

the California **Citrograph**

A Monthly Publication Devoted to the Interests of the Citrus Industry

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Vol. 31, No. 11, SEPTEMBER, 1946

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California Citrograph

Vol. 31, No. 11

SEPTEMBER, 1946

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RIGHTS CLARIFIED

IT may be that the millenium is just around the corner. Business men now have certain rights. And by Law, by golly.

No doubt this will come as a great shock to many an harassed executive.

The Administrative Procedure Act, signed recently by the President, provides the means whereby individuals may know explicitly what their rights are in dealing with government departments and agencies.

Why this news did not hit the headlines in second coming type is something about which we must inquire.

The news report mildly states that certain departments and agencies, for more than a decade, have been in some respects almost a law unto themselves. Now they are required by the terms of the Act to publish all information concerning their organizations and procedure; also final opinions, orders and rules. The Act also provides that the functions of investigating or prosecuting officers of a federal agency or department be separated from the functions of those who participate in or advise as to decisions. Decisions may be made only by the hearing officers concerned.

Individuals appearing before federal agencies may now be accompanied and represented by counsel. No person may be denied the right to appear before an agency or in any agency proceeding on the grounds that he is not a lawyer. When required to submit data for evidence, individuals may procure copies. Investigative processes or subpoenas may not be issued except as authorized by law—this to eliminate "fishing expeditions" and investigations beyond jurisdiction or authority. Particularly stressed in the Act is the right of the individual to judicial review.

Looks as if some one might have remembered the Golden Rule. Now if only we could have a judicial review of the un-needed government expense items that take such a big bite out of our wage checks. . . .

THE COVER

THE cover for this month is, we think, a remarkably good shot, taken in the Research Laboratory of the California Fruit Growers Exchange. The set-up is of no process in particular, although it could be. The whims of photogs being what they are, strict adherence to reality seems beside the point. The lights and darks are good and we like the man-from-Mars expression on the face of the researcher.

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New, problems, new processes, new techniques are demanding more research work—digging for new information, for the hows and whys and wherefores, finding wider uses for our products and by-products, working out economies, making more things to satisfy more wants. Properly these functions should be carried on in great measure by the industries concerned.

PEST HAZARDS INCREASE

AN increase of 160 percent in the number of vehicles entering California in June of this year above the number arriving in June, 1945, and a corresponding increase in interceptions of diseased or infested plant material of potential hazard to California agriculture is noted in the report of the Bureau of Entomology and Plant Quarantine, State Department of Agriculture, submitted to the Governor's Council.

There were 193,128 vehicles, carrying 593,140 passengers, inspected at border stations in June, 26 percent more than May. The take of infective material is impressive: 5,616 lots of prohibited material were intercepted.

Of special concern to the citrus industry is the fact that 18 interceptions of plant material infested with citrus white fly were made in 1945. So far this year there have been 36 interceptions of white fly-infested plants, 13 of them in June. A gardenia plant harboring citrus white fly from Mexico was found inside a hollowed-out section of a banana plant. Another gardenia plant, similarly infested, was found in a suitcase with clothing. Many interceptions of pests dangerous to various deciduous fruit crops also were made.

The rapid development in air transport and the greatly increased hazard of pest introductions, must not be overlooked. The large number of persons, mostly service people, returning from overseas, increases the chances for pest introductions in baggage and gear.

The timely discovery of the Mexican bean beetle recently in Ventura County, by agricultural inspectors making a citrus orchard survey, highlights what might happen if we relax our vigilance or let the bars down. This beetle, unknown here before, is probably the worst pest known to bean growers. Fortunately it was discovered before it had gotten widely spread, and it can be exterminated—at a price of course.

We need continued vigilance at points of entry to prevent introductions of insects and plant diseases that might cause great economic loss. We also need continuing surveys under the direction of competent entomologists in various districts, and in various crops, directed toward finding any infestations that might not have been previously detected. This would provide the best and cheapest protection we could buy.

TALK UP, SON

A young fellow named William O. Wollin, one of the Future Farmers of Los Gatos, Calif., high school, won the National Oratorical Contest sponsored by the American Legion during the past season. Prior to that he had won a state public speaking contest. From his latest triumph he came home with a scholarship certificate in his pocket worth \$4,000. He could enter any institution of higher learning he might choose. Back of the scenes there was, of course, a good coach, George Bruntz.

While at various times agriculture has had competent spokesmen, its leadership has not often been outstanding in its ability to state its case. The training of young men and women to get

up on their feet and think and debate with the best of them is important to agriculture in general, and to cooperative marketing organizations in particular. Most of us could well have spent the time dribbled away in Latin, Geometry and so-called physical education to much better advantage in learning rudiments of public speaking and debate, and in gaining experience and confidence through practice. "You can't learn to swim on a piano stool," as a good teacher once said.

Agriculture has a case to present. It must be well presented.

Let's train the next generation of farm folk to talk up. They have no need to be timid. They seem to have the ability to think a little straighter than certain other elements of our society.

Some of those Future Farmer kids we have seen in action could talk a Scotchman out of his kilts, an ability not to be discounted.

PRODUCTION COSTS

SEEMS that there has never been a better time to take an icy-eyed view of production costs than right now. Maybe nothing much can be done about the cost of labor, or farm machinery, and some of the other expenses required to "make a crop", except to use men and tools as efficiently as possible, substituting machines for hands wherever this can be done. Careful attention to use of fertilizers, application of irrigation water, pest control at the right time, can bring savings, improve production and quality of product. Could be that prices might drop faster than expenses. Careful management now would make the situation a little easier then.

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Professor Smith heads the Division of Beneficial Insect Investigations, University of California.

The Biological Control Program in Relation to California Agriculture

HARRY S. SMITH

IN recent years economic entomology in California has been characterized by three interesting and important developments: these are the profitable use of the biological control method; conspicuous success in the development and improvement of insecticides; and the evolution of resistant races of insects, which require heavier and heavier treatments for control. This latter event creates a difficult and therefore challenging problem for the economic entomologist, in view of the fact that some insecticides, if used excessively or over long periods of time, are injurious to the host plant.

The two basic factors in the problem are fundamental and are no longer open to question. They may be stated as follows: First, the population of many, if not all, species of insects have the inherent capacity, through the interaction of genetic variation and natural selection, to shift in the direction of greater and greater resistance to control by specific insecticides (1) and, second, the tissues of pest and host plant are affected in such a way by many insecticides that the differential between being fatal to the insect and injury to the host plant is very narrow.

No doubt the entomologist could increase his dosage in most cases to the point where a satisfactory kill would be secured, were he not confronted by the fact that the tolerance of the host plant for certain insecticides is limited. He cannot, therefore, get around this obstacle permanently simply by applying more insecticide. By so doing he embarks on a vicious circle. Increasing the dosage increases the proportion of resistant individuals in the population, making it necessary to increase the dosage still more to obtain control, until the limit set by the tolerance of the host plant for the insecticide is reached.

Since this situation results from fundamental facts which the economic entomologist cannot change, he can only "beat the devil around the bush" by developing new insecticides, or by modifying the old ones so that there is a greater differential between lethality to the insect and injury to the host plant, or by the development of control measures which do not involve such intensive and prolonged use of chemicals that are injurious to the plant.

Another solution is sometimes suggested, the reduction of the standards of pest control to a point similar to that existing on the continent of Europe, or in the Orient, where the presence of insects or evidence of insect injury on fruit is largely ignored, providing the edibility of the product is not seriously impaired. However, the competition for markets in this country is too keen to permit of that solution. The Pacific Slope has two strikes against it to begin

¹Smith, Harry S. Racial Segregation in Insect Populations and Its Significance in Applied Entomology. Jour. Econ. Ent. 34 (1): 1-13.

with. These are distances from markets, involving higher freight rates, and relatively high capitalization of productive lands. Because of these facts it appears essential that the fruit grower, in order to prosper in this area, must continue to place on the markets superior products only. A lowering of pest control standards therefore will not solve the problem.

It is my purpose to attempt to show that a partial solution of this difficulty lies in greater development of the biological control method; that returns on the investments made by governmental agencies in research along these lines have been remarkably profitable to California agriculture; and that, since in the United States as a whole, there has been a relative neglect of this field, the research program in economic entomology is out of balance. To the extent that insect pests can be controlled, or partially controlled, by the biological method, to that extent can the phenomena of resistance to and injurious effects of insecticides be avoided. The utilization of this method to the greatest possible degree would be justified even on the basis of lowered costs of crop production only. Its further use becomes a necessity in some instances where resistance to insecticides develops or where the continued application of insecticides causes serious injury to the host plant or seriously impairs the quality of the product to be marketed.

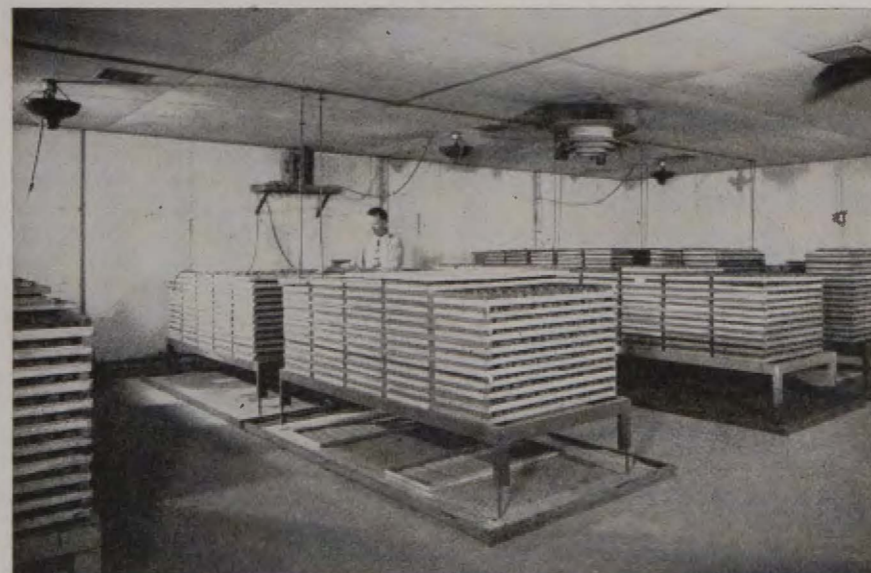
That greater emphasis on biological control is justified is, I think, amply borne out by the history of the work in California. It might be helpful, therefore, in attempting to estimate the possibilities of this method, to review some of the more successful projects and point out their economic significance.

First, of course, is the classic case of the introduction of the *Vedalia* for control of the cottony-cushion scale. We have become so accustomed to the innocuous existence of this scale insect that it is easy to forget what the introduction of *Vedalia* actually means in terms of present day economic benefit to the citrus industry. One can read, in the reports of the old California State Board of Horticulture, stories relating how the citrus industry was threatened with extinction, and how the banks refused to accept infested groves as collateral for loans. These stories might seem fantastic now, were it not for the fact that on a few occasions where infested citrus trees have been sprayed with arsenicals, thus giving the scale protection from *Vedalia*, the pest has built up to a point where damage to the trees was almost unbelievably severe. In one such case in Tulare County several years ago the scale

became so abundant that the leaves from the defoliated trees had up to an eighth of an inch of sugar on them, crystallized from the honeydew. Large branches were killed, and the injury was still evident after four years had elapsed. It is doubtful if, uncontrolled, even the red scale is as destructive to the citrus tree as the cottony-cushion scale.

It would not be correct, of course, to credit the present value of the citrus industry to the introduction of *Vedalia*. No doubt entomologists would have learned to control it by the use of insecticides. But even so, the expense of controlling such a terrific and widespread pest would be appalling and would undoubtedly run into millions of dollars annually in California alone. It is probable that the total cost of this introduction to the Government did not exceed ten thousand dollars, including the salaries of the entomologists concerned.

An equally perfect success resulted from the introduction of the parasites *Tetraneura pretiosus* and *Coccophagus gurneyi* from Australia for control of the citrophilus mealybug in 1927. While this pest was not so disastrous to the citrus tree as the uncontrolled *Icerya*, it did cause very great losses in many citrus groves and had spread to seventy thousand acres at the time the parasites were introduced. Since about 1930, when the full effect of these parasites began to make itself evident, the citrophilus mealybug has completely passed out of the picture as an economic factor. In the case of this insect it is not so difficult to arrive at an estimate of the value of the parasite introduction. It is well known that the Valencia orange, the principal variety grown in Orange County, has the unique characteristic of hanging onto the tree



Interior of Insectary at Albany, where the parasite of the Oriental Fruit Moth is being produced at a rate of 250,000 per day.

during the summer months. This not only makes it possible for the consumer to have oranges the year around, but makes this variety particularly desirable from the grower's standpoint, since it does not have to compete for markets with the Navel orange or with the main Florida and Texas crops. The citrophilus mealybug, however, caused these fruits to drop off. In order to save his crop, the grower had to pick his fruit early and sell it in competition with the other varieties. Consequently he received greatly reduced returns. The total losses due to this effect were very great. A letter written in 1931 by Director A. A. Brock of the California State Department of Agriculture, who at that time was closely associated with the project as Agricultural Commissioner of Orange County, contained the following:

"On several occasions I have made the statement that the introduction of these parasites was worth a million dollars annually to this county. I have been told by a number of packing-house managers that these figures are very conservative.

"While the infestation has never been heavy on all of the acreage the same year, it has been heavy on a part of the acreage every year, with the exception of the past two years. So, if we lost a half box per tree on one-fourth of the infested acreage, it would mean a loss of about \$1,500,000.00. "Again I wish to state I am positive that the introduction of these parasites means a saving to the citrus growers of this county of better than a million dollars annually."

Here again the total cost to the University of California of the search for and importation and establishment of these parasites did not exceed ten thousand dollars.

The third outstanding demonstration of the economic importance of biological control in California was in connection with the black scale. From the early days of citriculture in California, until the last decade, this insect was the number one insect pest of citrus. One of our most conservative members, A. F. Swain (2) who was working on this problem, wrote in 1928:

"Of the various scale insects attacking citrus in southern California, the black

²Swain, A. F. and Charles E. Duggan. Significance of midseason units counts on resistant black scale. Jour. Econ. Ent. 21: (4) p. 532, 1928.

scale (*Saissetia oleae* Bern.) is the most important from an economic standpoint. In the 1926-27 season approximately 60,000 acres of citrus in California were fumigated and about the same amount sprayed. Of this, 40,000 acres were fumigated and 30,000 sprayed primarily for the control of black scale. In other words, approximately \$1,500,000.00 was spent by the citrus growers of Southern California in an attempt to control black scale."

In 1937 the University of California introduced from South Africa and established, among other species, the parasite *Metaphycus helvolus*. This parasite had not previously been rated very high by California entomologists who had studied the black scale and its enemies in South Africa, but the effect of its introduction and establishment in California has been striking and of very great economic value. The parasite, colonized extensively by both the University and the local insectaries, built up in numbers and spread with great rapidity. The black scale, in the face of this attack, began to diminish and by 1941 it was evident that we were again witnessing an outstanding demonstration of the value of the biological control method. The control is not, it is true, so perfect as that of the cottony-cushion scale and the citrophilus mealybug. In certain interior areas, where the black scale's seasonal history is unfavorable and as a result there is a lack of synchronization in the seasonal development of host and parasite, it is still necessary to rely partly on artificial control. Occasionally, in other areas, where unusual conditions develop such as heavy ant infestations or excessive use of chemicals to which the parasite is particularly sensitive, the black scale will build up to the point where control measures must be applied. But when the present condition is compared with that existing when Swain wrote about the black scale in 1928, the difference is striking. In terms of dollars and cents the introduction of *Metaphycus helvolus* was probably just as profitable as was the biological control of *Icerya* and the citrophilus mealybug, since the black scale had a much more extensive distribution. Again, the cost of this introduction to the University of California was negligible.

It would not be fair, naturally, to debit against the biological control program the cost of only those projects which were successful. The numerous projects which failed should also be charged against it. But even so it is doubted if any investments by the University of California College of Agriculture can show greater returns than those for the biological control of insect pests.

Up to this point the discussion has been confined to the results obtained from the mere introduction and establishment of parasitic and predatory insects. But there is another aspect of biological control which, while not as spectacular in its results as that just discussed is, nevertheless, quite worthy of much more attention than it has received from economic entomologists. I refer to the mass production and periodic liberation of insect-destroying species. Here suc-

cess depends primarily upon the affirmative answer to two questions. First, do there exist species having the searching capacity, ruggedness and persistence necessary to eliminate the pest population if they can be colonized in sufficient numbers? And second, if such exist, can they be produced cheaply enough to make this procedure economically feasible and profitable? There is nothing biologically wrong with the idea that if there be turned loose in an orchard large numbers of insects having a strong urge either to eat, or to oviposit in, their hosts, the latter will be reduced in numbers. The profitability of such efforts will depend upon discovery of species having the necessary qualities, and the development of methods for their mass production which will make the program economically profitable. *Trichogramma* did not turn out so well, not because of unsatisfactory production methods, but because the parasite itself lacked the necessary qualities.

This aspect of biological control, the periodic colonization of beneficial insects, becomes desirable when the pest is not controlled by introduced parasites unaided. Generally speaking, most of the failure of introduced species to control their hosts come about through faulty synchronization of host and parasite populations. The distribution of the host population, both in space and in time, is of great importance in biological control.

Host distribution in time is at least as significant as host distribution in space from the standpoint of biological control, but its importance in this connection is often overlooked. The ability of a parasitic or predatory species to maintain its host at a low density depends not merely on the searching capacity of the individual but on the searching capacity of the population. The searching capacity of the population is a function of the searching capacity of the individual and the number of individuals. It is plain that the peak of the searching population must coincide in time with the occurrence of the susceptible host stages. Therefore the efficiency of a species as a control factor depends upon the synchronization of host and enemy population. Any ecological phenomenon which disturbs this synchronization reduces or destroys the capacity of the enemy species to control its host. Innumerable illustrations of this could be cited. The parasite *Aphytis chrysomphali* breeds freely only on certain stages of the red scale. There are periods when these stages are at a minimum. This reduces the parasite population to the point where it cannot overtake the host. The same seems to be true with *Comperiella bifasciata* and the yellow scale. Earlier, in the discussion of *Metaphycus helvolus* and the black scale, it was pointed out that in certain interior areas the parasite did not give satisfactory control of its host. This is for the reason that the hot interior climate produces in the black scale a single, extremely even generation. For a period of time greater than the adult

(Continued on Page 452)

GROWERS WING OVER FROM SOUTH AFRICA

By D. M. RUTHERFORD

DECIDING that they would like to see at first hand what is taking place in the citrus industry in the United States, Mr. and Mrs. J. P. Mackie Niven boarded a plane at Johannesburg, South Africa, and in a matter of a week, including stopovers, they were in New York. Having toured Florida, they were recently in California and included in their busy schedule a visit to the Citrus offices.

Mr. and Mrs. Niven are proprietors of "The Citrus Grower," an interesting monthly magazine printed in English and Dutch, and are citrus growers. They own two citrus enterprises, one of 12,000 trees and the other of 14,000. Valencias, Navels and Grapefruit are grown. One orchard is in an irrigation development, and the other is watered by the flow of artesian wells. The Nivens' agricultural interests also include sheep and beef cattle. Their home is on the Amanzi Estate, Uitenhage, Cape Province, South Africa, which our Atlas shows to be about 250 miles east of Cape Town, on the 34th parallel of latitude.

