightly more encouraging is the word that "range grasshopper populations will not be of any importance except in a few spots on some of the Indian reservations."

Egg counts were made in Apache, Pinal, Maricopa and Yuma counties.

"In Apache, heavy deposits of eggs were found in the Alpine, Eagar and St. Johns communities," Roney reports. "If the eggs hatch as expected, the farmers there can expect a severe infestation. They should make every effort to control the pests when they are about half grown."

Maricopa has an abundance of eggs in the Arlington, Palo Verde, Buckeye, Glendale, Perryville, South Chandler and Gilbert areas; also around the Citrus Experiment Station south of Tempe. Here the egg pods were laid by two species—the small red-leg and the large yellow-leg grasshopper. Red-leg eggs hatch early, the yellow-leg eggs somewhat later. "Indications are that we will have large populations in these sections and severe injury can be expected if the grasshoppers are not controlled while young," Roney adds.

For Yuma County, the counts are greatest on the J. E. Thomas and Strue farms in South Gila Valley, and on the Bill Whitman place in the Roll-Wellton district.

In the spring another survey will be made to learn how the hatches are coming along in the various areas. "It will be wise to prepare to poison blemished and start to spread over the for the grasshoppers get too numerous," Roney advises.

Farmers of Five Counties in War Against Hoppers

GRASSHOPPERS are still on a rampage in at least five Arizona counties. A new outbreak is reported at Marana, in Pima County, in addition to previous infestations in Maricopa, Yuma, Graham and Apache.

Maricopa farmers are waging a relentless war against the pests. They are getting expert advice and help from John O'Dell, their county agricultural agent. Help in the form of funds is also coming from the County Board of Supervisors.

Mixing the bait—sodium fluosilicate—with bran and sawdust is still being done by hand. Three new mixing machines, built under O'Dell's direction, still stand idle for want of a few key parts.

O'Dell reports severe infestations south of Chandler and Gilbert, other heavy outbreaks around Laveen, Glendale and Peoria.

Bait is still plentiful and may be obtained—at low cost—at mixing stations at Gilbert, Buckeye and Phoenix.

The dangerous Differentialis (the large, straw-colored hoppers) are just beginning to hatch, and now is the best time to kill them. The smaller Mexicalis hoppers are already in the adult stage, when killing is more difficult.

In general, results with sodium fluosilicate have been excellent. But some difficulty is reported in fields of alfalfa seed. The case of one farmer in the Buckeye district is typical. He made three applications in his field and got a 70% kill. Normally, this is considered good. But the 30% which remained after the three applications could eat up his crop. Seems the hoppers like the tender, green alfalfa better than they do the bait and simply refuse to come down off the stalks to taste the poison. It takes plenty of patience and hard work to get 'em, but it's well worth the effort.

Grasshopper Battle Reaches Peak in Five Counties

PREDICTIONS that 1945 would be a bad year for grasshoppers are coming true. Right now grasshoppers are public enemy No. 1 on farms in Maricopa, Yuma, and Apache counties. This is also true, to a lesser extent in Pima and Pinal.

Grasshopper control is essentially a community problem. It takes 100% cooperation to wipe out the pests in any infested district.

In most areas Extension Entomologist J. N. Roney and the various county agents are getting excellent cooperation. But in some localities, notably in Maricopa county, too many farmers are cooperating half-heartedly or not at all. This not only makes it hard on the fellow who does cooperate. It also is an open invitation to the hoppers to breed and multiply and come back in even greater numbers next year.

There is no way to force farmers to comply with the control program. The Extension Service can only plead for cooperation.

One non-cooperator can wreck the whole program in his district. His neighbors may kill all the hoppers in their fields only to see these same fields reinfested by hoppers hatched in the field of the non-cooperator.

How short sighted and pig-headed some farmers can be is illustrated in a story told Arizona Farmer by one of the county agents.

This particular farmer had 90 acres in alfalfa. He told the county agent he would let the hoppers take the whole 90 before he would put out poison.

The county agent figures it would cost this farmer 10 cents an acre for the poison and 25 cents an acre to distribute it. Assuming three applications would be necessary to get all the hoppers, the total cost would be a little over \$100. Rather than spend that small amount, the farmer would see his own crop destroyed and those of his neighbors jeopardized.

That sort of attitude is not helping conscientious farmers and their county agents in controlling this annual menace to our crops.

