California AGRICULTURE

Progress Reports of Agricultural Research, published by the University of California College of Agriculture, Agricultural Experiment Station

Vol. I | April, 1947 | No. 5

State, Federal and Interstate Roles In Conservation

A condensation of a report prepared by S. V. Wantrup at the request of the Council of State Governments, and published in the journal, STATE GOVERNMENT.

Legislation formulating public conservation policies in the United States appears in many unrelated acts, treaties, compacts, and ordinances. Execution of these enactments is spread over international, federal, state, and local agencies.

Under the Constitution of the United States, the individual states hold much of the power to regulate utilization of natural resources, especially agricultural land, ranges, forests, water, wild life, and minerals.

Conservation does not necessarily connote efficiency. Neither does depletion mean waste. Both may be wasteful.

Waste of resources means that the net-value stream from utilization of natural resources is not maximized. Maximization must consider both private and public values.

Application of the maximization principle is not easy. Solutions can be found, making it possible to reach minimum goals, at least, of public conservation policies.

Intrastate Coordination

State machinery for legislative and executive coordination of conservation policies usually is less effective than federal.

Better intrastate articulation or interrelation of resource policies is an aid to better state-federal and interstate cooperation.

(Continued on page 3)

Hybrid Vigor In Dairy Herds By Crossing in Breed

W. A. Regan

The generally accepted explanation of hybrid vigor or heterosis in dairy cattle is based on the fact that most of the desirable hereditary factors tend to be dominant, while those less desirable are often recessive or hidden.

Because the Guernsey breed has been developed along certain lines, it has definite factors governing desirable traits that are dominant. The Holstein, on the other hand, may have other dominant desirable genes. When the two breeds are crossed, the resulting hybrid heifer has the opportunity for and probably will carry more of these dominant desirable genes than were carried by either parent.

Fortunately the same things may be accomplished, even to a greater degree, by crossing between inbred families within a breed.

Inbred Jersey Purebreds

Over a quarter of a century ago we began the task of developing an inbred family of purebred Jerseys that would have a high order of transmitting ability for high milk and butterfat production and that, at the same time, would be free from simple recessive defects. In the main, these objectives have been attained.

An important phase of the work requires the use of the herds of cooperating dairymen in progeny testing of young bulls from the University of California experiment herd. Both purebred and high grade Jersey herds are used for this purpose.

Five of these herds which have used only University bred bulls for the

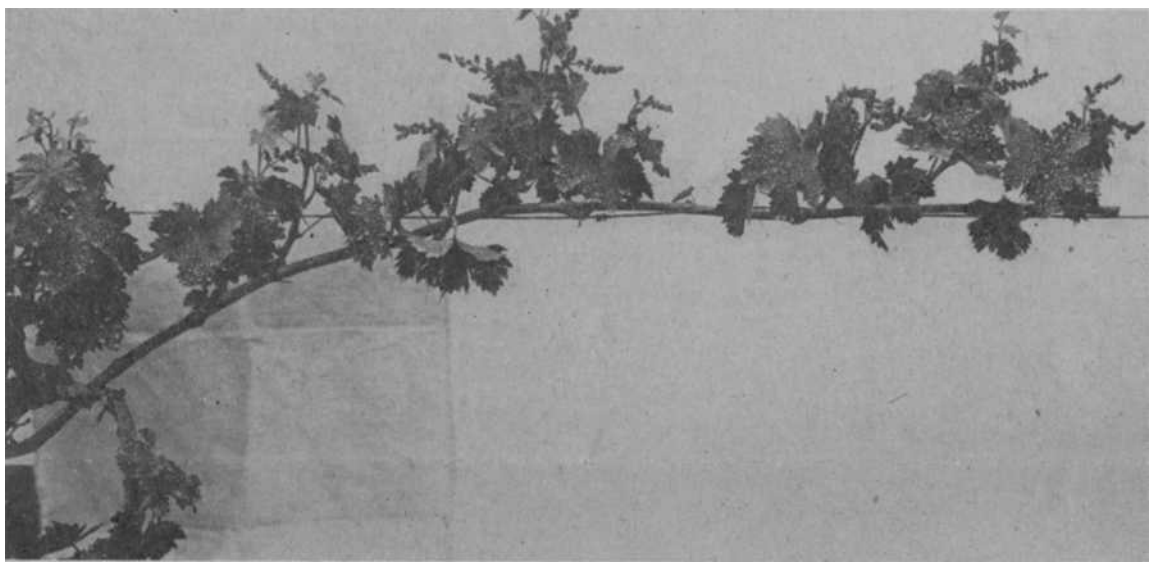
(Continued on page 2)

Recommendations For Improving Quality of Grapes By Using Proper Cultural Operations on the Vines

A. J. Winkler

Grape crops from 1942 to 1945 were the largest in the history of California grape production. With emphasis solely on quantity, quality suffered.