They had enjoyed the trip over very much, said the Nivens. Modern transportation is most efficient. They boarded a Belgian plane at Johannesburg, landed in Liberia. There was a three day wait for a Pan-American plane. Then they flew with little delay to Roberts Field at Dakar, then to Lisbon, Portugal; Shannon, Ireland; Newfoundland, and New York. Elapsed time about a week, and the weather was perfect. They purchased a new car in New York, visited Florida for several days, and then drove cross country. They will drive up the Pacific Coast, visiting points of interest and return to New York. The plan is to ship the car home, and fly to England where the eldest of their three sons, not long out of the Royal Navy, is a student at Cambridge. After an extended visit they will fly to Cairo, and return home in a flight over the eastern part of Africa. . . . Would that our editorial duties allowed a return visit!

The Nivens have a deep interest and long experience in the business of growing citrus fruits. Mr. Niven is a director of the South Africa Co-operative Citrus Exchange, Ltd., and a member of the executive committee, as well as being one of the seven members of the Government-established Citrus Board, which has handled the problem of citrus marketing during the difficult war years. Mrs. Niven is the daughter of Sir Percy Fitzpatrick who, associated with A. G. B. Pickstone, was one of the original developers of the citrus industry in South Africa. He established the first commercial nursery and developed the Sundays River district and his own Amanzi Estate.

Mr. Niven opines that costs of

citrus production in South Africa are about 30 percent under ours. Production methods and practices are similar. Much of the field and packing house equipment is purchased in California.

The war years brought difficult times for citrus growers. In the years immediately preceding 1939 all of the exportable crop was shipped. In 1940 39 percent was exported, in 1942 41 percent, in 1943 22 percent, in 1944 15 percent, and in 1945, a drought year, 55 percent of the exportable crop was exported. 1946 looks like a normal marketing year. From 1941 to 1943 much fruit was wasted. Very little fruit was wasted in 1945 and the period of surpluses now appears to be over.

When the export market disappeared the Control Board was organized to control the entire crop. An arrangement was worked out for pooling the crop on the basis of the estimated crop on the trees, using the fruit closest to markets. It worked very well. They are now on a variety grade and count on a national basis.

Fortunately for them, the South Africans have a strong Exchange, says Mr. Niven. Practically all of the citrus properties are owner-operated so their troubles in learning to cooperate are not too great. "Meetings, discussions, patience, but no pressure," capsule-commented Mr. Niven. Their directors are important factors on the Citrus Control Board, which also includes representatives of the public.

One effect of price control was to reduce retail margins on citrus fruits, in some instances as high as 266 percent in 1939 to an even 45 percent in 1945. Since 1941 the bulk of citrus sold in the Union has been of first grade, i.e., export quality. Citrus fruit consumption per capita greatly increased in the Union through trade promotion. The fixed price throughout the Union in 1945 was only enough to cover cash costs, growers depended upon export revenue to make a living.

The State has assumed the responsibility of distributing surplus fruit among the lower income groups through the Social Welfare Department. Administrative costs of the Board were less than 2 1/2 percent of the gross received by them for fruit sold. The Board assisted in procuring packing materials, insecticides and fertilizers in wholesale quantities.

With increased exports in prospect the industry will not ask for any State assistance in the current season.

Mr. and Mrs. Niven were outspoken in their praise of the fine job done during these trying times by Dr. Winston J. Allwright, general manager of the South African Citrus Exchange, who is well known in California.

Gastight Tents in Citrus Fumigation

D. L. LINDGREN and R. C. DICKSON

The accompanying article is a progress report prepared by staff members of the Division of Entomology, Citrus Experiment Station, University of California.

THE Citrus Experiment Station has been interested in the problem of gastight tents for the fumigation of citrus trees since 1914. The first attempts to make gastight covers consisted of treating the ordinary canvas tents with various substances such as linseed oil, paraffin, beeswax, and the use of oilcloth. In 1919 a tent consisting of balloon cloth made at the Arcadia Balloon School during the first world war was used in different places in the field as reported by Quayle and Knight in the *Citrograph* for April, 1921.

As a result of this work the Fruit Growers Supply Company purchased a string or set of rubber coated tents which were operated by the Fruit Growers Exchange for a season or a portion of a season, but they proved to be unsatisfactory. They were very heavy to pull over the trees and the rubber deteriorated in spite of the protection of the aluminum coating, much to the surprise of the promoters of the rubber company.

In the years following different commercial concerns supplied the Station with various so-called gastight fabrics, but they all failed to withstand the test in the field. It was not until 1941 when a fabric was secured that was treated with a vinyl chloride resin, one of the modern plastics, that we had something that looked promising enough to meet the requirements. Two tents of this material have been in more or less use since 1941 and they are still gastight and show little or no deterioration. It appears that with the development of modern plastics we may now have available gas-proofing materials that will hold up under field usage. The lack of such materials has been one of the chief handicaps in past attempts to use gastight tents in field fumigation.

As reported in the *Citrograph* for August, 1943, Lindgren and Dickson give an account of 2½ years work with such a tent in the field, giving data in comparison with canvas tents, of gas concentration, tree reaction and scale kill, and point out advantages and probable objections to the use of such tents. These conclusions have been verified in an article by Fulton and Nelson in a recent number of the *Citrograph* (March, 1946).

The two gastight tents made up in 1941 have now been in the field intermittently for the past six seasons, and as stated previously, are as gastight at the present time as they were originally. It is observed from Table 1 that the mean average concentration for the gastight tents when used

one, two or five and one-half years, was practically the same as for the tent when new. Neither the fabric base nor the plastic coating appear to have deteriorated, but the tent has lost its sheen due to sunlight and wear. The fact that these tents show no or very little deterioration and the coating has shown no separation from the fabric is in contrast to earlier experimental tents tested in which the coating checked, peeled and cracked from the fabric in less than one season's work. The tents we have been using are of fabric coated on both sides and are waterproof as well as gastight. They have been rolled with water standing on their surfaces without any deleterious effects.

The gastight tents were included in a string of commercially operated tents using 1/3 dosage of HCN used under the canvas tents. The scale kill obtained with the gastight tent and the adjacent canvas tents averaged for each grove are given in Table 2. All this work was done in the interior citrus sections and fumigation injury from the gastight tent with

TABLE 1
A Summary of Results of Experiments on the Control of Purple Scale with DDT

Treatment	Materials applied as oil-water emulsion*	Percentage kill of purple scale	Percentage of fruit infested with purple scale approximately 1 year later
A	3 gallons kerosene plus 1 lb. DDT to 100 gallons water.....	16	7
B	1½ gals. mineral seal oil plus ½ lb. DDT to 100 gallons water.....	90	4.5
C	1½ gals. mineral seal oil plus ½ lb. DDT, ¾ lb. ground cube root to 100 gallons water.....	85	11
D	3 gallons kerosene plus 1 lb. DDT and ¾ lb. ground cube root to 100 gallons water.....	26	5
E	1½ gallons mineral seal oil to 100 gallons water	64	25
F	3 gallons kerosene to 100 gallons water	6	65
Check	0	66

*4 oz. powdered blood albumin to 100 gallons of spray mixture.

	New Tent	Tent in Use One Year	Tent in Use Two Years	Tent in Use 5½ Years
Gastight Tent	0.67 mg.	0.60 mg.	0.74 mg.	0.59 mg.

Table 1. Mean average concentration, in milligrams HCN per liter, under New and used gastight tent. Dosage 4 cc. HCN per unit, 45 minutes exposure.

1/3 the dosage was no more than obtained when using the canvas tent at the full dosage. In practically all cases very slight or no injury was received with either cover. It is noticed from Table 2 that in 9 out of the 10 groves, the percentage kills obtained by the use of gastight covers and 1/3 the dosage were slightly better than received with canvas tents using a

full dosage of HCN. The average for all ten groves was slightly better for the gastight tent.

Figure 1 shows the results obtained in two nights of work of seven sets each. In these tests ½ the dosage was used under the gastight tents. It is observed that the kill obtained

(Continued on Page 448)



This photo gives a pretty good idea as to the appearance of the new gastight tents. Dr. Lindgren cautions us to disregard him and the long pipe at the doghole—the photographer caught him when he wasn't looking. Lindgren is not running a fumigation test with a skunk as might be inferred from the remote control apparatus.

The Sunkist Courier

DEPARTMENT

The success of cooperation lies not so much in cooperation itself as in the individual

COMPILED MONTHLY IN THE OFFICES OF THE CALIFORNIA FRUIT GROWERS EXCHANGE

CONTROLS RESTORED ON CITRUS BY OPA

Discounts on Small Oranges Again Demanded by Trade

Operating without price ceilings during the first 25 days of July, the orange market was shaping into good form when the revamped OPA bill was signed by the President late that month. Established price differentials, under a free market, had focussed the attention of the trade on small size valencias which were in good demand towards the end of July. Increased supplies were reaching the market and price adjustments would normally have followed under the supply and demand pattern.

Controls Restored

When the ceilings were restored under the OPA Extension Bill, prices on the scarce medium and large size fruit rolled back to the control level and the trade again demanded discounts on small sizes.

A comparison of Exchange packed valencia sales for the 1946 season to date compared with 1945 reveals the sale of 13,340 standard cars this year at an f.o.b. average only 46c higher than the 19,250 cars sold last year during the same period.

Half-Way Mark Passed

The half-way point in the Southern California valencia movement was reached August 3 with 26,580 standard cars distributed through all channels leaving an estimated 25,920 cars still to go. For a comparable period last year, 34,230 cars had been shipped with a balance of 42,000 still to be utilized in all channels.

Industry fresh fruit movement for July was 7400 cars compared with 11,870 for the same month last year. Exchange packed sales for the five weeks ending August 3 totaled 5282 cars; 3200 less than the volume sold last July. Industry movement to products was almost the same this year as last, 2650 cars this July and 2490 in 1945.

Deciduous Continues Heavy

Extremely heavy competition from deciduous fruit was encountered by oranges and grapefruit in July. All records were broken with peaches reaching a peak of more than 5500 cars in a single week. While the deciduous volume was declining somewhat early in August, competition could still be expected well into September.



MOVEMENT OF SECOND LARGEST LEMON CROP SLOWED BY COOL WEATHER, SUGAR SHORTAGE

The Lemon Administrative Committee estimate on July 1 showed a total of 35,538 cars, more than 3500 over the original estimate, making the 1945-46 crop the second largest in history. Actual harvest may even prove this latest estimate to be too low.

Variable off-season weather throughout the country and the nation-wide sugar shortage did not work advantageously on the lemon market as a whole. It was evident that lack of sugar was partially responsible for the general slow tone of the lemon market in July. Reports of decay in some cars were also a retarding factor in the lemon movement as the trade refused to handle such cars due to the scarcity of labor for repacking.

Exchange Sales High

For the five week period ending August 3, total Exchange fresh lemon sales were 3003 cars compared with 2815 cars sold during a comparable period in 1945. The industry shipped 3010 standard cars in fresh channels

with 1610 going to products for a total July movement of 4620 cars. Last year 2840 cars moved in fresh form and 930 were sent to products. Total Exchange fresh sales for November 1 to August 3 were 13,568 cars. During the same period last year 13,886 cars were sold. The 1946 season to date f.o.b. per box average ranged from \$1.10 to \$1.50 higher than in the five years prior to 1943. Industry utilization through all channels from November to August was 29,520 standard cars, 5000 more than the same period last year.

Storage Still Heavy

As of July 28 industry storage estimate stood at 5880 cars, more than 1300 cars ahead of 1945 and over 3100 two years ago. Approximately 7500 cars remained with Exchange shippers on July 28, including storage and fruit still to be harvested during the last quarter of the current season.

July picks were 1950 cars with an estimated 1180 for August. Actual August picks last year were slightly more, totaling 1320 cars.



PRIZE WINNERS

The two Sunkist Cold Lemonade 24-sheet posters shown on this page were awarded certificates of merit at a recent annual exhibition of outdoor advertising art, sponsored by the Art Directors Club of Chicago. These two designs were included in a selection of the one hundred best posters produced in 1945. Similar cold lemonade designs are appearing on the boards of well over one hundred large cities in the United States and Canada this year. Outdoor posters have long been a part of the advertising campaign of the Exchange.

FARM CO-OP LEADERS ATTEND PURDUE MEET

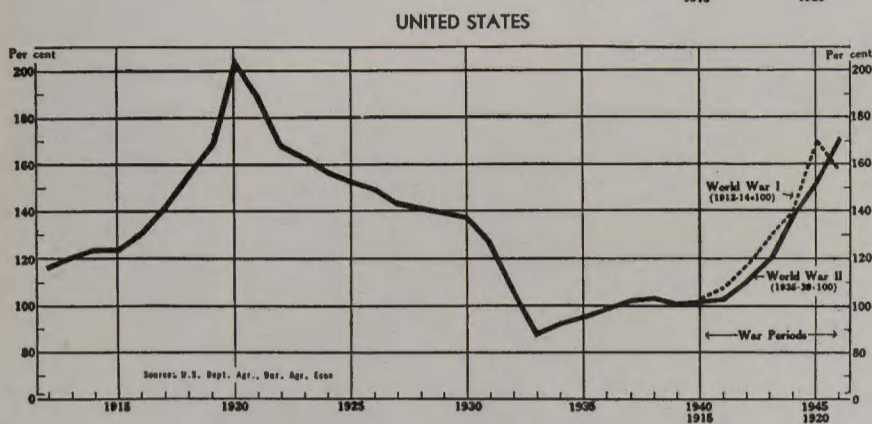
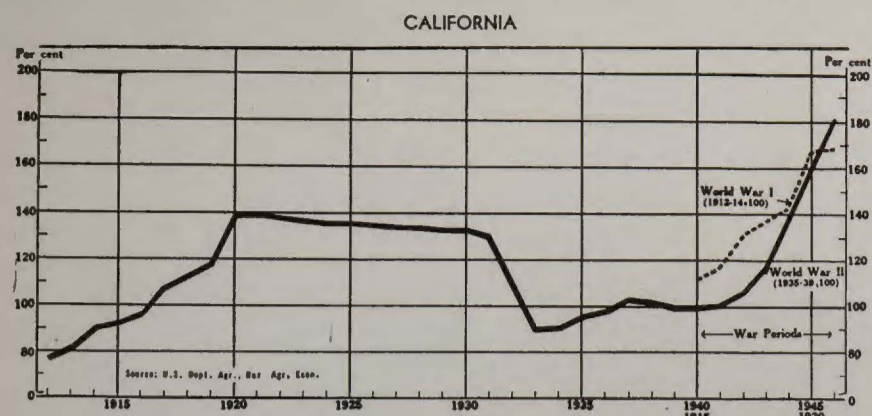
Armstrong at Session Prior to Annual Eastern Trip

Among the many nationally known agricultural and marketing authorities speaking before farm cooperative leaders in attendance at the eighth annual summer session of the American Institute of Cooperation, held at Purdue University from August 26 to 30, was General Manager Paul S. Armstrong. The Institute, of which the Exchange is a member, invited him to address two of the meetings scheduled in conjunction with the first summer session to be held since 1942.

Co-op Problems Discussed

Major cooperative problems were discussed at open forums with sectional meetings arranged for specific commodity, community and operating problems. The value of the farm cooperative to producer and

(Continued on Page 420)



DANGER SIGNS IN LAND PRICES

This Index of California and United States Farm Land Prices per acre and Comparison of Percentage Increases during World Wars I and II appeared in *California Farm Bureau Monthly*, May 1946. The present inflationary trend of farm land values is a matter for grave and thoughtful consideration. In 1940, farm land had a value of \$33 billion. In 1945 the figure had risen to \$50 billion and the curve is still swinging upward. In the Pacific Coast area, it is estimated that values have risen more than 80 percent because of increased population and industry expansion. The memory of the 1920 collapse should serve as a grim reminder to agriculture today.

CHANGING U. S. DIET SHOWN BY SURVEY

Citrus Consumption Up 400% Protective Foods Increase

How well Americans have been fed through peace and war, good times and depressions, is shown in an analysis of the United States' food supply from 1909 to 1945, released recently by the U. S. Department of Agriculture.

Citrus Consumption Up 400%

Among striking changes in American food habits in the 37 years have been a 400 percent increase in consumption of citrus fruit and a 30 percent decrease in potatoes and grain products.

During the recent war years, food for American civilians contained more calcium, iron, B vitamins, and vitamins A and C than at any other time in the 37-year period. Important factors in bringing about these nutritional gains were high consumption of milk, eggs, meat, poultry, vegetables, and fruit, and the enrichment of white bread and flour.

Calcium, Vitamin Increase

During the period covered by the analysis, there was a steady increase

TAKE LAXATIVES? TRY THIS INSTEAD—



LEMON and WATER is good for you—Try it 10 days—Sunkist

ANOTHER WINNER

At the recent convention of Pacific Coast Advertising Clubs, held in Spokane, Washington, the Sunkist lemon laxative car card illustrated above was awarded first prize in the car card competition. Since 1938, the laxative use of lemons has shown a 165 percent gain.

in calcium, vitamins A and C, and riboflavin (one of the B vitamins) in the food supply. The rise of calcium and riboflavin was due largely to greater consumption of milk and the rise of vitamins A and C to increased use of fruits and vegetables.

Because of the enrichment program, grain products now furnish a much greater share of the total available supply of iron, and the B vitamins, thiamine and niacin, than before World War II.

National Average

Nutritive values, the food economists explain, are for foods as brought into the kitchen. No allowance is made for cooking losses or for edible food thrown away or left

Britain Again Buys Orange Concentrate

The Exchange Orange Products Company recently sold 75,000 gallons of orange concentrate to Great Britain with confirmed orders for an additional 25,000 gallons. The concentrate will be used in the British child feeding program as a supplement to the short supply of Vitamin C in the nutritionally inadequate English postwar diet.

Recent approval by the U. S. Congress of the loan to Great Britain made it possible for the British government to purchase the concentrate.

Interest Born in War

During the war years, The Exchange Orange Products Company supplied almost three million gallons of concentrate to Britain through the lend-lease program then in effect. The first peacetime order for 100,000 gallons indicates the concentrate is considered a vital dietary supplement even though some fresh citrus is occasionally available in England from South Africa, Spain and Palestine.

See By-Products Export Market

The postwar export possibilities of citrus by-products have been a subject of considerable conjecture. The recent British purchase lends support to the belief that an expanding world market may open new outlets for the distribution of all citrus by-products.

LEMONS FEATURED IN U. S. D. A. DRIVE

Declared "Abundant Food" More Liberal Use Encouraged

The U. S. Department of Agriculture is making plans to launch an "abundant food" drive featuring lemons as the subject. Object of this and similar USDA promotions is to focus consumer attention on foods that are in abundant supply and to encourage more liberal use of such commodities.

Exchange Furnishes Material

At the request of the USDA, the Exchange supplied samples of all Sunkist lemon advertising on all lemon uses. In addition, samples of Sunkist lemon display material and representative Sunkist lemon recipes were given to the Department of Agriculture.