Fortunately, it isn't general. Dr. Roney reports excellent cooperation in most infested areas.

Yuma Makes Progress

Yuma is a good example. There are two grasshopper control districts in that county, one at Wellton, the other along the South Gila. Farmers in these districts have built two new mechanical mixers modeled after designs submitted by the Bureau of Entomology and Plant Quarantine.

Maricopa also has three of these new-type mixers in operation at Phoenix, Gilbert and Buckeye.

The means for combatting the hoppers—plenty of cheap bait at conveniently-located mixing stations—is still available. Only the will—in some cases—is lacking.

How about a little more cooperation?

Fight Lice and Warbles



Roney is giving this calf a thorough dusting with sulphur and rotenone that are death to parasites. On the calf's other side is S. W. Clark. At extreme left is Bondena Stevenson, Scottsdale 4-H girl, who is a champion livestock judge; at right are Bob Biggs and Bob Fuller of the Mesa 4-H Club.

THE lice-and-warbles editor thought somebody was trying to load him with Hassayamp' sand. "If you want to demonstrate lice and warbles control, why don't you do it with cattle that have lice and warbles on 'em?" he snorted. "I happen to know that those four heifers of Amos Terrell's are just off one of the finest, fanciest Hereford breeding farms in Arizona. You'll find no parasites in that herd."

"You won't, huh?" grunted Asst. County Agent Paul Brown. "You'll find cattle parasites wherever there are cattle."

"He's right," nodded Extension Entomologist J. N. Roney. "Even on thousand-dollar bulls and high-record dairy cows. The big fellows need just as much lice-and-warbles education as the little fellows, because blame few of them are doing anything about lice and warbles."

Roney and Brown proved their statements when they held their demonstration at the Terrell place, northeast of Phoenix, Jan. 13. It was mainly for 4-H boys and girls, but several adult stockmen were there to have their eyes opened.

Although the calves had been bought only a few days ago from a breeder whose reputation is nationwide, they were lousy and their backs were dotted with warble bumps. His name won't be mentioned here because he is no exception.

Too Pessimistic

Most breeders and dairymen know by this time that their cattle are infested by parasites that sap their vitality, increase feed costs, reduce milk and beef yields. Maybe one reason why not many have yet done anything is that they think it's almost hopeless. They think that in the lower altitudes, like Salt River Valley, animals have to be dipped or shampooed every week or two in order to keep them parasite-free.

Not so, declared Roney as he shampooed two of the yearlings with sulphur-rotenone solution and sprinkled the other two with a dust of the same ingredients that is equally effective. Two treatments in fall will control lice. Three in winter will control both lice and warbles.

His statement was backed up by a man who has probably done more work with warbles than any other in the U. S. This was S. W. Clark, former associate of Roney at Texas A. & M. College, now entomologist for the Texas Gulf Sulphur Co. Clark happened to be in Phoenix and assisted with the demonstration.

Live Inside Cattle

Warbles, as everybody must know by this time, are the larvae of heel flies. In Salt River Valley and similar Southern Arizona areas, heel

flies are active from Feb. 10 to April 10. It is then that they lay their eggs on the lower legs of cattle. A little less than a year later, the larvae have moved up to the back and each one has punctured a hole for air. Then they go back for a fraction of an inch and rest for about 37 days before they emerge, fall to the ground and pupate. It is at this period that they can be reached with rotenone or derris. The grubs die, and every dead grub means one less fly the next season.

For this altitude, Roney recommends a first treatment about Nov. 25, another 3 days later, and the third 3 days after that. If the treatment is thorough, all the lice on the animal's body are destroyed at the same time.

The 4-H members took keen interest in the proceedings. Some of them are talking of forming teams to visit farms and delouse and dewarble cattle at so much a head. They will probably find plenty of customers, especially among farmers who own just a few. The way things are going now, it won't be long until all the larger operators have their own treatment facilities. A shampoo outfit is easy to make, and any can may be converted into a powder sprinkler. Owners of large herds, of course, will want dipping vats such as most of the rangemen up in Apache County have already built.

More Cotton With DDT

By JIM WELKER



Even before the cotton was picked, there was no doubt about the result of the experiment. These stalks held up to view by W. A. Stevenson and Goodyear Farms Supt. Kenneth McMicken, are representative, average stalks from the DDT-treated plot and the untreated check plot. With only a few insects to sap its vitality, the DDT cotton could really "put on."