With fruits again moving freely in the normal channels of trade, buyers are becoming quality conscious. The demand for better quality was evident in all markets where fruits and grapes were sold during 1946. The offering of grapes fell short of expectations at times during that season. Some difficulty was had with the conditions and maturing of a considerable volume of grapes, in particular, with girdled Thompson Seedless.



A single cane of a Muscat vine showing the proper stage of development for flower-cluster thinning.

In most varieties the date at which the fruit reached the legal minimum degree Balling for shipment last season was late despite the fact that 1946 was average or above in heat summation in most producing areas.

A delay in maturing under such conditions very definitely indicates overloaded vines. In the case of Thompson Seedless, for instance, analyses of fruit in the range of 17° to 20° Balling showed the average acid content to be 33 per cent below that of fruit of this variety from the same areas and same range of maturity in prewar years. These figures reveal a situation of extreme overcropping of the vines from which the fruit was taken, since the grapes must hang beyond the normal date of maturing for a long time for the acidity to be depressed to this extent.

Improving Fruit Quality

Information at hand not only indicates the nature of the difficulties in 1946, but points the way to the avoidance of similar trouble in years to come. Overloaded vines cannot produce high-quality fruit.

Prior to the war, cultural operations were in common use, which, when properly applied, aided materially in the production of better grapes. The return to these practices is not only the simplest but probably the only means of insuring that the table grapes of 1947 will be of acceptable quality. These operations, in addition to good vineyard care are proper pruning, suckering, tendril and leaf removals, thinning, and girdling.

Pruning

The pruning season is practically over, but the importance of careful pruning must be emphasized. It is the means of distributing the bearing wood over the vine, between the vines, and between years in accordance with the capacity of the spurs, canes, or vines in order to equalize production and secure good crops of high-quality grapes. It is the cheapest way to reduce the number of clusters and thus lessens the cost of thinning in the regulation of the crop of table-grape vines.

Suckering

Suckering is intimately tied in with thinning. Valuable leaves should not be removed, but the fruit on the vines that are too bushy will not attain high quality. Judicious removal of excess shoots when they are still small makes for a normal coverage of foliage which favors the best development of the fruit and reduces both thinning and harvesting costs. A shoot should not be removed just because it happens not to have a cluster, for its leaves will nourish the clusters on other shoots.

Leaf Removal

Leaf removal if judiciously performed may be advantageous. Basal leaves that will rub the fruit, tendrils that will intertwine the clusters, and the lower lateral shoots where these form in profusion should be removed at the normal time for berry or cluster thinning. These operations may well be combined with the last thinning, especially in the case of Red Malaga and Ribier where only a few clusters have been left to be removed at this time. Only the leaves and laterals up to and opposite the clusters should be removed. All tendrils that might reach a cluster should be cut.

Opening for Color

The coloring for certain varieties can sometimes be facilitated by opening the vines to permit the air to move through them more freely. One means of doing this is to remove some of the leaves. If this removal is delayed until the fruit has attained the minimum sugar content desired, little or no harm will be done to either the vine or the fruit, and the coloring of the grapes may be improved.

Should many leaves be removed before the fruit reaches the minimum sugar content for harvesting, its maturing as well as the development of color may be retarded.

For the purpose of improving the color, only leaves in the head of staked vines and those on the lower part of the north or east side of trellised vines should be removed.

The removal of one-eighth to one-fourth of the leaves will usually give the desired results. More drastic treatment will weaken the vines and may stop the development of the fruit.

Thinning

Thinning is the removal of flower clusters before blooming and of immature clusters or parts of clusters after the berries have set. Like pruning, it concentrates the activities of the vine into the parts retained. It offers possibilities in addition to good pruning in the improvement of quality and in the production of a full crop every year.

The fruiting habits and the setting of the fruit of different varieties necessitates different methods of thinning. Thus with flower-cluster thinning, quality is improved through the better setting of normal berries, with berry thinning through the removal of the parts of clusters that tend to become too compact and by better coloring, and with cluster thinning through greater uniformity of size and better coloring.