The use of honey and syrup, scarce items themselves but in the aggregate in better supply than sugar, was featured in the recipes provided by the Sunkist Kitchen.

First Step in De-Control?

Under the new Price Control Bill, the Secretary of Agriculture is specifically given the responsibility of certifying which agricultural products are in short supply for the current season. If the item is found "short," price ceilings are continued until the Secretary feels supply is in line with demand. If he finds the product in ample supply and does not certify short supply, controls are required to be lifted.

Promotion of lemons as an abundant food by the USDA lends encouragement to the hope that price controls on this citrus variety may soon be lifted.

Armstrong in East

(Continued from Page 419)

consumer was one of the subjects assigned Armstrong, who also took part in a panel discussion on "Broadening Farm Markets by Integrated Merchandising and Advertising."

On Annual Eastern Trip

At the conclusion of the Institute August 30, Armstrong left for Kansas City where he joined General Sales Manager L. H. Wohlwend and Advertising Manager Russell Z. Eller at the first of four annual division meetings scheduled to be held throughout the country. Managers of the Southern Division Exchange sales offices gathered in Kansas City to discuss past problems and current plans for the 1946-47 season.

Similar meetings with the Central and Northern; Eastern and Atlantic; and Northwestern and Southwestern Exchange sales divisions were to follow in Chicago, New York and Victoria, British Columbia.

ANNUAL REPORT OF FLORIDA CITRUS EXCHANGE

1945-46 Production Surpasses Any Previous Season

Highlights of the Annual Report of the Florida Citrus Exchange for the 1945-46 season are given below with the thought they will prove interesting reading for California-Arizona citrus growers:

Volume of production this season is expected to exceed 85 million boxes which will surpass any previous season. Production in 1944-45 was 69 million boxes; in 1943-44 it was slightly less than 81 million.

Greatest marketing difficulty resulted from the multiplicity of late blooms. About 30 percent of all Florida fruit was from blooms appearing after April 1, 1945.

Processing Increased

Processing of oranges and grapefruit was higher than in any previous year with orange processing increased from 33.3 percent last season to 36 percent in 1945-46. Grapefruit processing remained at 69 percent, despite government fruit juice order cancellations.

The first successful, commercial canning of tangerine juice was one of the outstanding developments in the processing field this season. More than 500,000 boxes of tangerines, principally of grades and sizes which could not otherwise be marketed, were utilized in this manner.

Total Returns High

Although returns per box for some varieties will not be as high as 1944-45, when price ceilings were higher on early varieties, total returns to Florida growers will greatly exceed those of any previous year because of the greater volume of fruit produced this season.

Average tree-to-car costs of handling fresh Florida oranges and grapefruit increased almost 60 percent from 1938-39 to 1944-45.

Develop Stem End Decay Control

In the research field the most notable development was the discovery that thiourea will control stem end decay, always one of the most serious problems in the distribution and sale of fresh Florida fruit. Federal approved test shipments proved that thiourea treatments almost completely control this decay but further tests must be made to prove this treatment is harmless before the substance can be used commercially.

Estimate 100 Million Boxes

If conditions continue favorable, Florida's 1946-47 production may exceed 100 million boxes to establish an all-time record.

Since 1919-20, Florida orange production has increased 575%; Texas by 5212%; California 185%. Florida and Texas grapefruit production increased 720% and 7666% respectively during the same period.

FIRST POSTWAR DEALER SERVICE MEETINGS



Here are the Sunkist Dealer Service men who call on wholesalers and retailers throughout the United States and Canada to aid them in their merchandising problems. Dealer Service Manager H. J. Ackley is shown in the upper photo with Division Managers J. W. Shenk and H. E. Pitt who attended the New York meeting. The group in attendance at the Milwaukee conference is shown below.

DEALER SERVICE WORK NEARING PREWAR LEVEL

Expanded Staff Conducting Merchandising Calls Nationally

Thirty Sunkist Dealer Service men now comprise the staff of that division of the Exchange Advertising Department. During the war years, only six men were on the job conducting merchandising and trade work among retail and wholesale outlets. The balance of the prewar staff of 65 had either been called to military duty or had been transferred to sales offices to take the place of men in those points who had enlisted in the armed forces.

Meetings Conducted

To bring the expanded staff up-to-date on all current citrus marketing and merchandising problems, two meetings were recently conducted in New York and Milwaukee under the direction of Harold J. Ackley, manager of the Dealer Service Division.

Subjects discussed at the conferences included the coordination of Sunkist sales and advertising programs; chain and group contacts; display material; and general merchandising work.

Division Managers Present

Divisions Managers F. H. Schwehr and R. H. James attended the Dealer Service meeting held in Milwaukee while Divisions Managers H. E. Pitt and J. W. Shenk were present at the New York conference.

In addition to the work conducted by regular merchandising men, the Exchange district sales offices are active in the merchandising field. This affords a greater opportunity to broaden the scope of the trade contacts and the assistance of the sales offices is a valuable adjunct to the program.

Dealer Service Personnel

Representatives of the Dealer Service Division in the Atlantic Division are: H. C. Koechling, R. B. Olsen, A. M. Smith, A. J. Fournier, H. C. Johnson, J. P. Jordan, Jr., T. S. Sirak, J. P. Ward and W. E. Hillman.

Eastern Division: R. R. Walmsley, Douglas Black, H. M. P. O'Brien.

Central Division: R. C. Anderson, R. E. Lillig, F. P. Borgman, W. E. Ayres, I. R. Nilsen, H. O. Weinrich and G. V. Bennett.

Northern Division: T. W. Himes, William Stribling and R. E. Johnson.

Southern Division: J. O. Whalen, C. R. Garrison and R. W. Rosebrough.

Northwestern Division: D. M. Nelson and Harry Titus.

Southwestern Division: E. H. Pratt, E. W. Fredell and Jack Hartshorn.

PREVIOUS DEVELOPMENT COSTS RULING NOW REVERSED BY BUREAU OF INTERNAL REVENUE

New Ruling

Florida citrus growers have been extremely interested in a recent ruling by the Bureau of Internal Revenue which reversed a previous ruling by the Bureau and which has a direct bearing on the extremely heavy plantings of citrus made in Florida during the past five years.

Previous Ruling

With property available and comparatively cheap, many citrus men in the southern state were encouraged to plant large acreages by the previous Bureau ruling allowing them to deduct from their income tax returns all development costs as current operating expenses rather than capital investment. Under that ruling, growers in the higher brackets figured that \$4 of every \$5 invested in plantings were paid by the government.

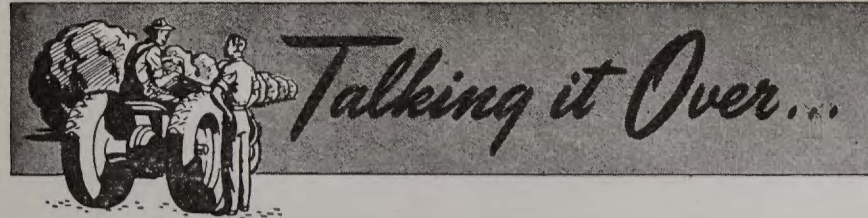
Calif.-Texas Also Affected

While the Bureau of Internal Revenue decision is of greatest interest to Florida since the heaviest plantings were in that state, it also affects California and Texas citrus growers to a lesser degree. California vitiiculturists are also affected for grape plantings in this state have been heavy since the start of the war.

The Sunkist Courier

DEPARTMENT

Compiled in the Offices of the California Fruit Growers Exchange and Published by Authority of the Board of Directors



The renewal of price controls, after 25 days of free marketing based on supply and demand, reminds us forcibly that the hand of government is slow to release the grasp it took on our economy during war time. That grasp, necessary to win the war, is becoming more noticeable now that the war emergency is over.

Eric Johnston, former president of the U. S. Chamber of Commerce and now president of the Motion Picture Association, made several pertinent remarks in a recent address before a theatrical and motion picture union convention in Chicago. Mr. Johnston's remarks, in part, were as follows:

The stake of management and labor in America is the same: Neither of us wants the government to boss our business, our unions or our jobs. Neither of us wants the government to tell us how to work, where to work or how long to work.

When we run to government with problems our own good sense should solve, we're asking for harnesses, and harnesses are for horses, not for human beings.

It was a different story during the war. During the war we had a controlled economy. Now we're trying to decontrol it. We had voluntary compulsion during the war. Now we're on our own. We didn't like that compulsion even though it was voluntary. Americans never like compulsion. We accepted it only because we wanted to win the war.

When the war was going on, the government bought fifty cents out of every dollar's worth produced. The government told us what to make and how to make it. And government inspectors stalked every plant to see that we made what we were told to make and made it right. The government told labor what it would get; it told management what it would pay. The government, in effect, fixed the conditions of work, and it told labor where it had to work.

Nothing like this had ever happened in America. It was a complete departure from practice, tradition and custom. We were all frozen. Wages were frozen, hours were frozen, prices were frozen, production was frozen into grooves. We Americans learned that it is possible to freeze even our volatile dispositions when we want them frozen, and again, I say, we wanted them to be frozen only because we wanted to win the war.

Now we're like a restless river, breaking loose from the shackles of winter's ice, roaring out of our channels, heedless, reckless and in a hurry to get somewhere. People are tired of death, trouble and all the sundry woes of war. They are tired of the big woes and tired of the little ones. We're in a hurry to get on with living. We want the small familiar things of life returned to us. We want bacon and butter and beefsteaks. We're in a hurry to decontrol.

We're seeking a new balance between wages, profits and prices, but the scales are juggling wildly as each segment of our economy throws its weight around. Labor wants to preserve the gains it made in wartime. Management wants to maintain its wartime level of profits, and a huge mass of consumers is suspicious and fearful of both.

We here in America need production more than ever. The whole world needs production. What threatens production threatens our whole economy. It threatens our futures. It threatens our hopes of an ever-rising living standard; our hope of an ever larger number of people having more things because they are making more things and thereby are able to buy more things.

The progressive viewpoint today is one which puts production paramount and condemns the creed of scarcity as something to be dropped down a sinkhole.

Having the things we want spells Utopia. Utopia now and always is production.

Mr. Johnston's remarks make mighty good sense.

DO YOU REMEMBER ?



... when no really well-dressed gentleman citrus packing house employe was seen without an enveloping carpenter style apron? This group of Fullerton citrus workers (circa 1894) is doubtless typical of the period.

Grapefruit in Good July Comeback

Interest in grapefruit rose steadily during July, sales progressing from 96 cars the week of July 6 to 179 the week of August 3. During this period, the f.o.b. average climbed from a low of \$1.81 to \$3.35 the middle of the month. Some decline occurred the end of the month due to a heavier proportion of small sizes contained in offerings.

Considering the heavy deciduous competition and trade complaints on small size fruit plus decay showing up in some shipments, the grapefruit market made a healthy comeback from the June ebb. Considerable export interest in New York was a contributing factor in buoying the market.

Season Shipments Lag

Total California-Arizona industry shipments for the season to August 3 were lagging behind 1945 by about 2500 cars. July shipments totaled 1290 standard cars. For the same month last year, 1410 cars were shipped and two years ago the total was 1250 cars.

Early in the month, some Florida and Texas fruit was hauled out of storage but was not generally well received due to soft condition and prevalence of decay.

Canned Juice Competitive Factor

Retail stores throughout the country have been loaded with canned fruit juices, especially grapefruit juice. Florida alone has canned an estimated 70 percent of the past season's grapefruit harvest. Offered consumers at very attractive prices, canned juices were a definite competitive factor to the sale of fresh fruit.



Census reports show that the average production of citrus fruits in California in 1919 was 2.1 boxes per tree.

A total of 153,796 letters from consumers responding to Sunkist magazine and newspaper advertising and offers on fruit wraps were received the first six months of the current season compared with 97,332 similar requests for the same period last year.

An amendment to the Fordney Tariff Bill, introduced on the floor of the Senate by Senator Hiram Johnson proposes an increase in the various duties on citrus by-products including an advance from 12 to 20c per pound on citric acid and an increase from 20 to 40% ad valorem in the rate on orange and lemon oil imports.

Approximately 50% of the current valencia crop is running to small sizes ranging from 216s to 324s according to reports from various associations.

The car service division of the American Railway Association stated that over 555,000 freight cars were temporarily out of service on July 23 due to business depression.

CITRUS SHIPMENTS

Season Carlot Shipments from November 1 to Week Ending August 13

Weeks Ending	Week's Shipments Calif.-Ariz.	Week's F.O.B. Pk.-Bx.	Total Calif.-Ariz. From Nov. 1	Total U.S. From Nov. 1
ORANGES				
8-10-46	1,183	4.64	66,126	151,917
8-11-45	2,015	3.06	80,840	162,644
8-12-44	1,841	4.39	77,474	177,551
GRAPEFRUIT				
8-10-46	175	2.76	8,768	59,893
8-11-45	99	2.86	11,096	52,134
8-12-44	110	3.38	9,292	54,330
LEMONS				
8-10-46	388	3.36	19,021	19,021
8-11-45	410	3.63	19,562	19,562
8-12-44	710	5.40	20,287	20,287

Timber Shortage a Threat to World Economy

THE newly established Branch of Forestry and Forest Products in the United Nations Food and Agriculture Organization is the first step in a long delayed attack on the growing world timber shortage that is a threat to world reconstruction and economy, according to Lyle F. Watts, chief of the Forest Service, U. S. Department of Agriculture, Washington, D. C.

Supplying the wood needs of the world's people is no longer a regional or national matter, but a world problem that will require cooperative action by the United Nations if world supply and demand are to be brought into balance, Mr. Watts said.

Marcel LeLoup, former director general of the French Department of Water and Forests has been appointed permanent director of the new organization with headquarters in Washington. It is planned to establish regional offices in Europe, South America and perhaps China, and an advisory committee of 12 to 15 forestry experts, selected on the basis of knowledge and experience. The organization will assemble worldwide forestry statistics, assist governments with advice on forest policy, make scientific studies, promote research and circulate findings among nations.

The world forests for centuries have been steadily shrinking in size and acreage because of destructive cutting and misuse, fire, insects, disease and war, Mr. Watts said. As a result, while certain nations in South America and Africa still have abundant forests, others like China or India have practically none. In Europe, some of the most populous nations most in need of wood must import their supply. Unfortunately, nations that possess the last great forest reserves lack knowledge of commercial timber, and labor, transportation and equipment to harvest their wood reserves.

The rapid progress true science now makes, occasions my regretting sometimes that I was born so soon. It is impossible to imagine the height to which may be carried, in a thousand years, the power of man over matter . . . O that moral science were in a fair way of improvement, that men would cease to be wolves to one another, and that human beings would at length learn what they now improperly call humanity!

—Ben Franklin, 1780.

There is a destiny that makes us brothers; None goes his way alone; All that we send into the lives of others Comes back into our own.

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CALIFORNIA ORCHARD HEATER COMPANY

Office and Warehouse
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Robert A. Bakke, 420 So. Mirage Ave. Lindsay, Calif. Phone 442-L	W. E. Grigsby Jr., 25 W. Stuart Redlands, Calif. Phone 3730	

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Hours: Daily 9 A.M. to 5:30 P.M. Wednesday & Saturday till 9

NEWS of INTEREST to CITRUS GROWERS

Mr. and Mrs. J. C. Stearn of Buena Park purchased 40 acres of citrus in Anaheim, part of the estate of the late John W. Harpster.

Senor Arrosto Peixoto, chief of the fruit and vegetable crop section of an agricultural institute near Rio de Janeiro, is visiting the Citrus Experiment Station for several weeks. He is interested in various problems under study at the station.

The revival of the National Orange Show in San Bernardino was virtually assured inasmuch as the War Department has declared surplus the Orange Show property.

Plans are under way by the Army for general use of frozen foods for feeding troops in overseas areas. Now developing are plans for packing and shipping specifications.

A. G. Salter, San Bernardino County Farm Advisor, has announced the appointment of A. B. Crowley as San Bernardino County Farm Labor Placement Manager. This appointment was made to fill the vacancy caused by the death of Stone Virene. Mr. Crowley, for the past three years, has been in charge of the Redlands Farm Labor Office.

Indications point to another large grape crop in California . . . 2,504,000 tons for all varieties.

Bureau of Entomology and Plant Quarantine suggests reading the labels of all aerosol insecticides. It has approved no formula for use by the general public that contains more than 3% DDT which would be harmful to human beings.

George H. Weldon has joined the Riverside County Agricultural Extension Service staff. Mr. Weldon's work will deal primarily with crops in the Coachella Valley.

Current prospects based on Civilian Production Administration reports to the American Plant Food Council "indicate farmers will have a little more fertilizer during the 1946-47 fertilizer year than during the 1945-46 period, with American manufacturers exceeding their record production of last season," says J. W. Wizeman, Chief of Civilian Production Administration's Inorganics Branch.

The National Council of Farmer Cooperatives represents, directly and indirectly, a total membership of over 2,400,000 farmer patrons who belong to 4,800 local cooperative associations in all of the 48 States. The National Council has a direct membership of 105 regional and State cooperatives engaged in marketing and purchasing farm supplies.

The USDA Office of Foreign Agricultural Relations forecasts that world food production in 1946-47 will be larger than in 1945-46, but below the prewar average. The increased supply will be offset by the small carryover, particularly of bread grains, leaving the world's total food supply uncomfortably low.

The Yuma Mesa Fruit Growers Association of Arizona met recently and elected the following to office: President, Roscoe F. Rupp; Vice-President, J. R. Wester; Treasurer, J. W. Longstreth; Secretary, C. W. Van Horn.

When the Exeter Orange Growers of Exeter, California, held their annual meeting the following were named to serve for the coming year: Ferrill Hamilton, President; R. D. Sellars, Vice-President; W. F. Cosart, Treasurer and Secretary.

The Florida State Plant Board have agreed to contribute \$20,000 to a cooperative plan sponsored by the State of Texas and the Florida Citrus Commission to send a staff of scientists to South America for study of tristeza, a mysterious citrus disease.

Frank S. Boice, prominent stockman of Sonoita, Arizona, has been appointed director at large of the Farm Credit Administration by Governor I. W. Duggan for the Eleventh Farm Credit District, comprising California, Arizona, Utah and Nevada.

California field crop acreage this year is at a record high point. Present indications show a total of 5,860,000 acres which exceeds by three percent, or 170,000 acres, the previous high record established in 1945.

A recent visitor to southern California citrus districts was Mr. W. C. Pedersen, president of the Waverley Growers Cooperative, Waverley, Fla.

The Agricultural Research Study Committee, appointed by Governor Warren, will hold a hearing on avocado, citrus and walnut problems at the Mission Inn, Riverside, on Thursday, September 19, at 9:30 A.M.

Dr. Daniel G. Aldrich, lately a captain of infantry on the Manila-Tokyo route, and now again at work in the Division of Soils and Plant Nutrition of the Citrus Experiment Station, Riverside, has been advanced from junior chemist to assistant chemist in the division headed by Dr. H. D. Chapman.

Dr. Glenn E. Carman has been advanced to the rank of associate entomologist in the Division of Entomology, headed by Dr. A. M. Boyce.

Dan W. Emmett of Oxnard has sold 96 acres of citrus to David S. Gray and Georgia D. Gray.