WITH the interest of all American agriculture focused on DDT, the insect- and germ-killing chemical made famous by its military uses, results are now revealed on a cotton-dusting experiment made last year by Goodyear Farms at Litchfield Park.

A field of cotton air-plane dusted with a DDT-bearing preparation produced 30% more lint per acre than did a field treated with the standard sulphur-Paris green mixture, and 100% more than did an untreated check plot!

Although officials of Goodyear

Farms urge strong reserve in accepting the results of the experiment as final, they agree that the figures are additional evidence to bolster the hope that DDT may become one of agriculture's most potent weapons against crop pests.

Agricultural papers and the lay press have warned farmers against expecting too much of DDT. All sources of information have taken the attitude that, while amazing things are accomplished by the new insecticide, the whole story is yet to be told. If DDT represents something magi-

cal, then science must learn to control that magic. Such is the tone of all that has been disclosed.

Here are the Goodyear Farms figures:

	DDT	Check	Sulfur-Paris Green
Acres	18½	12½	58
Seed Cotton (total)	34,530 lbs.	11,820 lbs.	78,180 lbs.
Seed Cotton per acre	1,866 lbs.	945 lbs.	1,348 lbs.
Lint Cotton (total)	11,285 lbs.	3,805 lbs.	27,522 lbs.
Lint Cotton per acre	610 lbs.	304 lbs.	470 lbs.

The DDT and check acreages were portions of the same field. The 58-acre field represented a typical one raised by Goodyear Farms in 1944, among the many making up the approximately 1,600 acres of Acala cotton.

The trial was carried out in co-operation with the U. S. Bureau of Entomology and Plant Quarantine. W. A. Stevenson bureau entomologist, supervised the experiment, which sought only to test the effect of DDT, spread by airplane, on the hemipterous ("sucking") insects which prey on cotton in this irrigated region.

Largest Trial Yet

Goodyear Farms made available sizable acreages for the trial, which is believed to be the largest DDT experiment of its kind. The ranch has for several years employed the airplane dusting method on cotton and other crops.

In addition to the substantially greater quantities of the fiber produced under the shield of DDT, it appeared that the quality of the DDT cotton was slightly better than that treated with these regular sulphur-Paris green dust.

This checked with observations made by Stevenson of other, though smaller and hand-dusted, DDT cotton trials at the Mesa Experiment Farm during the latter part of the growing season. The entomologist at that time made a cautious note that "quality of cotton treated with DDT shows up a little better than cotton treated with other insecticides, where reasonably accurate comparisons are available."

In comparison with the check plot, the DDT cotton at Litchfield Park was markedly better in quality. The experiment will be repeated at Goodyear Farms this year before any final

conclusions are drawn on the score of quality.

It Killed the Bugs

The insecticide was spread for the first time on the trial acreage in pro-

portion of 2% DDT to 98% inert carrier. That treatment occurred July 11. The potency of that first treatment is shown in the comparative insect population counts.

On July 6, the counts were: Acreage to be treated with DDT, 34; check plot, 30.3. On July 12, day following the dusting, the counts were: DDT treated, 61; check plot, 107.7.

Five more applications were made, the proportions of all being 4% DDT, 60% sulfur, and 36% inert carrier. Here is the insect count table:

Date of Dusting	Insect Counts	
	DDT	Check
July 18	13.7	72.3
July 25	12.7	51.3
Aug. 9	22.7	38.3
Aug. 15	22	36.3
Aug. 28	11	35.7

In all, 15 counts were taken. The average of all of them showed these comparisons: DDT treated, 21.1; check, 45.8. The first two applications accomplished the most effective results, as far as proportionate counts reveal. The infestation of cotton pests common to this region had evidently reached its high point. These included the big and little green stinkbugs (*Chlorochroa sayi*) and *Thyanta custator*, the brown cotton stinkbug (*Euschistus impectiventris*), lygus (*Lygus hesperus*), and the western cotton plant bug (*Creontiades femoralis*). Lygus was predominant.

No definite conclusions can be drawn regarding the amounts of DDT, either alone or in combination with other insecticidal agents from the single Goodyear Farms trial. The findings, however, will be linked with those from other experiments and will help to advance further the information on the famous synthetic chemical.