Girdling

Girdling—or ringing—consists in removing a complete ring of bark ⅛ to ¼ inch wide from the trunk, arm, or cane below the fruit which it is intended to affect. As a result, the carbohydrates elaborated in the leaves will accumulate in the parts above the wound, including the fruit, and will influence its development.

The effects to be achieved determine the time of girdling. Thus, if the girdling is to increase size of berry it should be done just before or at the beginning of most rapid berry growth, which is soon after the berries set, and if it is to hasten coloring and maturing it must be done just before or at the beginning of the ripening period.

Properly timed and executed girdling accompanied by proper thinning has regularly increased the size of Thompson Seedless berries from 50 to 100 per cent.

The berry size of seeded varieties like Ribier, Malaga, etc., is influenced relatively little. Although not so consistent as the influence on berry size, the coloring of Red Malaga and Ribier can often be hastened by girdling. The rate of ripening of most seeded varieties may be slightly accelerated.

A. J. Winkler is Professor of Viticulture and Viticulturist in the Experiment Station, Davis.

Constant Research For the Control Of Citrus Thrips

W. H. Ewart

Citrus thrips are found in all citrus-growing areas of California but are a serious pest only in the inland valleys.

The most serious damage occurs in the Sacramento and San Joaquin Valleys in central California, in the San Fernando Valley, Foothill regions and the Coachella Valley in southern California. Limited numbers of thrips occur on citrus in the coastal areas but they have not caused enough damage to warrant general control measures.

Injury to Fruit and to New Growth

The fruit and the new growth of all varieties of citrus may be injured by thrips.

Nymphs which hatch in the early spring from overwintering eggs begin to feed on the new flush of growth on oranges and grapefruit and may cause considerable injury.

When the new growth hardens, which is about the time most of the petals have fallen, thrips move to the small fruits where their feeding causes the characteristic ring scarring. Fruits may be injured in this manner until they are about the size of a walnut.

During the early part of the summer the thrips feed on the surface of fruits and tender growth. In late summer the fall flush of growth may be so badly damaged by thrips feeding that very few new leaves develop. On lemons, injury to both fruit and new growth begins with the nymphs which hatch from overwintering

(Continued on page 2)

Investigations in Poultry Disease Problems Reported

Attempts to develop an improved vaccine for pneumoencephalitis—known in all states except California as Newcastle disease—focused on studies of the effect which the addition of certain substances to the present vaccine might have on its immunizing property.

Laboratory tests of some of these experimental vaccines gave encouraging results.

One vaccine was subjected to field trials involving 37,400 pullets on five farms. Approximately 20 per cent were left unvaccinated for controls and the remainder were given two 0.5 cubic centimeters doses of vaccine. Part of the birds received their two doses of vaccine at four and twelve weeks of age and part at twelve and fourteen weeks of age. These flocks became infected with a mild type of the disease in three to five months after the second vaccination.

The egg yield of all groups was depressed but this effect was significantly less marked in the vaccinated than in the control group.

(Continued on page 4)

Control of Lygus Bugs in Alfalfa Seed Fields With DDT Dusts Requires Care in Application

Ray F. Smith

Within the past fifteen or more years considerable evidence has been obtained which definitely places lygus bugs as one of the more important factors affecting the yield of alfalfa seed.

Lygus bugs are the most important factor in reducing alfalfa seed yields in many fields.

Extensive investigations on the control of lygus bugs have been conducted during the past two years in various parts of the state by the University of California in cooperation with various county officials and the farmers of the areas. One objective of this study has been to develop a suitable control method for lygus bugs so that this one uncertainty may be eliminated from alfalfa seed production.

Proper Timing of DDT Dust Applications

The basis of good control of lygus bugs is the proper timing of DDT dust applications. At present this must be based on the trend of the lygus bug population count.

Population counts are determined by taking two sweeps of a standard insect net at representative spots in the field and counting all the bugs in the net. An average of several counts should be taken for each type of growing condition in the field to determine whether dusting is necessary. Most comparable counts are obtained between 9:00 a.m. and 4:30 p.m. The alfalfa should be dry, no strong wind blowing, and the temperature not greatly exceeding 100° F. For further instruction, consult your farm advisor.

Control Applications

Lygus bugs are not likely to cause any material damage until an average of at least five can be collected per sweep of an insect net. Severe loss of seed is not likely to result until the population reaches a much higher level. The objective should be to time the control measures so as to keep the population below five per sweep.