Dr. Leon D. Batchelor, director of the Citrus Experiment Station, has announced the appointment of Richard L. Doust to the staff as a junior entomologist. Doust is a native of La Habra and was graduated from the University of California. He spent five years in the naval air corps.

Most of the trees in the first test breeding orchard of the Citrus Experiment station are being replaced after nearly three years preparatory work by the divisions of cultivation and of plant breeding.

The State Department of Education has been designated by Governor Warren as the agency to handle the state-wide school lunch program.

According to the report of the Crop Reporting Board of the Bureau of Agricultural Economics, record-breaking crops of both corn and wheat are indicated for 1946.

D. R. Bailey, general manager of the California Almond Growers Exchange, states that the producers hope for early action from the State Department on foreign importations since the current crop, now entering the harvest stage, is the largest in history.

William Craig, former Grand Opera singer and Navy veteran of World War II, has purchased a 50-acre lemon grove in the Santa Rosa Valley, Ventura County.

C. H. Scott of Tocomwal, New South Wales, Australia, reports that throughout the Murray Valley the citrus crop is light due to heavy frosts.

Dr. and Mrs. Lee C. Deming recently disposed of their 60-acre Valencia grove in the West Anaheim district. Buying the property was a Los Angeles syndicate headed by W. A. Diage, president of the Mode-O-Day Corporation.

Sidney Babcock sold his acreage at the end of Newport boulevard consisting of some avocado and lemon acreage to Harry Buffum of Long Beach.

Field box use has been discontinued by Yuma Mesa Growers which has substituted trucks that size the fruit as it is unloaded.

Shipments of deciduous fruits to national markets, as they hit their summer peak, exceeded all previous records.

A visitor in a large eastern city, making a survey of grocery stores stocks counted more than fifty different brands of canned citrus juices.

Robert H. Hilgeman of Arizona has become associate horticulturist with the U. S. Bureau of Plant Industry and will work at the Date Experiment Station, Indio, Calif., on date and grapefruit problems with the new director, Dr. J. R. Furr.

Next year's Navels and Valencias have grown rapidly during the last few weeks, reports H. J. Ryan, L. A. Co. Agricultural Commissioner. Ditto lemons.

Lemon picks will be light in August and September. More lemons in storage than last year, shipping is normal.

Dr. Winston W. Jones, formerly of the University of Arizona, has accepted an appointment as associate horticulturist in the division of orchard management, Citrus Experiment Station, Riverside, and will work on problems of fruit production and quality with Dr. Edwin R. Parker, division head.

Dr. William Rogoff, until recently a navy lieutenant, has been appointed to the division of entomology under Dr. A. M. Boyce as an associate in the experiment station. He will work on new insecticides at the Citrus Experiment Station.

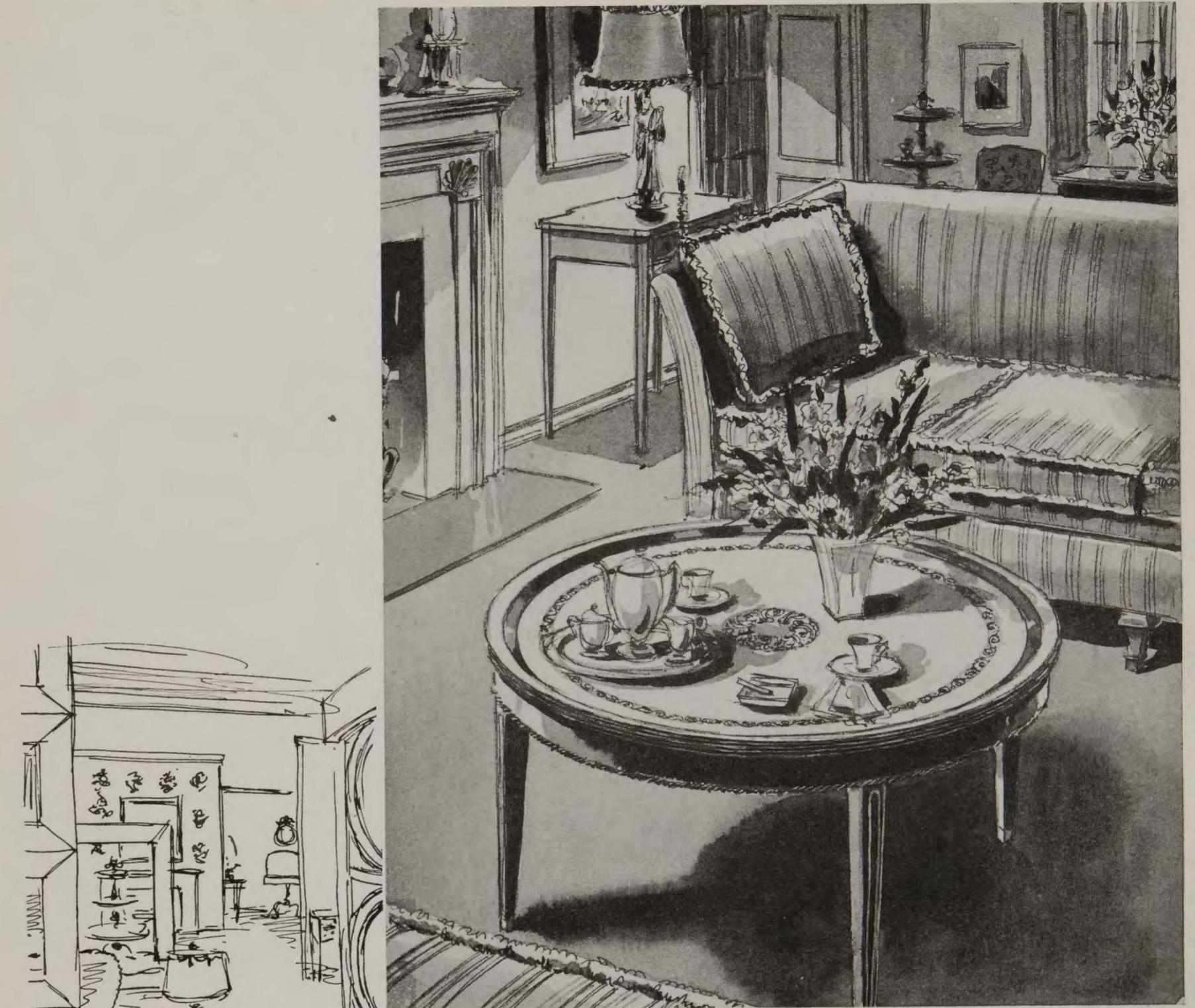
The total volume of sales of the Florida Citrus Exchange for its affiliates during the 1945-46 season approximated \$65,000,000 the highest in its 31 years of cooperative marketing. Included in this record volume of business will be the sale of about \$5,000,000 worth of California deciduous fruits marketed through northern offices, mostly in the summer months.

Floyd B. Holland was re-elected president of the Texsun Citrus Exchange and its affiliate, the Citrus Supply Corp. for the eighth consecutive year recently. Holland was also elected for the ninth time as president of the Mission Citrus Growers Union in Texas.

One of the biggest deals in Florida citrus history was closed in Bartow, Florida, recently, with the sale of the Holly Hill packing plant and about 1,000 acres of grove land for \$935,300.

Ralph Vaughn, recently discharged from the U. S. Navy as a lieutenant, a former U. S. C. All-American basketball star, now calls Orange his home, following his purchase of a 15-acre orange grove in Cerro Villa Heights.

(More Notes on Page 453)



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Although the authors are attorneys for a number of cooperative associations, the views expressed herein are their own, and do not necessarily reflect the views of any of their clients, who have neither approved or disapproved of this statement. This is the first of several articles on the legal aspects of cooperative marketing.

A SOUND legal and financial plan is as important to the success of a local association as is competent management or an efficient floor plan in a packing house.

No uniform contract can be drawn to meet the wishes of all groups organizing local marketing associations. The various problems presented and the changing relations between growers and associations can never be satisfied with an inflexible form contract.

A group when organizing, if it is well advised, will give its first attention to the actual needs of the particular situation. This will include

Grower - Local Association Marketing Contract

By GEORGE E. FARRAND and STEPHEN M. FARRAND

the need of the growers and the local for money, its proposed method of operation, its plant and other required equipment and investments, and the likely future growth of the association.

In view of all these factors, what form shall the contract between the grower and his local marketing association take? Shall it be oral or written, flexible or ironclad, simple or complex? Shall the contract be expressed in the local's articles of incorporation, in its by-laws, or in a separate document, or in all three?

Yes or no answers cannot be given to these questions. Much depends on the crop or product, the locality, the precedents there, competitive factors,

and financial and marketing needs. However, the following general statements can properly be made.

In its simplest form the contract should be in writing. It should show the date, names of parties, property and commodity covered, substance of the arrangement, how long the contract is to be in force, withdrawal or termination rights, and how exercised, time and manner of settlement with the grower, and method of amendment if that is to be done by the consent of less than all. If deductions in addition to cost are to be made, the contract should so state. The obligations of the local and of the grower should be clearly stated. If the grower is to pay the deficiency

in case of red ink sales, such fact should be stated and not left to subsequent quarrels. The contract should contemplate failure as well as success in carrying out its stated objectives, and provision should be made for such failure as well as for the contemplated success. The cooperative nature of the agreement should definitely appear in the contract.

In form the grower-local contract may be either the "agency" type, as is the case in many citrus contracts, or the "purchase and sale" type, as is the case in some walnut and other associations. We do not decide the question, but perhaps the substance of both types is the same.

Although it is purely a matter of preference, we recommend that neither the articles of incorporation nor the by-laws contain the marketing contract. The articles is not the proper place to express anything other than the matters necessary to show compliance with statutory requirements for incorporation. It is better to keep the by-laws confined to matters of internal administration. The contract when signed by the grower is valid no matter whether found in the articles, by-laws, in a separate contract, or in any other form in which the intent to contract is present.

The term should not be made for more than 15 years. (See Agricultural Code, Sec. 1208.) The agreement may contain many other clauses if the parties wish. We mention a few which are found in some contracts which have stood the test of time: The description of the grower's land which is subject to the contract; a provision that the member will sell or lease or agree to sell or lease his property only if his vendee or lessee agrees to sign up his land and crops with the association and is acceptable as a member to it; a clause consenting to the issuance of an injunction, liquidated damage and specific performance by the court of the agreement in case of breach; an agreement to pay court costs, bond premiums, and attorneys' fees in case suit is successfully brought on the contract; clauses which provide that the grower mortgages his land and his crops to be grown thereon for the term of the contract to secure the faithful performance by the grower of his marketing contract; provisions prohibiting the withdrawal of a member, even if otherwise entitled to withdraw, while any debt of his remains unpaid to his local or while any part of the capital debt of the local remains unpaid; clauses making the provisions of the agreement binding on the grower, his successors and assigns, and on his estate. Many of these clauses are of the "iron-clad" type.

The contract may contain as many valid provisions as the ingenuity of the growers and their attorneys may devise. When an association is being formed there is a tendency to play down growers' obligations and to play up association advantages and opportunity. Later when the default of a grower comes, management is surprised that the contract contains so little which binds the grower, and per-

mits him so easily to evade and avoid the contract and to escape its supposed obligations. These are problems which should be frankly discussed in the beginning between the growers and their attorneys. When the wishes and desires are thus determined, the contract can be drawn more easily and more exactly.

Of one thing we are certain and that is that no cooperative association can succeed for long which relies upon legal tricks or harsh clauses in its contracts. The grower-association relationship will be satisfactory if all parties to the arrangement understand why the association is being formed and why the contracts are being drawn, and if the plan of the association is developed on a basis entirely equitable to all concerned, and if the adopted plan is administered in such a way as to reflect the understanding thus reached. Court injunctions cannot be relied on to keep a grower cooperative group together. There must be present always the wish and desire to help each other in solving common problems. Attention to business details is an excellent way to avoid subsequent misunderstandings. It is wise to have sound legal draftsmanship reflect sound conclusions.

California Third in Agricultural Research

The smallest state in the union, with the smallest amount of money received for its crops spent the most money on experiment stations—Rhode Island with 1944 crops valued at \$17,313,000, appropriated \$5.54 for its experimental work for every \$1,000 crop money.

California led all other states with \$1,744,445,000 crop money—but spent only 81 cents per thousand dollars for experimental work, and stood 29th.

Iowa was second in dollar value of crops, \$1,479,181,000, but stood last of all the states in its expenditures for experiment stations, with only 33 cent per \$1,000.

Most of the states ranking below California are in the South, or the prairie region, where agriculture is comparatively simple, and the number of farm products limited.

But California agriculture is distinguished by the tremendous range of products, and by the fact that, with the exception of the state of Washington, California agriculture is expanding at the greatest rate of all the states. This expansion is twofold—due to better markets created by growth of population, and to the addition of agricultural land through developments like the Central Valley project.

—Western Grower and Shipper.

Since 1939 our national consumption of canned citrus fruits and juices has trebled.

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... And Then
Just An
Hour-and-a-Half"

J. C. Crowell
Covina, California



When a grove-care contractor undertakes a job, his customer has the right to expect the quality and quantity of work he pays for. To win steady customers, the contractor must have equipment that does good work—that's ready to go through long, hard working seasons—that stands up, and operates with the economy to leave him a profit.

Grove-care contractor J. C. Crowell, Covina, California, has some definite ideas on the subject—based on experiences with his first "Caterpillar" Diesel D2 Tractor. (He now has two D2s).

"This tractor," states Mr. Crowell, "has done about 11,000 hours of grove work. We have had one motor overhaul on this tractor. I take care of about 600 acres of citrus.

"Have only been broken-down one time in a grove with my D2 and then only for an hour-and-a-half.

"Using 'Caterpillar' power gives one a chance to operate at a profit instead of having to put all my money back in repair on the tractors. I have used two other makes of track-type tractors in my operations but sure do like 'Caterpillar' best."

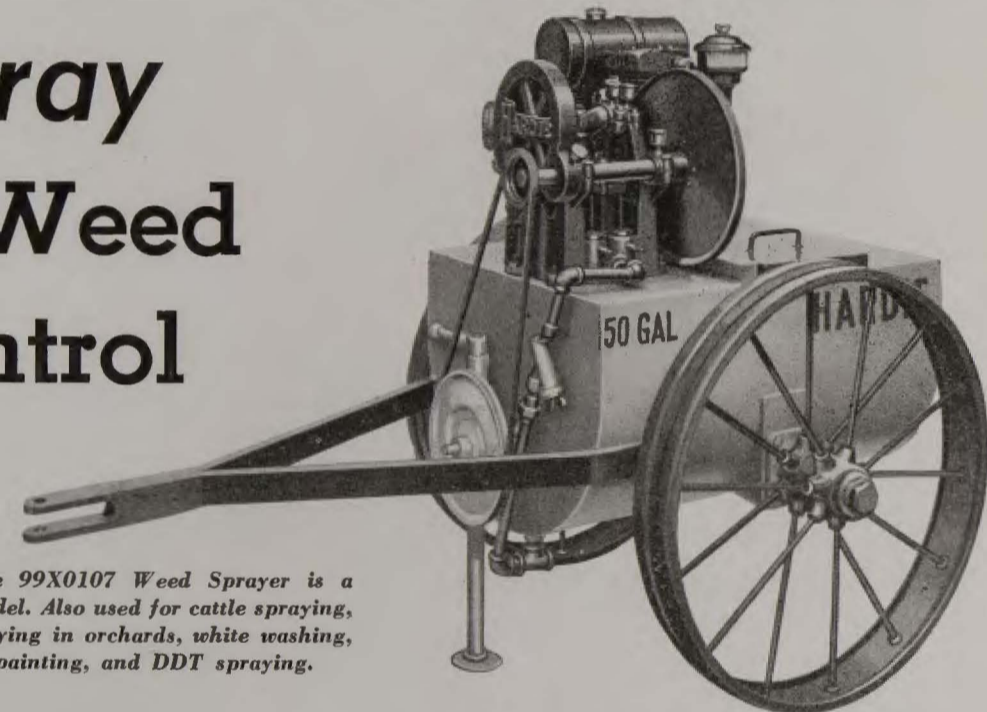
"Caterpillar" builds exceptionally long life into original parts—then builds repair parts to duplicate or excel the originals, and provides them at moderate cost, through up-and-coming "Caterpillar" dealers! No wonder so many of the first "Caterpillar" Diesel Tractors built are still at work!

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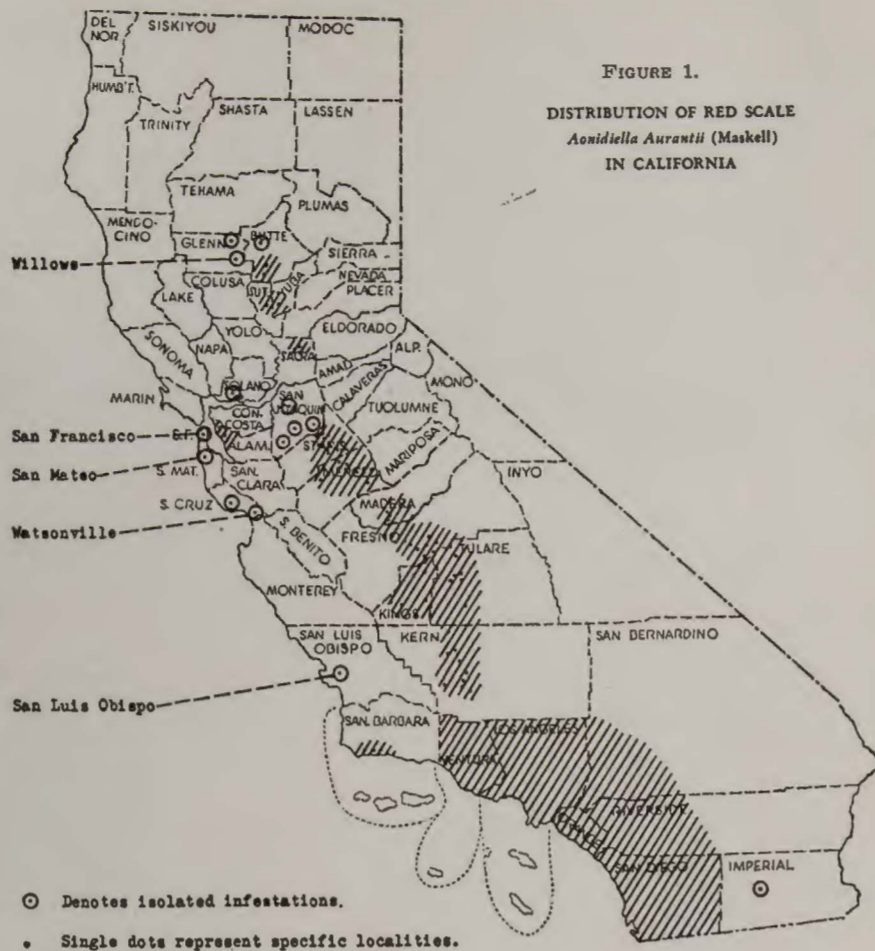
Brentwood 95-W	Irvington 27	Ukiah 723
Chico 1206 or 2389W	Lodi 329	Woodland
College City Arbuckle 2644	Moderato 4774	Sacramento 3-2509
Concord 2785	Orland Chico 1206	Yuba City
Cupertino Santa Clara 114	Oroville 18-F-24	Marysville 41-Y-13
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Distribution of Red Scale in California

By HOWARD L. MCKENZIE

This article was first published in the April-June issue of the Bulletin of the California Department of Agriculture. Mr. McKenzie is a member of the Staff of the Bureau of Entomology and Plant Quarantine.