Shedding Light on DDT



The quick, easy, sure way to apply DDT is in an oil mist that spreads over many acres as fast as air currents can carry it. This is a "long" shot in Col. Dale Bumstead's vineyard, where the Fog-DDT method was first used agriculturally on April 23.

A revolutionary and very rapid manner of dispersing DDT has been invented. Now, how far and how safely can that method be used?

Some of the wisest entomologists and chemists in the U. S., now gathered here for the Fog-DDT tests under way in Salt River Valley, can not answer this question. They can't say, because they don't yet know enough about DDT.

Main objection to the indiscriminate spreading of DDT is that it kills not only harmful insects, but also species that are friends of man. The number of such friends is enormous. They help by preying on enemies, by pollinating flowers, by gathering honey, and in many other ways unknown to the layman.

The objection to applying DDT by means of the fog generator now used by Allied armed forces as a war and health weapon, is the difficulty of controlling the fog. It is so fine and so light that any current of air carries it far—maybe over the premises of several neighbors. The neighbors may not like it.

Those scientists mentioned, as well as 30 or 40 leading Arizona agriculturists, debated the problems from every angle when they met at a Litchfield Park luncheon, April 25. In the chair was Dr. Charles T. Vorhies of the University of Arizona, who went to Washington with Col. Dale Bumstead and helped to arrange for the present trials.

Fact after fact about DDT was brought out in questions directed at representatives of two concerns which manufacture DDT. These men are Dr. Harry F. Dietz, field entomologist for the pest control research department of DuPont, and Dr. Roy Hansberry, director of the Shell Chemical Corporation research laboratory at Modesto, Calif.

Big Help to Spiders

Some of the most significant statements, however, were made by R. S. Woglum, who directs pest control work for the California Fruit Growers Exchange.

In California, Woglum said, it has been demonstrated that DDT will kill all the various scales which infest citrus trees. It will kill practically all insects found in groves. But several of the mites that live on citrus are not insects; red spider is an example. They are immune to DDT. When their predators are destroyed, they multiply without restraint. Soon they are more destructive than all the other pests put together.

But Woglum added that this handicap may be overcome. Some other way to control mites may be found, making it safe to treat groves with DDT-impregnated fog.

Growers would be delighted to adopt the fog method, he added, because of the staggering cost of la-

bor required for fumigation and spraying. Some of the men who fumigate now demand—and get—\$3 an hour. Of course it takes many men

many hours to cover as many acres as a fog machine could cover in a few minutes.

Boon to Livestock

Only speaker who saw no drawbacks to Fog-DDT was Dr. E. L. Scott of Suncrest Hereford Ranch. Speaking as a stockman, he could see nothing but promise. Animals, he pointed out, can be collected at a central point and treated. There is no drift problem and no danger of killing "good" insects.

It is possible that some livestock pests, such as warbles, may be eradicated by dipping or spraying cattle in a DDT solution. Then, when the heel fly alights to lay the eggs which hatch into warbles, she will be killed.

Dr. Dietz had already remarked that all flies appear to be peculiarly susceptible to DDT. He confirmed reports that flies die if they alight on a surface within four months after it is sprayed with a DDT solution—but only on an interior surface. In the open air, DDT appears to lose its potency in about 14 days.

No Control for Aphids

Leafhoppers, troublesome foes of the vineyardist, are also very susceptible to DDT. Jess Watt, superintendent of Tal-wi-wi, confirmed this statement. Only 10 days before, he and another man had spent seven hours spraying 50 acres of grapes. The application was made with an ordinary sprayer—0.42 pounds of DDT to the acre, dissolved in kerosene. Twenty-four hours later, not one leafhopper was left alive, and not a single flea beetle. Hansberry said that he had got about the same result in California.

M. O. Best and Chet Johns, vegetable growers, were disappointed to learn that DDT is ineffective against aphids. But it is fatal to thrips, which rank right along with aphids as pests. Dr. Dietz said that it had not been possible to do much by feeding DDT to grasshoppers.

Orrin A. Hills, U. S. Bureau of Entomology investigator working on sugar beet pests in Arizona, reviewed excellent DDT results in combatting lygus and stinkbug. "It looks too good to be true," he said.

There was much discussion of DDT toxicity to human beings. The testimony of Dr. Dietz and Hansberry indicated this danger is very slight. The new insecticide may not be absolutely harmless to warm-blooded animals, as rotenone and pyrethrum are, but it would take an enormous amount to do any harm.