Results over the past two years have indicated that at 30 pounds per acre, 5 per cent DDT and 10 per cent DDT are better than 3 per cent DDT both in initial control and residual action. There is apparently no marked difference between 5 per cent and 10 per cent DDT in the control of lygus bugs. Where 10 per cent DDT is used, the hazard to bees and other beneficial insects may prove to be greater. The lowest possible concentration and poundage which will give satisfactory control should be used.

The incorporation of 50 per cent or more sulfur in the dust mixture gives some increase in control, but since sulfur will cause injury to alfalfa flowers in hot weather, its use is not recommended.

Recommended Pounds per Acre of 5 per cent DDT Dust

Type of Duster	Bud Stage Dusting	Bloom Stage Dusting	
	All Fields	Growth Normal	Growth Unusually Heavy
Ground Machine	25	20	25
Airplane	30	25	30

Hazard of DDT Residue

If the straw remaining after seed harvest is burned or is used as fertilizer, there will be no problem of DDT residue. In spite of the fact that we do not expect toxic effects in animals fed this straw, there is still a problem involving human health. The Federal Food and Drug Administration has not placed a tolerance for DDT in meats or milk. Until a tolerance is set, the feeding of straw from alfalfa seed fields which were dusted with DDT cannot be recommended.

Relation of DDT Applications to Beneficial Insects

There are two groups of beneficial insects in alfalfa seed fields. One group is the parasites and predators which destroy harmful insects. These beneficial insects fortunately are less affected by DDT than lygus bugs at dosages of 30 pounds of 5 per cent DDT dust per acre. For this reason it would seem wise to maintain this favorable balance by holding the amount and concentration of DDT to the absolute minimum that will give satisfactory control of lygus bugs.

The other group of beneficial insects is the pollinating insects. Shortly after dusting blooming alfalfa fields with DDT, markedly fewer bees are present in the treated portions of the fields than in the untreated portions, or than were in the field the day before dusting. On the day after dusting, this reduction is less marked and within another day or two is no longer evident.

Ultimately, especially when the lygus bug population is high at time of dusting, more bees are usually found in the treated area than at any time previously.

After dusting, some bees may be observed which are behaving abnormally and are presumably being affected by DDT. When such bees are placed in cages, some of them may die. Whether or not they would die if left in the open fields has not been determined. No significant number of dead bees has been observed in fields after dusting, even in row plantings where the ground can readily be observed. Nor are unusual accumulations of dead bees observed in apiaries coincident with dusting programs in California.

In view of the present uncertainties as to the effect of DDT on bees, the following recommendations are made.

Control Recommendations

Dust in the bud stage if the nymphal lygus bug population exceeds the adult population and the total count exceeds two per sweep. Dusts should be applied to alfalfa seed fields only when proven to be necessary. This is especially true when fields are in bloom, since any hazard to bees would be greatest at this time.

Rates of application—pounds per acre and per cent of DDT in the dust—should be kept as low as satisfactory control will permit. Five per cent DDT in talc or pyrophyllite at the poundage given in the table is recommended at the present time.

Every effort should be made to obtain a thorough, even, application of dust and to keep drift to a minimum.

Although our work during the past two years has shown that best control will result from dusting in bloom, we cannot recommend it because we do not know for sure that it will not harm the pollinators.

Since some dust may be applied in the bloom stage, the following suggestions are made in the hope that any loss to bees will be minimized. In early bloom to full bloom, it is suggested that dust only be applied if the nymphal population exceeds the adult population and the total count exceeds five per sweep in short-cycle fields—having a total blooming period of less than 30 days on the basis of previous history—or ten per sweep in long-cycle fields—having a total blooming period of over 30 days on the basis of previous history.

In late bloom, it is suggested that dust only be applied when there is considerable secondary growth and the field is expected to continue to bloom for some time. Do not dust in this stage unless the count exceeds 10 to 15 per sweep. Do not dust a field which has started to dry up.

If alfalfa is to be dusted in bloom, beekeepers in the vicinity should be given advance notice and the applications should be made before 6:30 a.m.

Ray F. Smith is Instructor in Entomology and Junior Entomologist in the Experiment Station.

Bees Valuable to Growers for Aid As Pollinizers

J. E. Eckert

To insure the adequate pollination of plants that are benefitted by insect pollination, colonies of honeybees should be located in or near orchards or fields at the rate of one or more strong colonies per acre.