DURING the past few years the State Department of Agriculture has had many requests for information relative to the distribution of red scale, *Aonidiella aurantii* (Maskell), in California, with particular reference to its occurrence in the interior valleys.

It has been believed even by some of the foremost authorities, that red scale could not develop and spread to economic proportions in the areas mentioned. Collections made by State and County Inspectors, however, indicate it is spreading gradually and persistently throughout the interior valley counties of California. Apparently it will live "out of doors" as far north as Butte and Glenn Counties, and thriving infestations are recorded on grapefruit at Palm Springs and Indio, both desert locations in Riverside County. These instances further indicate its ecological adaptability.

Surveys* currently conducted by the Bureau of Entomology and Plant Quarantine since 1941 in the San Joaquin Valley have shown 19 separate collections of red scale in Madera County; 32 in Merced County and over 47 in Stanislaus County.

The last named county has yet to be completely surveyed. In the city of Merced, Merced County, actual collections were made on 23 properties in a few contiguous city blocks. This would suggest a general spread from a single initial focus in the city. Prior to 1941 State surveys were conducted in Kern, Kings, Tulare, and Fresno Counties, and numerous collections of red scale were made as shown in the accompanying map (Fig. 1).

It seems reasonable to assume from these facts and figures that red scale is existing very well in the interior valleys of California, and that further spread to the east and west, as well as to the north, may be anticipated, if it is not already an actuality.

While the accompanying map shows red scale as generally scattered throughout the San Joaquin Valley, the records on which this is based are confined primarily to ornamentals and door-yard citrus infestations. The map is not intended to convey the impression that the commercial citrus in this area is generally infested, but rather that red scale can and does thrive in this valley. Infestations in commercial plantings are usually subject to eradication measures, and at this time orchards appear to be essentially free of red scale. Several infestations in the Oroville-Orland areas are in commercial plantings and are under treatment looking toward eradication.

Red scale continually appears in scattered infestations in various parts of Ventura County, which accounts for that area being blocked in on the map. However, the energetic and effective control and eradication measures exercised by the Citrus Growers' Organizations in that county have prevented this scale from developing to populations of economic proportions in commercial plantings.

With one exception as indicated, the map (Fig. 1) is based on actual records in the files of the Bureau of Entomology and Plant Quarantine, State Department of Agriculture. For the greater part, actual specimens from each reported host and locality are in the State collection, and have been examined by the author. They were taken from established plants or trees in orchards, or on residential premises, and do not include collections made in nurseries throughout the State.

In addition to the citrus species red scale has been found in California on a wide variety of plants, including Rose, Camellia, Kafirlily, Euonymus, Privet, Camphor-tree, Boxwood, Carob, English Holly, Madrone, Myrtle, Cotoneaster, Zinnia, Avocado, Viburnum, Palm, Pittosporum, Bottlebrush, Eucalyptus, Persian Walnut, Black Mustard, Goosefoot.

*It is interesting to note that search for red scale in California has been carried out by State survey crews incidental to the major survey of the olive *Parlatoria oleae*, *Parlatoria oleae* (Colvée).

Contour Checks for Irrigation Discussed

THE Contour Check Method of Orchard Irrigation, Agricultural Extension Service Circular No. 73, has come from the University of California Press, and is ready for distribution. This pamphlet, written by J. B. Brown, lecturer on irrigation, may be obtained free from the office of any county farm advisor or from the College of Agriculture at Berkeley.

Pointing out that there has been an increasing interest in this method of irrigating fruit trees, Brown discusses the subject and gives detailed information regarding it. The use of contour checks as a method of irrigation is not new, he says, but its application to orchard irrigation, where the positions of contour levees are permanently marked by means of various painting schemes, is a development of recent years.

The contour check method may be used, the author says, in place of any of the common systems of flood irrigation, such as single basins, square checks, containing a number of trees, or strip checks, if the available flow of water is sufficient to fill the contour basins without excessive percolation during the process of filling. Contour checks usually contain several trees in each basin and cannot be irrigated economically with small streams, especially where the soils are sandy. With streams of 50 to 300 gallons per minute, single tree basins or furrow distribution give a more uniform application of water than the contour check method.

PLOWING 4 FEET DEEP TAKES EXTRA POWER

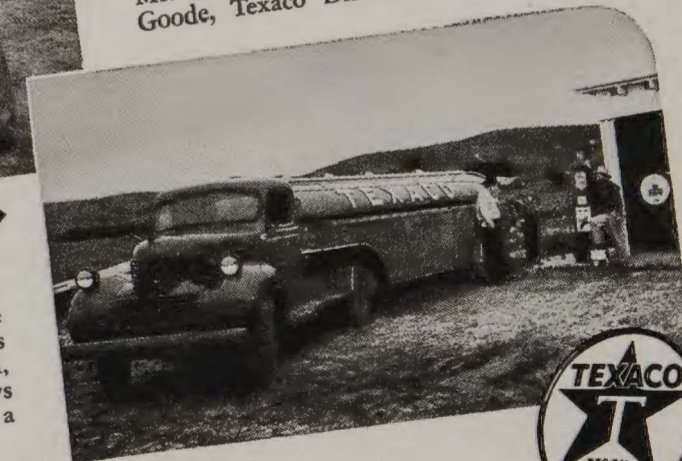
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KEEN PROGRESSIVE RANCHERS like Mr. A. H. Jamieson and Merle Wolverton "power" their tractors with Texaco fuels and keep their farm equipment rolling with Texaco lubricants. They farm 1,400 acres near Santa Ana, California. In the picture Mr. Jamieson is measuring the depth of the furrow of a "little" land fitting operation they carried out on 247 acres. Mr. Wolverton checks the depth — 52 inches. This huge moldboard plow with "wing-spread" of five feet was used when it was discovered that good soil was "buried" under a sandy top layer. The use of the Big Plow resulted in an increase of 5 to 6 sacks of lima beans per acre. Four big track type tractors were teamed up to pull the plow. *This is really plowing!*



TYPICAL FRIENDLY GATHERING when Texaco Men meet the farmers they serve. Mr. Wolverton and Mr. Jamieson hear about New and Improved Havoline, the great new motor oil that cleans as it lubricates. Present are: (left to right) Mr. T. M. Goode, Mr. D. Kennedy, Mr. Wolverton, Mr. Jamieson, and Mr. J. N. Goode, Texaco Distributor.



"CHILI PEPPER KING" GETS NEW FIRE-CHIEF GAS: Rex McDaniel, "Chili Pepper King" of San Luis Rey, California, gets a tankful of new Fire-Chief, the gasoline with superior fire-power, from C. J. (Tiny) Heltibridge, Texaco consignee of Oceanside. "Dependable service is what counts most with us ranchers," says Mr. McDaniel, who farms 1,200 acres. "Tiny keeps the keys to my tanks and they are always filled. He's a man you can trust."

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FUNGICIDES FOR THE CONTROL OF BROWN ROT OF CITRUS

L. J. KLOTZ and G. A. ZENTMYER

A progress report by two members of the Division of Plant Pathology, Citrus Experiment Station, University of California, Riverside.

BECAUSE of the aggravation of HCN fumigation injury to citrus trees by prior coverage with copper sprays, pathologists have for many years sought for a non-copper spray material that would be effective against *Phytophthora brown rot* of citrus fruit. The search has been intensified during the past two seasons because in some localities citrus trees have been directly and severely damaged by copper sprays even in the absence of HCN fumigation.

Many fungicides, including the new organic spray materials are being tested. Results thus far show that no satisfactory substitute has been found. However, among those tested and found worthy of further study are: disodium ethylene bisdithiocarbamate with zinc sulfate and lime, tetrachloroquinone, zinc dimethyl dithiocarbamate and 2,3 dichloro Naphthoquinone. While in laboratory experiments these materials have shown promise approaching the efficacy of Bordeaux mixture, in the grove they have failed to weather satisfactorily and to protect fruit from decay by the brown rot fungi.

In these studies a spray was either applied to the lemons while still on the tree where it was allowed to weather for a period or the lemons were picked and the spray applied in the laboratory. In the latter case, and also in the former if there had been no rain, half of the number (40) of lemons of each lot were exposed to artificial rain before inoculation. A zoospore suspension of *Phytophthora citrophthora* was then atomized onto the sprayed fruit in a moist chamber. Thirty-six hours after inoculation and at the end of each of three 24-hour periods thereafter the infections were counted and marked.

The effectiveness of the copper-containing materials is evident from all five trials. The iron-copper spray was outstandingly good. This may be due to the spreading and adhesive properties of the iron part of the material holding the copper and cutting down weathering. Colloidal iron hydroxide may be responsible for this action. A spray of iron sulfate and calcium hydroxide increased infection rather than protected the fruit, showing that the effect of the added iron salt was not one of toxicity to the fungus. Enthusiasm for the iron-copper spray was somewhat dampened by surface injury to the lemons.

Spargon was prematurely hailed as a possible solution to the brown rot and copper-HCN injury problems. A quarter of a pound of the chemical

in 100 gallons of water gave perfect protection to lemons even after the sprayed fruit had been exposed to nine inches of artificial rain. In the field the protective properties of the material rapidly broke down, even a pound per 100 gallons being relatively ineffective after a few weeks. Apparently sunlight and (or) oxidation are responsible for the decomposition.

Dithane has shown some promise, being better in some instances than some of the proprietary copper sprays. It did not, however, resist weathering well.

Zerlate exhibited good protection in some of the experiments and is worthy of commercial trial where the danger from copper damage is important.

Phygon in a laboratory experiment gave outstanding protection but caused a sooty staining of the fruit which was not removable by washing in soap solution. Moreover, Phygon 604 was relatively ineffective in the field experiment.

Aluminum field crates now available, weighing 10 pounds less than the standard wooden crate, would save about two tons in a big tractor-trailer hauling unit and thus allow that much more fruit to be hauled per load, besides having a longer useful life that would amortize their higher initial cost—Citrus, Florida.

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Some Observations on "Creasing" in Oranges

Adequate Fertilization Suggested as Advisable in Years of Larger than Normal Crops.

"CREASING" is a physiological disorder of oranges that occurs as the fruits approach maturity. This disorder is characterized by irregular grooves running in various directions over the surface of the fruit, often producing irregular patterns. These grooves are caused by fissures or gaps in the inner, spongy portion of the rind (albedo) and the sinking of the overlying, oil-bearing layer (flavedo). Creasing is more pronounced in some seasons than in others and occurs more frequently in certain groves than in others.

A seedling orange grove in Seminole county, north-central Florida, has had the reputation of producing "creased" fruits for a number of years. The trees in this grove are 40 or 50 years old. The soil is relatively high in organic matter and would be classed locally as "high hammock."

During the season of 1943-1944, when the trees produced an average crop of fruit, creasing was of no commercial significance. In the season of 1944-45 the trees bore a larger crop of fruit, and creasing attained serious proportions.

As the oranges in this grove were being picked for commercial shipment, a casual inspection of the field boxes of fruit indicated that the greatest number of creased fruits were to be found on the trees producing the largest crops. Detailed observations and records were therefore made on between 40 and 50 field crates of fruit selected at random. A count was made of the normal and creased fruits in each crate and both types of fruit were classified as to size.

Table 1.—The Relation of Size to the Occurrence of Creasing in Seedling Oranges

PACKING SIZE	PERCENT SHOWING CREASING
324	49.6
288	35.5
250	23.7
216	16.7
200	15.1
176	7.7
150	2.4
126	2.5
96	2.5

These records revealed a very marked increase in number of creased fruits with decrease in size. For instance in the larger sizes (96, 126, and 150) the percent of creasing was approximately 2.5 percent and was of no practical significance. However, in size 176 the amount of creasing increased to 7.5 percent. For size 200 it was 15 percent; for 216, about 17 percent; and for 250 it was over 23 percent. These last mentioned sizes are perhaps the most popular in the

*By Erston V. Miller, physiologist, Division of Fruit and Vegetable Crops and Diseases, Bureau of Plant Industry, Soils, and Agricultural Engineering, Agricultural Research Administration, U.S.D.A.

retail trade. Oranges in the 288-size group showed about 35 percent creasing and in the smallest size (324's) creased fruits amounted to practically 50 percent of the whole.

It was thought that this disorder might possibly be associated with some deficiency. Thus far the fruits in this grove have been analyzed for boron only, and no deficiency of this element has been found.

Until additional information is obtained on this subject, no specific recommendations for control of creasing can be made. However, in the years of large crops of oranges it seems that it would be advisable as a precaution to fertilize adequately to provide all of the less common mineral elements, and to irrigate, if practicable, during drought periods.

Acknowledgement.—These investigations were made possible through the cooperation of Chase and Co., the owners of the grove under ob-

servaion, and appreciation is expressed to Dr. Irving Feinberg of the company for his advice and assistance.

Editor's Note: It is a matter of common observation by growers that when orange trees bear an abnormally large crop, there is a pronounced tendency for the fruit to be smaller, which would seem to be a natural result. In practice, to a certain extent, this tendency has been overcome by stepping up the amount of fertilizer in the spring-to-summer period, over that usually applied.

Dr. Erston Miller's preliminary report on "Creasing in Oranges" indicates there may also be a relationship between this trouble and the failure to apply additional fertilizer in heavy crop years. And this year so far has given indications of an unusually heavy crop for the state as a whole. —From "Citrus" (Florida), June, 1946.

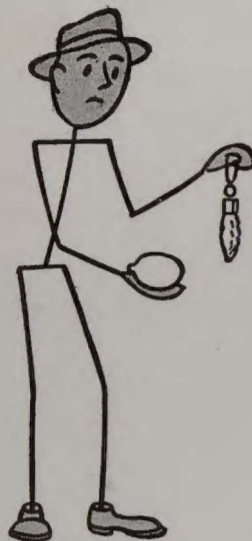
Why Co-Ops Are Born

SUNKIST has a recent example of why farmers are forced to cooperate.

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Whichever it was, it constitutes a nudge to Sunkist to protect its citrus growers by manufacturing and selling juice from its surplus fruits.

In broad outline that is why most farm marketing co-ops have been formed. It is exactly why Sunkist was organized in the first place. Private industry was failing to pay a living price for citrus or to promote the wider use of citrus.—Editorial in Pacific Rural Press



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Young Trees Need Frequent Watering

RECENTLY planted citrus trees will need water more often than old, well-established trees, says Kenneth M. Smoyer, assistant farm advisor in Los Angeles county. He reports observing young replants and trees in new orchards showing signs of dryness during this hot weather. "Some of the hottest and driest weather of the year can normally be

expected during August and September," he said. Root systems of young trees cannot be either widespread or deep. If planted this year, they are still partly dependent upon root in the nursery ball. These young trees will need water a little more often than the normal full irrigation interval. Growers would be wise to examine the soil for moisture and if at all dry, supply water either by tank or a special irrigation."



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Improving Keeping Quality of Stored Lemons

The following is a part of the summary of an extensive report on "Changes in Lemons during Storage as Affected by Air Circulation and Ventilation," Technical Bulletin No. 908, Feb. 1846, by Dr. E. M. Harvey, senior physiologist, Division of Fruit and Vegetable Crops and Diseases, Agricultural Research Administration.

THE lemon tree blooms more or less continuously, and mature fruit as well as blossoms occurs on the tree every month of the year; however, the heaviest bloom occurs in March or April, so that most of the fruit is ready for harvest in winter and spring. The greatest market demand for lemons, however, is from June through August. This demand is met by storing most of the winter and spring-harvested fruit at the place of production. The fruit is sorted, washed, sometimes treated with a water-wax emulsion, and held loose in boxes in rooms equipped with ventilating or air-conditioning devices to maintain the desired storage condition. The average storage period for the lemon crop as a whole is about 3 months; such storage costs about 11 cents per box.

From 1938 to 1941 Eureka lemons, the most common variety grown in California, were studied to determine the physiological changes that occur during long periods of storage, the correlation between such changes, their relation to alternaria rot, and the relative effects of ventilation, air circulation, and still air on such changes and the keeping quality of lemons.

The study showed in general (1) that air circulation cannot be substituted for ventilation as ordinarily provided in commercial storage; (2) that sufficient carbon dioxide does not accumulate in commercial storage to injure lemons, but it did not eliminate the probability that certain other emanations (particularly ethylene) of molds and of the lemons them-

selves can easily become injurious to lemons held in long storage; and (3) that the percentage of buttons that are green and their rate of change from one color class to another afford a practical means of predicting the maximum safe period for holding a given lot of lemons in storage. The results of the tests are summarized in more detail as follows:

Weekly loss of weight was greatest in the commercial storage (control) and least in the still-air chamber. Lemons of different stages of maturity lost weight in the following order: Tree-ripe, silver, light-green, and dark-green. The differences in rate of weight loss for all practical purposes was negligible, because of differences in the relative durations of storage of fruit of different maturities. Lowering the relative humidity in storage 5 percent without changing the temperature more than doubled the rate of shrinkage of lemons for about three weeks afterward.

In commercial storage (control) the carbon dioxide content was less than 0.1 percent. In 1938 the average maximum carbon dioxide accumulation was generally greater in the circulating-air chamber than in the still-air one, but in 1939 the reverse was true; in 1940 the accumulation was greater in the circulating-air chamber than in the ventilated one. The total extractable volumes of internal gases of lemons varied with the maturity in the following decreasing order: Silver, tree-ripe, light-green, and dark-green. High volume yields were associated with high oxygen and low carbon dioxide and vice versa. The average carbon dioxide content of lemons was greatest in the still-air chamber and least in the circulating-air one.

The first external sign of alternaria decay was seldom found to indicate decay in more than 1 percent of the other lemons. When at least 2 percent of the lemons showed externally visible symptoms of decay the lot was

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considered to have reached decay break (beginning of definite susceptibility to *Alternaria*.) This later was arbitrarily fixed at 3 percent. The length of time lemons could be held in storage before decay break occurred depended upon their stage of maturity at storage, the time of picking, the year, and the condition of storage; but the rate of subsequent decay was rapid and rather uniform regardless of the original storage quality. At or near decay break lemons changed from almost complete immunity to *Alternaria* to extreme susceptibility. The order of increasing keeping quality of fruit picked on the same date was in general tree-ripe, silver, light-green, and dark-green. Lemons picked in mid-winter had the best storage qualities; after February their keeping quality diminished until late spring and early summer. Light-green lemons picked in February, did not reach their decay break until 6 weeks after those picked from the same grove in May. Fruits keep much longer in storage in some years than in others. Decay developed earlier in the still-air chamber than in the circulating-air one and earlier in the latter than in commercial storage.

The residue-solids ratio of lemons decreased rather steadily to a minimum near the close of the storage period and then increased slightly. Thus, there was indicated a corresponding change in the solubilities of the wall substances. The ratios also differed greatly with stage of maturity of the fruit.

Buttons of stored lemons were classified in five categories: full-green, intergreen, interblack, full-black and off. The changes in button conditions were related to time of picking, stage of maturity, and condition of storage.

Close correlation was observed between the condition of buttons and the development of alternaria decay, often many weeks later. The behavior of tree-ripe lemons often could be predicted from an initial inspection and another about 3 weeks after storage, of silver from two or three inspections during a storage of 8 to 10 weeks, and of light-green only after one more inspection and a longer period of storage.

Special respiration tests indicated that during storage the potential anaerobic responses of lemons continually change. Immediately after being placed in storage their potential for anaerobic respiration increases for usually a few weeks; afterward it decreases steadily to the end of the storage life of the lemon. The decay break appears to come just previous to what may be called the storage climacteric, when the anaerobic responses of the lemon show complete reversal from what they were at the beginning of the storage period.

"The basis of our political system is the right of the people to make and to alter the Constitution of Government. But the Constitution which at any time exists, until changed by an explicit and authentic act of the whole people, is sacred and obligatory upon all."—George Washington.



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Orchard and Grove Tractors are available in two models—0-4 and 0-6—with your choice of high-compression straight gasoline engine or combination distillate-gasoline engine. See these special tractors at your International Harvester dealer's.

THE SAME rich soil and warm sunshine that will bring these two-year-old lemon trees (above) to fruitful maturity also causes heavy growths of weeds. Here, they are nearly as high as the trees. That's why this hilltop lemon grove is being disked for the second time in one season. And since the 70 acres of citrus trees are planted on hills, an efficient, powerful tractor is needed for the job of uphill, downhill cultivation—an International Diesel TD-6.

The TD-6 is teamed up with a Dyrr Model-SO Disc Harrow, designed especially for such work, and together, this cultivating combination does the job in four 11-hour days. That's efficient power! It's economical power too, using only 20 gallons of low-cost Diesel fuel per 11-hour day.

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THE possibility of bringing new crop pests into California is great. The necessity for taking steps to prevent their introduction is brought out in this K F I script, broadcast at 12:00 Noon, July 31, 1946, in which Harold J. Ryan, Los Angeles County Agricultural Commissioner, was interviewed by D. M. Rutherford, Editor of the California Citrograph.

The Insect Threat To Agriculture

force quarantines against dangerous insect pests that might be brought into the state and cause serious damage to agriculture. Is that right?

A. Yes, it is the most important job we have. The pests already here cost farmers several million dollars a year in money and crop loss. Farmers in Los Angeles County alone pay

out over two million dollars a year to fumigate and spray insect pests. There are a lot of dangerous pests in other states and in foreign countries that will cost a great many more millions of dollars if they get established here.

lished here?" Don't you think the quarantines will keep them out?

A. I do not think so. No experienced quarantine officers believe that we can keep all the pests out. Commerce and travel between nations and states will always carry with it the hazard of pest introduction. Pest infested shipments have been taken from ships, automobiles, and airplanes and there is always the probability that some will get by.

Q. Why say "if they get estab-

Q. And I suppose the faster they travel, the better chance they have of being alive and kicking when they get here.

A. That is very true. A shipment that travels by boat for several weeks is not so likely to reach here with live pests in it as the same shipment traveling the same distance by air in a few hours.

Q. What are some of the serious pests you think might come in?

A. Mediterranean fruit fly, Mexican fruit fly, melon fruit fly, citrus black fly, white fringed beetle, cotton boll weevil, pink bollworm, just to name a few of them. Any one of these is likely to do serious damage—damage costing several million dollars a year to California crops if it gets in and becomes established.

Q. And if one does get in, will we just have to learn to live with it?

A. Not necessarily. If it can be found soon enough it might be eradicated. California farmers would certainly want to make the try if they have a chance.

Q. What chance is there of finding it soon enough?

A. I think there is a good chance. For several years glass traps with an attractive bait for fruit flies and metal traps with an attractive bait for Japanese beetles have been operated in parts of California during the time of the year when these insects would be on the wing if they were here. None of the dangerous fruit flies and no Japanese beetle has been picked up but sooner or later we think we are going to get them in the traps.

Q. What about other insects that cannot be attracted to traps?

A. In that line I do not think we are doing enough. One of the most likely places of finding a new pest is in nursery stock which might have been brought in when the pest was in the dormant stage without the inspectors finding it. Some survey work has been done in nurseries in some counties. Many new insects have been found and have been eradicated at very small cost. Sometimes just a half dozen plants or so are found infested with new insects. It is a simple and inexpensive thing to fumigate these or burn them up to destroy the infestation.

Q. I can see that when you find a few plants infested, it is easy enough to clean up the pest but what chance have you of doing it when the infestation is established in permanent plantings?

Q. One of your main jobs is to en-



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Both of these new Shell sprays with residual killing power are in stock at your local Shell office. Order a supply of each—and be sure to read directions before using. Shell Oil Company, Incorporated.



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A. It has been done. Mediterranean fruit fly was well established in Florida in 1929. The Federal Government and the State of Florida eradicated it.

Citrus white fly was established in citrus orchards scattered from Sacramento to Southern California and an eradication campaign was started by the state in 1927. The job was finished in 1943 and today, if there is a live citrus white fly in California, it is keeping out of sight.

An infestation of obscure scale, a serious pest of nut trees, was found a few years ago in Los Angeles County and in two places in San Diego County. The Los Angeles County infestation and one of the San Diego County infestations have been eradicated. The other one is on its way out.

We have a list of twenty-one different species of insect pests that were found in Los Angeles County nurseries and eradicated during the past few years as a result of continuous inspection work.

We know we can eradicate a pest if we find it soon enough.

Q. It sounds like a lot has been done to clean up new pests. Why do you say that is not enough?

A. We need a permanent survey program for new pests. A small crew of trained inspectors who know the most likely places to find Mexican fruit fly and each of the other pests likely to be introduced should be employed by the state as a permanent organization.

Q. That is going to cost money?

A. Yes, but it will save money. About four years ago Oriental fruit moth, a new pest, was found in California. The Legislature immediately appropriated over \$800,000 to clean it up. All the money was not spent because it was too late to try eradication—but—if we had that same money spread over a ten year program of survey we would almost certainly find other serious pests in time to eradicate them. There is more than a good chance that we would have found Oriental fruit moth in time to eradicate it.

Q. Then you would spend money to save money?

A. Yes—when you consider that red scale of citrus probably costs ten million dollars every year in fruit damage and control costs, you can see that a few thousand dollars a year spent to prevent establishment of other pests as bad or worse than red scale would be money well spent.

British Loan Interests State Agriculture

THE British loan proposed by the United States is of prime importance to California agriculture, according to George Alcorn, marketing specialist of the University of California Agricultural Extension Service.

"The United Kingdom and the

United States are the two greatest trading countries in the world, and each is about the best customer of the other," Alcorn says. "The United Kingdom in the prewar period, 1934-1938, was our biggest fruit customer, taking 43 per cent of the total value of the United States exports of fresh, canned, and dried fruits. Our average annual exports of fresh fruit, 1934-1938, were 591,434 tons, of which 204,670 tons went to the British Isles. Canada was our second best customer and she took an average of 168,373 tons.

"Our exports of dried fruits averaged 199,871 tons, of which the United Kingdom took 49,046 tons. Our exports of canned fruits averaged 139,106 tons, and the British took 120,466 tons of these.

"The United Kingdom was also the best barley customer. In the ten years prior to World War II, they took about 93 per cent of all the barley exported from California, and over one fourth of the state's crop was exported during that period."

Alcorn explains that the United Kingdom's import possibilities were greatly changed as a result of the war. Some of her prewar methods of obtaining funds for payment of the importance of keeping our best customer on her feet is indicated by the volume of fruit exported to the United Kingdom. The proposed loan involves a series of agreements which are designed to improve trade relations.

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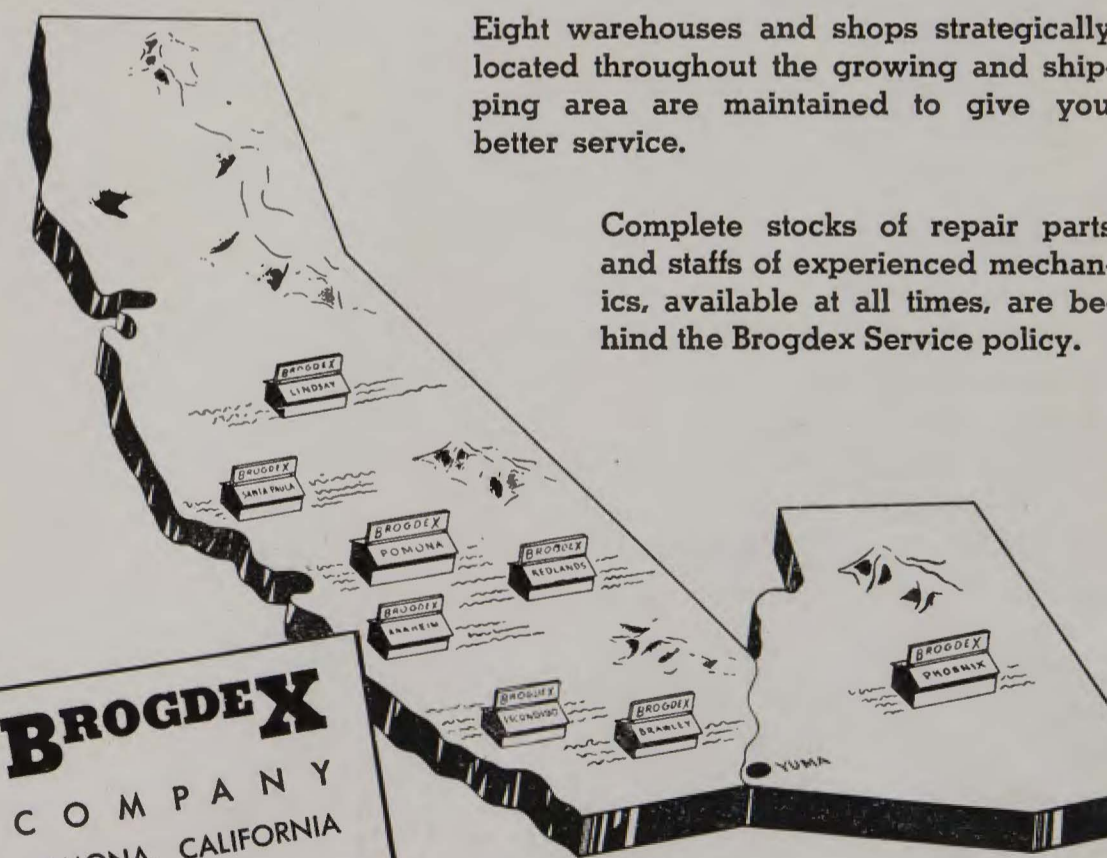
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The following account of the role of microorganisms in avocado tree decline was presented at a meeting of the Pacific division of the American Phytopathological Society in Berkeley, California, June 24, 1946. The authors are staff members of the Division of Plant Pathology, University of California Citrus Experiment Station, Riverside.

Microorganisms in Avocado Tree Decline

By G. A. ZENTMYER and L. J. KLOTZ

THE disease of avocado trees known by the general term "decline" has been observed in California for at least 20 years, but has assumed considerable proportions only during the past four or five years. Poor drainage of the soil, resulting in the accumulation of excess water in the root zone during periods of heavy rainfall or over-irrigation, appears to be the factor initiating the trouble.

Decline occurs on two main types of soil: (1) very compact, heavy soils which naturally drain poorly, and (2) soils with a permeable surface layer but with an impervious layer near the surface. In either type,

drainage may be poor and a waterlogged condition may develop. Waterlogged soil, means a low oxygen content, which may be harmful to root growth as well as favorable to the formation of various toxic chemicals by microorganisms which are favored by anaerobic conditions.

The general symptoms of decline are no different from those of any trouble which restricts root growth—pale yellow leaves, sparse foliage, wilting of leaves during periods of high transpiration, slight or no new growth, dieback of twigs and eventually larger branches. The feeder roots turn brown or black, die and rot; this rather nondescript type of rot progresses gradually into larger roots until practically the entire root system may be destroyed. Occasion-

ally definite lesions are found on the roots, but not consistently.

Although the disease occurs primarily under conditions of poor drainage, there is evidence that a biological factor or factors may be involved as well. Sterilization of soil taken from around declining trees into the greenhouse has resulted in pronounced increase in growth and vigor of seedlings replanted in this soil as compared with replanting in non-sterilized soil. Generally in several experiments, seedlings in the sterile soil (autoclaving for 2 hours, or chloropicrin treatment) have made 3 to 4 times the height growth that seedlings in non-sterile decline soil have made in 9 months.

There have been indications during the past 4 or 5 years that the fungus *Phytophthora cinnamomi* may play a part in avocado decline. Wager showed that this fungus caused injury to avocado seedlings when they were waterlogged in pots. A survey by Harvey demonstrated the presence of this fungus on roots of declining trees much more commonly than on roots of healthy trees, which of course may have been effect rather than cause. Since *P. cinnamomi* has been demonstrated to be the cause of a serious root disease of chestnut trees, which bears many similarities to avocado decline, as well as being pathogenic on a number of other hosts, it is a reasonable suspect at least.

We have waterlogged avocado seedlings under varied conditions—in sterile soil and non-sterile soil from decline areas, in sand; in the presence of various fungi including *P. cinnamomi* and *Pythium vexans* and in their absence at varying soil temperatures, for varying periods of time. The results indicate two main things: (1) waterlogging soil, regardless of type of microflora present, for 10-14 days or more results in serious injury to avocado roots. This occurs even in soil initially sterilized with chloropicrin or by autoclaving. (2) Waterlogging in the presence of *P. cinnamomi* results in even more serious injury and death of roots and tops. Thus in the field it seems very possible that we may have two types of injury—one merely from waterlogging (roots become bluish or black), and the other from waterlogging in combination with *P. cinnamomi*. Either type may be serious; the latter may result in more extensive and more permanent injury, however.

The waterlogging experiments also have shown that: the length of the waterlogging period is very important. If the soil was saturated for short periods (2-4 days, for instance) no injury resulted with our seedlings. Injury has occurred with slightly longer periods of waterlogging (6-8

days) where *P. cinnamomi* was present, but not in its absence. Soil temperature is also a factor here; seedlings will decline even in sterilized soil following short periods of waterlogging at high soil temperatures (32°C).

In a recent experiment in the Wisconsin temperature tanks, inoculation of soil with *P. cinnamomi* and use of soil from "decline" areas (containing *P. cinnamomi* as well as other microorganisms) has resulted in injury to the root system of seedlings even without excess water. The soil used in the experiment was taken from around trees affected with de-

cline. Half of the soil was sterilized with chloropicrin before planting to Topa-Topa avocado seedlings. In this experiment, half of the soil cans were brought up to field capacity, then permitted to drop to 1/2 field capacity, then brought back to field capacity, etc.; the other cans were waterlogged for a period of 10 days.

Some figures from this experiment are very indicative of the effect of waterlogging and of *P. cinnamomi* plus other microflora present in the soil from decline areas.

For each of the 5 soil temperatures the seedling growing in sterile soil, at field capacity or less, made the best growth, and had the largest and healthiest roots. An arbitrary figure for root area was obtained by use of a photoelectric areometer. For the seedlings in sterile soil at field capacity or less, the average root area figure was 921; for sterile soil at field capacity or less, inoculated with *P. cinnamomi* the average figure was 222; for waterlogged sterile soil the figure was 415. For non-sterile soil, maintained at field capacity or less the average root area was 223; figures for seedlings in waterlogged non-sterile soil and inoculated soil were slightly less but not appreciably so. Weights of roots in this experiment followed a similar trend. Seedlings in sterile soil, field capacity or less averaged 44 gms wet weight of root; those in sterile soil inoculated with *P. cinnamomi*, maintained at field capacity or less averaged 16.2 grams, while sterile soil waterlogged averaged 19.2 grams. Figures for increase in height of seedlings during this experiment are equally illuminating and follow a similar trend, as indicated by the slides.

These and other results indicate that *P. cinnamomi* when present may accelerate "decline", but also indicate that "decline" occurrence is not dependent on the presence of this fungus alone. Injury will occur in soils which have been sterilized when waterlogged in the absence of this fungus. Previous work has also shown that toxic products formed by bacteria and other microorganisms under anaerobic conditions undoubtedly play a part in the decline picture. These include such chemicals toxic to roots as nitrite, butyric acid and hydrogen sulfide. These products, and consequently root injury and decline, have been found to increase in soils in which the carbohydrate content has been increased by addition of sugar in our experience. Another factor of importance in this respect is that it has been found that *P. cinnamomi* can produce nitrites, which may explain in part destruction of roots in soil inoculated with this fungus. Nitrites and the other toxic chemicals mentioned above can injure or even kill avocado roots, and may damage them sufficiently to permit entry of saprophytic organisms which complete destruction of the tissue.

If the 1945 farm accidental death toll were concentrated in one city, it would completely wipe out a town the size of President Truman's home town, Independence, Mo.



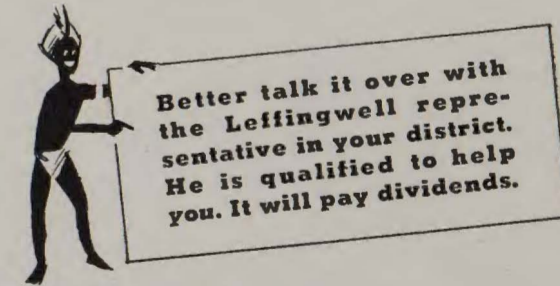
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Excerpts from a recent address by Robert M. Salter, Chief of the Bureau of Plant Industry, U. S. Department of Agriculture.

SOME RESULTS OF RESEARCH IN FERTILIZATION

THE total volume of agricultural production was half again as large in World War II as in World War I, this in spite of 10 per cent fewer workers on farms and no greater acreage of crop land. The volume of products per worker was 75 per cent more, and the volume per acre 50

per cent more than during World War I. This miracle of increased production could not have happened without the "know how" gained from the intervening quarter century of scientific research.

This is what has enabled the farmer to grow on two acres crops that required three acres in 1917.

You all know the story of hybrid corn, which by conservative estimate added two billion bushels to the nation's corn crop during three war years. For the first time, we pushed our wheat crop above the billion bushel mark, a feat possible only because of rust-resistant varieties developed since the first World War.

The development of the domestic synthetic ammonia industry is an outstanding example of applied research. The nation is no longer dependent on foreign sources of nitrogen and per unit cost to farmers has steadily decreased over a 20-year period. This development also paved the way for adding free ammonia directly to mixed fertilizers, thus utilizing nitrogen in its cheapest form and at the same time greatly improving the physical condition of the mixtures.

Side by side with improvements in technology have come improvements in the use of fertilizers. Most significant is the increase in total tonnage of plant food used on American farms which now stands at about 270 percent of what was applied three decades ago. This increase reflects the integrated effect of literally thousands of field, and laboratory experiments that have been conducted throughout the nation.

Even research that aims mainly at increased efficiency in livestock production creates greater outlets for fertilizer. The control of animals parasites and diseases, the development of higher producing strains, the breeding of the heat-tolerant cattle for the South, all tend to stimulate livestock production. More livestock require more feed, and more feed requires more plant food.