Colonies are generally placed in groups of from 10 to 20 in orchards and in larger groups for the pollination of field crops.

Precautions Needed

Because of the widespread use of poisons in the control of injurious insects, and because many poisons are also toxic to pollinating and other beneficial insects as well, chemical control programs should include the maximum protection of those insects that add materially to the production of a majority of our agricultural crops.

This can be done by following a few general rules:

1. Arsenicals should not be applied to fruit bloom, truck crops, alfalfa, corn or other crops while a majority of the plants are in bloom.

2. Eliminate the use of arsenicals, especially in dust form and substitute DDT or other materials that are less toxic to honeybees.

3. Mists or sprays should be used wherever possible in order to confine the poisons to the fields treated.

4. Beekeepers whose colonies are in the vicinity of fields or orchards to which chemicals are to be applied should be notified a few days in advance if the chemicals might be injurious to pollinating insects.

5. Beekeepers should become familiar with the chemical control programs of the territory in which they locate their colonies and should register the number of colonies and their location each spring, or whenever they move their colonies, with the Agricultural Commissioner of the county in which their colonies are located.

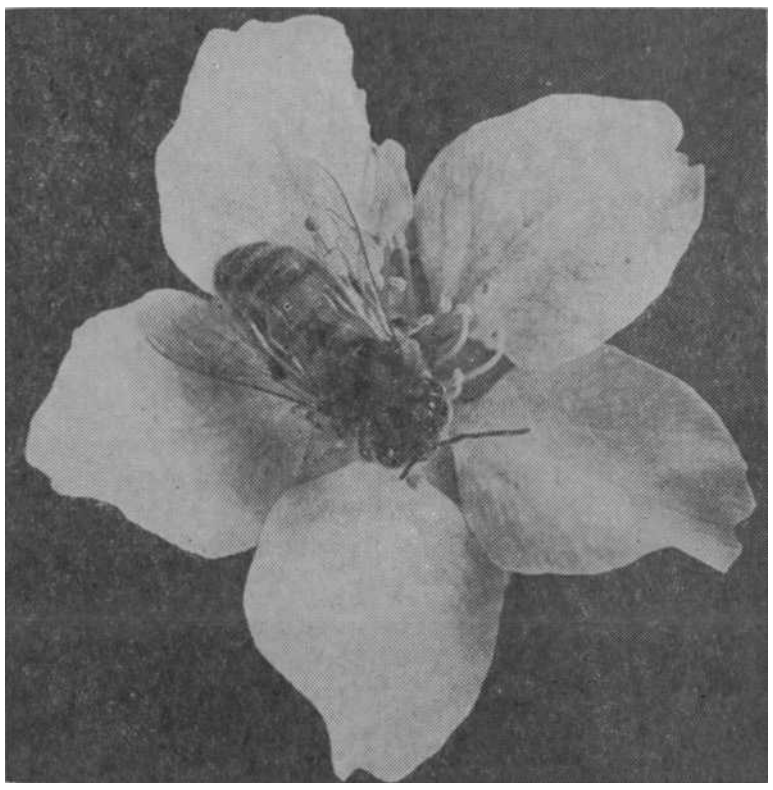
Growers who profit by the pollination services of the honeybee usually get beekeepers to locate colonies in or near their fields and generally pay a per colony rental as a recognition of the services rendered.

It is back-breaking work to move heavy colonies of bees and a nominal rental aids the beekeeper in meeting his moving expenses.

The growers of almonds, plums, prunes, apples, pears, cherries, alfalfa, and other legume seed, avocados and many other fruit vegetable and seed crops get far greater returns from the pollination services of the honeybee than the beekeeper receives from the honey, beeswax, bees and queens he is able to produce.

The products of the hive produced by the beekeeper are merely by-products as far as agricultural returns are concerned and agriculture gains more by protecting the beekeeping industry from injury from chemicals than the beekeepers themselves.

J. E. Eckert is Professor of Entomology and Apiculturist in the Experiment Station, Davis.



The pollinization services of the honeybee are of greater value to agriculture in general than are their products to the beekeeper.

Poultry Disease Investigations Seeking Solution to Problems Of Chicken and Turkey Raisers

(Continued from page 1)

The number of birds removed as culls following the onset of the disease was significantly larger in the non-vaccinated groups.

The results do not show that the vaccine was superior to that used in preceding years as regards its ability to protect against field infection.