Research aimed at finding new uses for crops, such as cotton, peanuts, and soybeans, stimulates their production and is reflected in greater demands for plant food. The same is true for research on new crops. For

example, research is rapidly placing the American tung industry on a sound economic footing and tung trees respond profitably to liberal fertilization. All this research tends to place the farmer in a sounder economic position.

Increased recognition of the role of the minor elements in plant nutrition, and better delineation of the areas in which soil deficiencies of these elements occur are focusing attention on their inclusion in mixed fertilizers. Examples are the need for boron on alfalfa in the South and East, for certain vegetable crops along the East coast, and for sugar beets on particular soils; the need for copper and manganese on crops in the Florida everglades; and the need for zinc on pecan trees. Inclusion of these elements in mixtures is primarily a question of determining the proper quantities for specified soil and crop conditions.

A promising field for research is in developing non-leaching synthetic compounds which will gradually release nitrogen to plants at predetermined, controllable rates. Such compounds should be particularly useful in fertilizing forage and other long season crops and for use on sandy soils where leaching is a problem. Enough work has already been done by our Bureau to show that compound having the desired properties can be prepared.

I would remind you that scientific research is the Aladdin's lamp of the twentieth century. In the brief period between the two world wars and since, it has developed a veritable flood of new products and techniques, whose contribution, present and potential, to man's comfort and convenience, to his efficiency and escape from toil, to his health and longevity, and unfortunately, to his powers of self destruction, make the magic of Aladdin's time seem childish and impotent.—Texas Farming and Citriculture.

"When we look at the acorn it is sometimes difficult to imagine the mighty oak. By the same token there are probably young people around us, in every community, whose ideas and work will set the pattern for our civilization 50 years hence."—C. F. Kettering, vice president of General Motors in charge of research.

Grapefruit Industry Groups Named

THE State Department of Agriculture has announced the appointment of members and alternate members of two desert grapefruit industry groups.

The appointments were made to the Grapefruit Advisory Board and the California Desert Grapefruit Industry Board. Nomination meetings were held by the industry and the appointments were made from the producers and handlers nominated at these meetings.

Appointed to the Grapefruit Advisory Board to represent the industry in operations of the Marketing Order Regulating the Handling in Intrastate Commerce of Grapefruit Grown in Imperial County and that part of Riverside County South and East of San Geronio Pass as producers were: Member, Max M. Zimmerer, Mecca; alternate, Leland J. Yost, Thermal; member, Morgan U. Ward, Anaheim; Alternate, W. H. Kersteiner, Coachella; member, John L. DuBoise, El Centro; alternate, Emil Steiner, Brawley; member J. D. Huston, Imperial; alternate, George W. Cutshaw, Brawley.

Appointed to the Advisory Board to represent handlers were: Member, J. E. Harshman, Brawley; alternate, Joe Russo, Brawley; member, Argus Dean, Los Angeles; alternate, J. E. Pippen, Indio; member, Robbins Russel, Redlands; alternate, Arthur Chandler, Redlands.

Appointed to the California Desert Grapefruit Industry Board to represent the industry in operations of the Marketing Order for Advertising and Trade Promotion for California Desert Grapefruit and Grapefruit Products as producers were: Member, Max M. Zimmerer, Mecca alternate, Leland J. Yost, Thermal; member, Morgan U. Ward, Anaheim; alternate, W. H. Kersteiner, Coachella; member, J. E. Harshman, Brawley; alternate, Emil Steiner, Brawley; member George W. Cutshaw, Brawley; alternate, A. W. Nelson, Brawley.

Appointed to represent packer members were: Member, Argus Dean, Los Angeles; alternate, John L. DuBois, El Centro; member, Willis H. Parker, Redlands; alternate, Dave De Roo, Redlands.

Appointed to represent processors were: Member, W. K. McCracken,

Santa Ana; alternate, Clark Donmyer, Redlands.

The Grapefruit Advisory Board is concerned with the Marketing Order which establishes grade and size restrictions on the movements of grapefruit to market in fresh form while the Grapefruit Industry Board is concerned with the Marketing Order advertising both grapefruit in its fresh form and grapefruit juice and other products.

The State Director of Agriculture also indicated he had been advised that appointment of a committee composed of both California and Arizona grapefruit producers had been made by the United States Department of Agriculture to assist in the operation of a Federal program which includes both desert regions of California and Arizona. The term of office of all of the groups is for one year.

More deaths occurred in agricultural work than in any of the other seven major industrial groups—the total of 4,500 represents 28 per cent of the nation's occupational death toll. Agriculture, which has more workers than any other industry, had a death rate per 100,000 workers of 53; the all-industry rate was 31, the National Safety Council reports.

Were we directed from Washington when to sow, and when to reap, we would soon want bread.—Thomas Jefferson.

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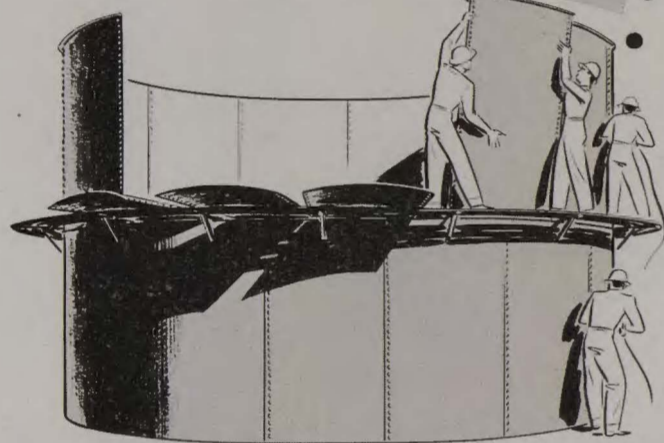
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THE purple scale *Lepidosaphes beckii* (Newm.), is one of the most important scale insects attacking citrus in California. Its reported occurrence in other parts of the world as a pest, together with the difficulty of controlling it on citrus, are further evidences of the serious nature of purple scale. It occurs in California, Florida and other Gulf States, the western Mediterranean Basin, South Africa and South America. It is one of the most destructive

Control of Purple Scale With DDT

By D. L. LINDGREN, J. P. LaDUE, L. S. HARRIS

insects in Florida and the other Gulf States, and is a serious pest in South America. Quayle (1938) ranks purple scale as the third most important citrus scale pest in California.

According to Quayle the purple scale appears to have been introduced

into California directly from Florida in 1888 or 1889. In the report of the California State Board of Horticulture for 1893, Alexander Crow states that, "Four years ago two carloads of orange trees were received in this State from Florida and planted in Los Angeles and San Diego Counties without disinfection. The result is that the climate that has been preached to us by importers of Florida stock as unfavorable to the development of the species of scale has proved to be the opposite, for on a visit to the above counties last summer I was shown trees completely covered with purple scale."

Purple scale occurs in the following counties in California: San Diego, Orange, Los Angeles, Ventura and Santa Barbara, and does not occur in the citrus areas of the San Joaquin and Sacramento* valleys or in Riverside and San Bernardino Counties. From its distribution it appears to be an insect that prefers moderate temperature and relatively humid conditions rather than high temperature and dry conditions. Although the purple scale has been in California for over 50 years it has not appeared in the interior sections of California with the exception of the Sacramento record already indicated.

Generally, there are three generations of purple scale per year and under favorable conditions there may be a partial fourth. Quayle's records show that from May to October at Whittier the purple scale will go through its development in three months, or slightly less, so there will be two generations during this time. A third generation will get fairly well started before cold weather, but in the colder winter months egg laying ceases and is not resumed until the following spring. During May and June young scales begin appearing in large numbers, which is the first definite spring hatch. There is usually another pronounced hatch of purple scale in September and October.

The best single treatment for purple scale at the present time is HCN fumigation. Oil spray is also recommended, but in general is not as satisfactory as fumigation. In heavily infested groves a light medium or medium oil at 2 per cent as an emulsion or 1.2-3 per cent as an emulsive is used before or after fumigation. The time for treatment is in the late summer or fall, usually determined by the time of hatch, since the younger stages of Purple scale are most susceptible to treatment. The appearance of the younger stages of this scale is not as uniform as the black, but is more uniform than the red scale.

It has been demonstrated under

Under the fuller title "Preliminary Field Experiments on the Control of Purple Scale With D D T Incorporated in Petroleum Oil", this article was first published in the April-June, 1946, issue of the Bulletin of the California Department of Agriculture. The authors are members of the staff of the Division of Entomology of the University of California's Citrus Experiment Station.

laboratory conditions that the presence of DDT deposits on sprayed fruit prevents the young purple scales from developing for as long as 45 days after spraying. Since at certain times of the year most of the purple scales are in the adult stage producing eggs, and the eggs are deposited over a relatively short period of three or four weeks and hatch in two to three weeks, it was assumed that by timing the application of DDT in the field it should be effective in the prevention of the young from settling and developing. With this in mind



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*An infestation of purple scale has been reported in the city of Sacramento on a few citrus trees.



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heavily infested purple scale trees were sprayed with DDT incorporated in oil in May of 1944 and again in May and June of 1945.

In Table 1 appear in brief the results from one of our spray plots treated in May of 1944, and it is indicative of what has happened in all our treatments. It is noticed (column 3) that some increase in initial kill of purple scale adults was obtained when DDT was incorporated in the spray (compare treatment A with F and treatment B with E) while there was apparently no or little effect from the ground cube root on scale kill (compare treatment A with D and treatment B with C). In column 4 of the table is given the percentage of fruit infested with purple scale approximately one year after treatment. The fruits at the time of treatment were very small whereas a year later they were practically mature. It is observed that in those treatments containing DDT the number of infested fruits per tree was 11 per cent or lower. The mineral seal oil treatment alone had 25 per cent infested fruits per tree and the kerosene treatment alone 65 per cent. The check trees had 66 per cent of the fruits infested. Also many of the infested fruits on the DDT sprayed plots had only a few scales per fruit while on the kerosene and check plots the fruits in most instances had many scales per fruit. It is also obvious from the table that there is no correlation between initial kill and the number of infested fruits per tree one year later since the major effect of DDT is not on the original kill of scale but on its residual action in preventing the young scale from developing. The question may arise as to why the number of infested fruits per tree is so low in all cases where DDT is used since these fruits were very small at the time of spraying and as they increased in size very little DDT would be present on their surfaces. In this particular experiment almost all the scale present on the trees were in the adult stage and producing eggs at about the time the sprays were applied. The generation of scale that hatched at this time was the one that was effectively controlled by the DDT deposit.

In the spring of 1945 these plots were again treated with DDT. Other plots were also sprayed with various combinations of DDT in oil. With the use of a solubilizer twice as much DDT was applied per 100 gallons of water in some experiments. All the treatments that had no DDT incorporated in the spray had to be retreated in September due to the heavy build up of purple scale. In all the treatments receiving DDT, with the exception of one, the purple scale population is now (March, 1946) extremely low. In this treatment in which 3 per cent kerosene with one pound of DDT to 100 gallons of spray was used, a few infestations of purple scale are now appearing. In this particular grove the spray was not applied at the proper time since purple scale in all stages of development could be found at the time of treatment. Other plots in this same

grove where 1½ per cent mineral seal was used with 1½ pound of DDT to 100 gallons of water or where 3 percent kerosene plus a solubilizer with 2 pounds of DDT to the 100 gallons was used, the purple scale population is low. Final counts of scale-infested fruits will be made on all the plots in the spring of 1946.

The above discussion is a progress report on limited field plots. Many large-scale field experiments will

have to be carried on before it will be known whether DDT will fit into the purple scale program in California. There are many complicating factors that need to be worked out before DDT can be recommended such as: effect of DDT on parasites and predators; on the increase of red spider; on the apparent increase of red scale in those treatments where a single spray per year with a light oil plus DDT has been used; the

matter of timing the sprays, whether spraying during the spring hatch, or the fall hatch is more effective or if there is any difference between fall or spring spraying. These are a few of the more obvious problems involved in the use of DDT on purple scale.

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Oppose Bug Imports

WIDESPREAD expansion of airplane use throughout the Pacific and Oriental areas has brought a new menace to agriculture and horticulture in Hawaii as well as on the mainland, the board of directors of the California State Chamber of Commerce declared recently—pointing to the danger of plant insect pest spread—with heavy crop losses—unless strong federal inspection is immediately instituted.

To forestall introduction of such pests, the State Chamber has requested the War, Navy and Agriculture Departments to immediately undertake the following program:

1. Army and Navy immediately and rigidly enforce Public Health Service regulations for application of insecticides on planes enroute to Hawaii from points outside these islands.

2. U. S. Bureau of Entomology and Plant Quarantine initiate a program for disinsectizing all planes immediately upon arrival in Hawaii.

3. Bureau of Entomology and Plant Quarantine initiate—with Army and Navy cooperation—a control program against agricultural pests of economic importance on such outlying islands where it may be determined and desirable and feasible.

4. Army, Navy and Bureau of Entomology and Plant Quarantine cooperatively establish disinsectizing stations on the continental United States and certain selected islands west and south of Hawaii to disinsectize all planes taking off from those islands or the mainland previous to their departure for Hawaii or California.

5. Further efforts be made by the proper agency to develop structural design and to devise methods and appliances to facilitate destruction of nests which may stow away on airplanes.

6. Fullest support of all departments of the government be given to creating a proper defense against introduction of dangerous insects into Hawaii and the continental United States.

Golden Advice

John Erskine wrote in Reader's Digest that he learned the most valuable lesson of his life when he was fourteen. His piano teacher asked him how much he practiced and how long at a stretch. The boy said an hour or more at a time.

"Don't do that" warned the teacher. "When you grow up time won't come in long stretches. Practice in minutes whenever you can find them—five or ten before school after lunch, between chores. Spread the practice through the day and piano-playing will become a part of your life."

This is golden advice. Erskine says that the observance of it has enabled him to live a comparatively complete life as a creative writer, outside his regular duties as a professor.

Los Angeles Falls to U. S. Forces -- Fremont in Hot Pursuit of Pico!

In 1846 history was being made in California. The following story prepared by the Centennial Celebrations Committee of the California State Chamber of Commerce, is presented as it might have appeared 100 years ago.

ON this 13th day of August 1846, amid the blare of a brass band and before the somber gaze of the inhabitants, the flag of the United States was raised over the city of Los Angeles, capitol of California, in a ceremony climaxing the brilliant military movements of American forces under the leadership of Commodore Robert E. Stockton.

Com. Stockton started his march from the hills of San Pedro on the night of August 11. Due to the irregularity of the terrain progress was very slow and in many cases the artillery had to be drawn by oxen or by the marines themselves. Lt. Larkin, with a small spearhead detachment, was sent ahead to deliver a message to General Castro but upon arriving found that the Mexican forces had retreated. Commodore Stockton on learning of Castro's

flight detached 150 of the marines to serve as rear guard and continued with his main force to Temple's rancho for bivouac. From here scouting parties were dispatched to uncover any possibilities of ambush.

Commodore Stockton resumed his march early this morning and joined with the forces of Major John E. Fremont, whose troops had driven north from their victory at San Diego, to march into Los Angeles. The Americans occupied the city uncontested and immediately set up their headquarters and prepared their encampment. All evidence pointed to the hurried flight of the Mexican army and of the ten pieces of artillery found abandoned only four were spiked.

Many of the Angelinos are now returning to the city, upon receiving the assurance that no harm will befall them, after their temporary flight to the ranchos of their friends in the nearby hills. Commodore Stockton in a proclamation to the Angelinos stressed the liberty of conscience and full protection of life and property available to those who should adhere to the new government.

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The CITRUS GROWER'S QUESTION BOX

By J. C. Johnston, Extension Specialist in Citriculture, University of California



Readers are invited to send in their questions on cultural problems.

Q. Would it be desirable to subsoil a young two year old orange orchard to get better water penetration?

A. Unless there is some unusual condition the answer is no. The important thing is to change the physical properties of the soil so the water will penetrate. The usual methods are to stir the soil as little as possible and use cover crops, especially those having very finely divided root systems. Bulky manure will be helpful. If these methods fail try dissolving gypsum in the irrigation water or discontinue tillage altogether.

Q. Is DN-75 satisfactory for treating scaly bark trees?

A. It is recommended for the treatment of the early stages of the disease. It is quicker and easier than the older bark scraping method, but it is not a cure. Treatment retards

the progress of the disease and prolongs the productive life of the tree.

Q. In planting a new orchard on the site of the old one what have the old trees taken out that the grower should put back into the soil?

A. So far as I know it has not been shown that anything aside from the usual fertilizer needs to be added. The problem is not so simple. It may be that the trees have added something to the soil that is toxic, or it may be that the population of nematodes and other organisms which are harmful to a live tree have been built up. This problem has been solved with most plants by crop rotation. In certain cases where replanting has failed growers are finding it necessary to plant other crops such as avocados. In some instances soil fumigation has been quite helpful, but this requires further study and trial before it can be recommended generally.

Caution With 2,4-D

SOME precautions must be stressed in view of mistakes being made with 2,4-D as a weed killer. Damage often results from permitting 2,4-D spray to drift in the air or irrigation water to plants not intended for the kill, direct contact with the wrong plants, and failure to clean spray equipment before using it for insecticides.

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Now you can effectively eradicate Yellow Nut Grass with a MASTERkil spraying program, without sterilizing the soil. Spray the top foliage with MASTERkil when plants are 10" to 12" high; MASTERkil does the rest.

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Ragweed, Crab Grass, Dandelion, Lamb's Quarters, Burr Clover and other crop-smothering weeds are killed at the roots by spraying the top foliage only with MASTERkil. For best results with MASTERkil spray when temperatures are between 70° and 90°. Never use when soil is wet.

One Gallon MASTERkil dilutes with 50 gallons water.

It's economical . . . When diluted as above and purchased in commercial quantities it costs from 6¢ to 7¢ per gallon of spray material. One gallon full strength MASTERkil diluted should treat 3000 to 6000 sq. ft.



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The killing power of 2,4-D in minute quantities makes it dangerous to adjoining plantings if it drifts in the wind. This makes it necessary to use sprays of this nature on a calm day and to direct the spray away from plants of economic value which might be damaged. This precaution applies also to home gardeners killing weeds in lawns where damage to flower beds or shrubs may result from wind drift.

Damage may be caused in 2,4-D getting into irrigation water much in the same way as drifting in wind. It may kill plants for which it was not intended.

Another source of occasional trouble has been the use of the same spray equipment for 2,4-D and for pest-control spray. The equipment should be washed and cleaned thoroughly after use of 2,4-D or the material will damage plants when insecticides are used in the same sprayer. Four or five thorough washings with

hot soapy water and repeated rinsings may be necessary. Take care that the hose and nozzle of the sprayer are cleaned thoroughly. A mere trace of 2,4-D may kill some valuable plants.—A. G. Salter

G. F. Ashby, President of the Union Pacific Railroad, announced the contemplated purchase of 1500 new box cars.

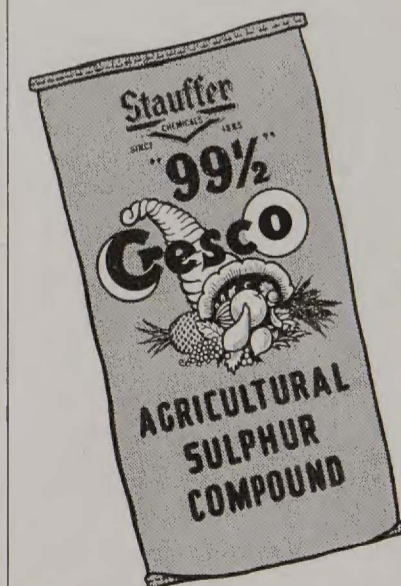
Portland Oregon, will become the site for the first far western plant for the production of DDT which will be built by the Pennsylvania Salt Manufacturing Company of Washington. It will be the third unit in Pennsalt's nationwide chemical manufacturing facilities producing technical DDT.