These vaccination experiments emphasize the necessity of subjecting experimental vaccines to trial on the farms for final determination of their effectiveness.

Evidence suggesting that the disease may be transmitted by eggs from infected flocks has been obtained recently which supports similar evidence reported by other investigators.

The virus was isolated from the unabsorbed yolk of four-day old chicks which were hatched from eggs laid by an infected breeding flock when the egg yield was at the lowest point.

The virus was isolated also from the pooled contents of eight infertile eggs laid by a flock in which the disease was present.

Attempts to isolate the virus from developing embryos in eggs from three flocks following recovery from the disease resulted in failure.

Lymphomatosis

In current experiments efforts are being made to obtain definite evidence that this very prevalent disease of chickens is caused by a filterable agent or virus.

Attempts have been made to isolate a virus by subjecting mascerated tumors to filtration and ultracentrifugation to separate out all tumor cells.

About 400 chicks have been injected with various preparations which might be expected to contain virus if it was present in the tumor tissue. These birds are now from five to ten months of age and none of them have shown evidence that the material injected has produced lymphomatosis. They are still too young to conclude that this will not occur.

Pox in Turkeys

Investigations to determine if the necessity of revaccination for pox of turkeys kept for breeding could be avoided by using vaccine made from virus of turkey instead of chicken origin, gave negative results. A high percentage vaccinated with the turkey virus vaccine were again susceptible when tested six months after vaccination.

Hexamatiasis in Turkeys

The importance of wild birds in the infection of turkeys with hexamatiasis was emphasized by the occurence of a severe epidemic of the disease in one section of the state after the poults were put out on the range.

Pheasants and quail were incriminated as the sources of the infection in these outbreaks. These birds as well as chukars can be carriers.

Several sulfonamides were tried for the treatment of hexamatiasis in poults under field conditions but none was found to be of practical value. Mercuric chloride was tried and proved to be toxic for poults and valueless as a treatment.

Salmonellosis (Paratyphoid) of Turkeys

New evidence of the importance of reptiles and wild birds as complicating factors in protecting turkeys against paratyphoid is constantly being uncovered.

Approximately 25 per cent of all snakes caught on ranches have been found to be carriers of one of five different types of the paratyphoid organism. All of these types of the organism have been found to be the cause of disease in turkeys.

A young blue jay caught on a turkey ranch was also found to be a paratyphoid carrier.

Air Sac Infection in Turkeys

A field survey conducted in cooperation with a large hatchery yielded evidence that this type of respiratory disease of turkeys is not likely to result from transmission of the infection through hatching eggs.

Trials of Sulfonamides and Penicillin

Silver nitrate—four per cent solution—has been extensively used for several years in the treatment of sinusitis of turkeys. This chemical has been compared with several others of possible value for treating the disease and was superior to all of them.

Sulfamerazine—0.25 per cent in the mash—was found to be of possible benefit as a treatment of air sac infection which often accompanies sinusitis of turkeys. It did not effect a permanent cure and in this respect resembles sulfathiazole as a treatment of coryza in chickens.

Sulfathiazole was found to be unsuitable for turkeys because mash containing it is distasteful to the birds and, in non-toxic doses, it is ineffective as a treatment of any disease of turkeys for which it has been tried.

Sulfamethazine given to chickens, as 0.5 percent of the mash, proved ineffective as a treatment for infectious coryza. The loss in appetite and body weight of birds given the medicated mash for fourteen days indicates that the drug is somewhat toxic for chickens.

Pencillin injected into the breast muscle of chicken with infections coryza in three daily doses of 1,000, 10,000, 50,000, or 100,000 units had no beneficial effect on the course of the disease.

The foregoing report represents research by participating members of the staff of the Department of Veterinary Sciences: R. A. Bankowski, J. R. Beach, P. D. DeLay, K. D. DeOme, W. R. Hinshaw, E. McNeil.

DONATIONS FOR AGRICULTURE RESEARCH

Gifts to the University of California for research by the College of Agriculture, accepted in March 1947

BERKELEY

California Olive Association, San Francisco 250.00
Research on Olives by Food Technology Division.

Donsing Breeding Farm and Hatchery, Rio Linda $1,000.00
Research by the Division of Poultry Husbandry.

DAVIS

Ailing House Termite Inspection Bureau, Berkeley 500.00
Division of Entomology and Parasitology.

California Committee on Relation of Electricity to Agriculture 2,500.00
For electricity applications to agriculture.