A survey reveals that last year the two most popular books in America were the Bible and Forever Amber. On that you can write your own comment.—Indianapolis News



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In cooperation with the District Agricultural Inspectors in Los Angeles County, Burnell Yarick, assistant farm advisor, arranged a series of eight meetings for the purpose of passing along current information on citrus pest control matters and affording growers opportunity for discussion. This interesting article is based on comments made and questions most commonly asked.

"KEEP one control measure ahead," says Cliff Papke, pest control operator on the Murphy Ranch, Whittier. This slogan was adopted as the theme for the recent series of eight citrus pest control meetings in Los Angeles County.

These meetings for growers were held in each of the agricultural inspection districts and the senior in-

spectors gave the recommended pest control methods for the current season.

"All too frequently growers wait too long before applying control treatments and therefore maintain dirty orchards at high expense." This was a pretty general observation. Infestations of red scale or citrus red mite cause losses that go far beyond direct crop loss. As fruit quality becomes more and more important in determining packinghouse returns, proper control of citrus orchard pests becomes equally more important.

A grower must know what his pests

Citrus Pest Tips

By B. E. YARICK

are and the damage they can do. He should be able to size up the severity of the attack and know how rapidly the insect population may change from bad to worse. The best source of information is competent personal observation in the orchard.

One should be very careful, however, in accepting "free" advice on control measures. It may be very expensive in the long run. The best information on local control methods may be obtained from the local agricultural inspectors. They live with these problems, know the conditions better than anyone else. An ideal situation is obtained when a well-informed grower works out a program with his inspector and his pest control operator well in advance of the time of treatment. Some pest control districts have a distinct advantage when they are able to maintain the services of a well trained pest control man. Such districts are usually very clean of pests with high fruit quality and little tree damage.

Some pest control crews want to do an extra good job for certain

growers. They're human. It pays well to have a crew want to do a good job on your property. How can that be done?

Just help the crew get the work done and keep out of their hair! Be sure the orchard is ready for work, that the furrows are knocked down, and surface pipe and pots are out of the way. Have a handy source of clean water ready and help them to recognize the boundaries of the property to be treated. A mid-afternoon snack might taste awfully good. Don't ever let a crew get stuck in the mud on your property because of a leaky pipe or other carelessness. Help them. Watch for tears in the fumigation canvas, but by all means keep out of the way.

Crews often get a good laugh when incredulous owners make ridiculous attempts to check up on them. Naturally, during the War, much poor, sloppy, and hurried work was done with old, inadequate equipment and unskilled help. A grower should check on the work done but be careful to appear in the field with an attitude of willingness to help. If things are obviously wrong, discuss it with the foreman or inspector, never with the sprayer. A grower will quite certainly obtain a poor and expensive job if he distrusts those

he hires. Some growers always go fishing when their orchards are being de-pested.

The most important factors are: Know your own situation, hire competent men, trust them, and, as Cliff Papke says, "Keep one control measure ahead."

The eight meetings were held in various parts of the county in orchards and packinghouses. One was held on a property where the grower had become convinced that oil sprays were responsible for his small orange sizes. To prove this, he allowed two rows to remain unsprayed last fall. No difference in fruit size can be observed now between the sprayed and unsprayed trees. The unsprayed trees, however, are very heavy with red scale, citrus red mite, and mite damage.

The commonest question asked by growers referred to the relative values of fumigation and oil spray treatments. Which is better? Why? The answer goes if, if, if. Each area and each orchard is different. A complete history must be known to make the recommendation. Red and black scale become resistant to fumigation in some areas, while oil spray on navels may influence water spot.

DDT was asked about in all areas, and some operators are using it now where tartar emetic has become ineffective on thrips. Some asked if DDT would kill aphids. It won't. It helps aphids and spider by killing parasites and predators. Parasites live inside their hosts, at least the larval forms may, while predators chew up the host from the outside.

There are always questions about ants. Do they do any direct damage? No. Ants carry young black scale, brown and cottony cushion scale, and mealy bugs, and deposit young aphids about on young twig tips. These insects excrete honeydew, a sweet juice. The next time you see a trail of ants on a tree trunk, notice that those ascending are small and black. Those descending are tanked-up and swollen,—baby food. Fully twice as large and a lot lighter in color. They nurse the scale and pro-

tect them by fighting off parasites or by interfering with oviposition. Ants are not concerned with red, yellow, or purple scale. These are armored scale. They excrete no honeydew. Ants aren't interested. Ants are best controlled by poison syrup in cups, work.

Why don't parasites control black scale? They do, in some areas. But as the parasites kill all their hosts, they too must disappear. Soon, in an area free from them, black scale may again thrive, but only for a while.

Why has red scale no parasites? It has, but not here. Many have been introduced from all over the world. But usually, these parasites either die out under unfavorable weather conditions, or because some other secondary parasite goes to work on the beneficial kinds.

Will DDT control red scale? Some results look good, others not so good. It is fairly certain that if a red crawler settles on some fresh DDT crystals, he will never feed. Much experimental work is being done on this general problem at the Citrus Experiment Station.

What are the little holes in the black scale covers? These are emergence holes of beneficial insects and they come in two sizes. The large one is the egg predator, *Scutellista*, and the small one is from the parasite, *Metophycus* spp.

Why do some aphids seem to discolor and become round? These are parasitized and contain larvae. Sometimes the small parasitic wasp, not much bigger than the aphids, can be observed laying eggs in or stinging its host. She will approach a victim head-on, and bend her abdomen forward underneath her body and through all her legs for the oviposition.

Why do trees become all black? This is due to the growth of the sooty mold fungus growing in the sweet excreta of insects. The black deposit shades the leaves and interferes with the normal manufacture of sugar for plant growth. To get all the protein they need from leaf juice, the insects have to take up more sugars than they can use. The excess is excreted.



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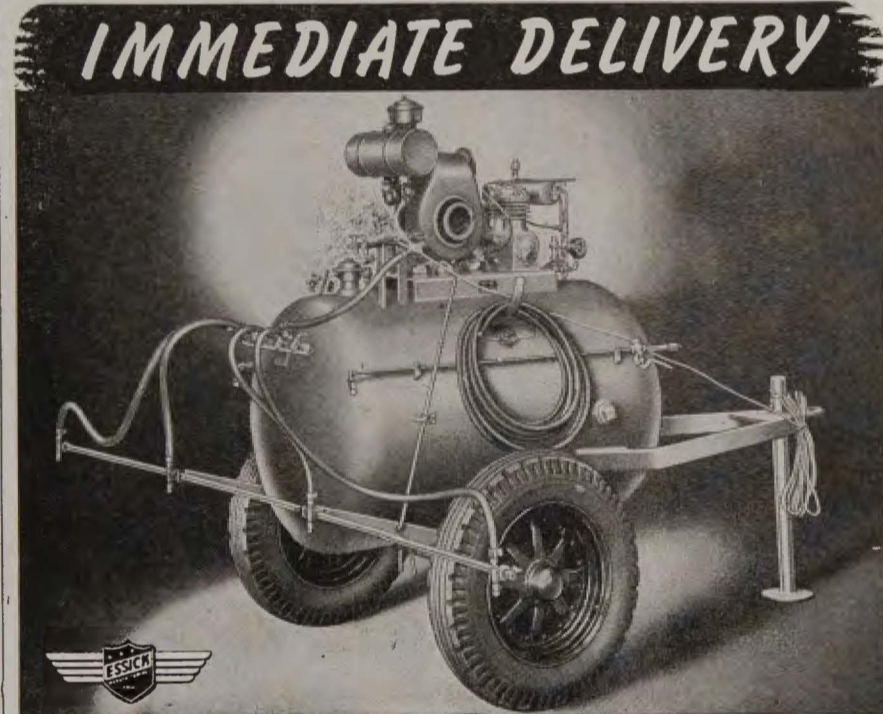
- * Drastic reductions in horsepower requirements . . . secured through improved soil-working times. Now a 4 ft. power take-off model Seaman Tiller can be operated by a top-rated 3-plow tractor, under average conditions . . . or a 3-ft. tiller can be handled by a top-rated 2-plow tractor.
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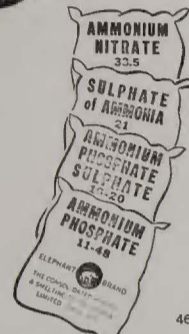
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The Latest on Avocado Varieties

The following article is a part of the 1946 annual report of the Variety Committee of the California Avocado Society.

Varieties Recommended for Commercial Planting

THE Fuerte is established as the major variety in southern California and can be grown in areas where the spring temperature is warm enough for fruit setting and where the trees and fruit are not subjected to extreme cold during the winter.

The Fuerte is recommended for planting in all avocado districts except coastal San Diego County and the coastal district of Ventura County. If grown in districts where there is some question regarding the adaptability, special "strains" should be selected. In selecting bud wood for Fuertes special attention should be given to the source of the buds in that the mother tree have a good yield record and be free from disease.

The Hass is now recommended for commercial planting in the San Diego coastal, the Whittier, the Rivera, the north Orange County and the San Gabriel Valley areas of Los Angeles County. The Hass has many of the ideal properties of a commercial variety but is a dark fruit when soft. In spite of that handicap it is proving to be a very desirable variety from both the grower and consumer point of view. It has the advantage over the Fuerte in being precocious since the trees begin to set and mature fruit in some cases in the second year.

The Anaheim is a commercial variety recommended for the San Diego coastal area, yet it can be grown quite successfully in most of the other districts of southern California. However, from the standpoint of production and appearance of the fruit it excels in the coastal areas, especially in San Diego County. Since the Fuerte is not satisfactory in that area, the Anaheim supplies the need for a consistent and profitable producing variety and therefore is being generally planted and is replacing unsatisfactory varieties by means of top-working.

The Nabal has been removed from the recommended list for all areas except the San Diego coastal. It is a very satisfactory variety in that area although the inland part of that county as well as some portions of others have some very profitable orchards of Nabals. However, in intermediate districts, bearing is erratic, and health of trees not good following a heavy crop. The Nabal has an excellent flavor.

The MacArthur recommended for planting in the coastal area of Santa Barbara and Ventura counties continues to be popular and its planting

is being extended in that area. It is quite satisfactory as to production, shipping qualities and consumer satisfaction.

Growers are urged to top-work varieties which are unprofitable or are poor in quality or both where practicable to varieties which have proved satisfactory for their district.

Experimental Varieties on Trial

Among the prominent experimental varieties the Tantlinger, a green Fuerte-like fruit, originating near Santa Ana, is giving some indication of being a regular bearer in coastal areas. It has a good flavor but matures during the Fuerte season, therefore having no advantage other than the possibility of being a consistent producer. It is being tried at Carpinteria, Fillmore, Santa Paula, Westwood, and La Habra Heights.

The Twomy, a green Fuerte like fruit, maturing in late spring at Vista, is under trial in a number of locations in southern California and shows some promise at Stanley Shepard's place at Carpinteria where he has 25 progeny trees.

The Rincon, registered in 1945 by Mr. Shepard, is a green pyriform fruit maturing in the spring and showing promise as a fruit for Santa Barbara County.

For several years the Frey has been on trial in the San Gabriel Valley, especially in the Baldwin Park and Covina districts. It is a green summer fruit of fairly good eating qualities. However, it is large and a considerable percentage of the fruits have a slightly crooked neck. It has the advantage of being precocious and bears consistently in the area where it has been on trial for a number of years.

The Bonita avocado on the experimental list in 1945 has been propagated experimentally in Ventura and Santa Barbara counties.

The Encanada, another on the list last year, has been propagated to a limited extent but has not had sufficient trial.

The Hellen, also on the list in 1945, has not given promise of being productive in most places where tried. However, at Santa Monica the Hellen has been productive.

The Hazzard, a good quality fruit, is hard to propagate. Further trials are necessary with this variety. It is a consistent bearer at Carpinteria and in other locations on the coast.



The Nowels, a green fruit, maturing in the late fall at Huntington Park, is losing favor because of variability in its bearing and because the fruit is too small when the crop is normal in volume.

The Halsted is a green fruit maturing during the winter, originating near Redondo Beach and showing signs of early bearing at La Habra Heights on H. B. Griswold's place.

The Society during 1944 and 1945 registered a number of green seedlings some of which are worthy of trial but should be considered experimental in any area where propagated. Three of them mature in the spring but most of them during the summer and early fall in the communities in which they originate. These varieties are listed as follows: Boley at Highland, Carlos at Villa Park, Chapala at Vista, Corona at Goleta, Gem at Pasadena, Glendale at Vista, Graham at La Habra, Jaybee at Hollywood, Raymond at Encinitas, Regina at Los Angeles, Rue at Vista, Tomko at Vista, and Verano at Vista.

Cooperatives throughout the world were given recognition in the United Nations organization when the International Cooperative Alliance was invited to serve as a permanent consultant of the Economic and Social Council of the UN.



Pedro, that's my cousin, had job as machine operator in war plant. Now, after long vacation, plenty siesta, he is back working on ranch. He say he feel better if eat every day. Pedro is pick oranges again, but he don't think much of job.

Boss he fix OK. He say, "Pedro, as an operator in our Harvesting Department you have very important job. We must pick and ship the fruit or here nobody eats."

And now Pedro is happy and pick lots oranges. He makes good wages, has plenty frijoles.

Apple Yield Larger

The apple crop this year is expected to exceed that of last year by at least 50 percent. The total yield estimate for August 1 is 111,728,000 bushels, up 5,263,000 bushels from the July 1 estimate by USDA. Even so, the figure is 12 percent under the ten-year average (1935-44) of 120,962,000 bushels.



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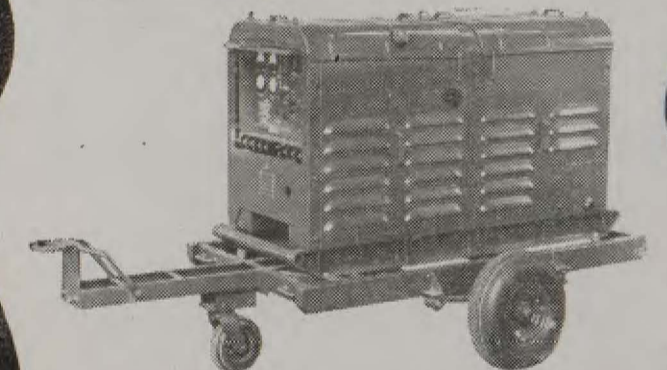
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More News Notes

The board of directors of the Citrus Pest Control district No. 1 of Fontana held their regular organization meeting recently. The directors follow: Frank Williams, F. P. Williamson, Robert Downing, A. A. Lundgren.

San Bernardino County Agricultural Conservation Chairman, John H. Paterson has resigned from the chairmanship to become the executive secretary of the Conservation Association.

Paterson is well known in Fontana as a poultryman, citrus and walnut grower.

The Union Pacific and The Southern Pacific, joint owners of Pacific Fruit Express, recently authorized the purchase of 3,000 new railroad refrigerator cars.

According to the Department of Agriculture the crop of pears indicated for this year is 32,573,000 bu. This is 4 percent smaller than the record crop of 34,011,000 bu. harvested last year.

H. W. Longfellow, Orange County Assistant Farm Advisor reports that local 4-H Club boys and girls are making plans for their annual State Convention to be held at Davis, California, Sept. 5, 6, and 7th. This convention is the first held since the beginning of the war and a program is planned by the University of California to acquaint the members with improved agricultural methods.

Mr. and Mrs. Horace J. Stevens purchased two citrus ranches in the Tustin area totaling 55 acres.

George Woodhams, Agricultural Commissioner of San Bernardino County, has resigned, effective as of September 1, to engage in commercial pest control work.

Bert Smith, executive secretary of the California Farm Bureau Federation, resigned from that position in August.

The Agricultural Extension Service in Orange County has released its 20th Annual Citrus Production Cost Summary in cooperation with 72 Valencia orange growers and 24 lemon producers, reports Harold E. Wahlberg, farm advisor.

Due to the increasing demand by dealers over a period of months, a completely illustrated 32-page book on the modernizing of fruit and produce display stands is nearing completion by the Sunkist Dealer Service Department of the California Fruit Growers Exchange.

The British war discovery "666", said to have 10 times the killing power of concentrated DDT, has been uncovered by scientists. Quantities for experimental purposes are being produced at the Whitmarsh Research Laboratories of the Pennsylvania Salt Manufacturing Company in Wynmoor, Pennsylvania.

The forty eight acre citrus ranch of film star Fred McMurray, located in Pedley, has become affiliated with the Rialto Heights Orange Growers.

The outlook is favorable for a good grape crop. Several air express shipments were made to the east with excellent results.

Don't Flip That Match!

"Statistics show," says W. S. Rosecrans, Chairman of the Conservation Committee of the Los Angeles Chamber of Commerce and President of the Conservation Association of Southern California, "that last year there were 210,000 outdoor fires. As an average, each of them destroyed enough material (timber) to have built a five-room house for a service man—90% were caused by the carelessness of American citizens. Only you and I can prevent such fires. Be careful yourselves—warn others—report fires to the nearest fire wardens."

In the 13 great states served by Union Pacific, there still is land to be tilled, minerals to be unearthed, livestock to be raised, room for new homes and industrial expansion.

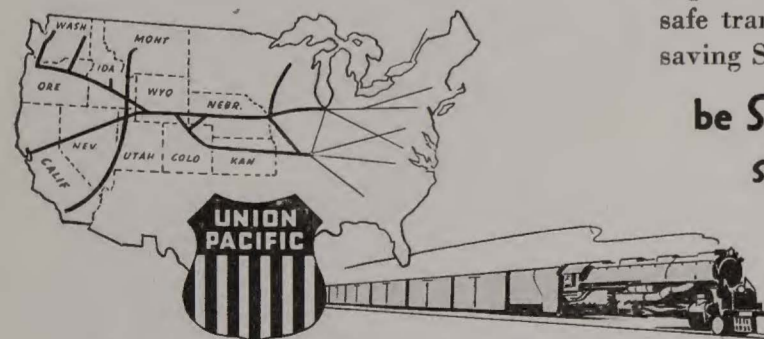
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STRAW HAT INVESTMENTS

When do you get the best bargains in straw hats? During the winter, of course, when nobody wants them.

Summer is the time to sell them at a profit if you happen to be in that business.

Investments, too, have their winters and summers.

During "investment winters" such as the middle 1930's and in '38 and '42 many securities were on the bargain counter because nobody wanted them.

During the past year investors have enjoyed a real "investment summer" with rising profits and everyone looking for "straw hat investments."

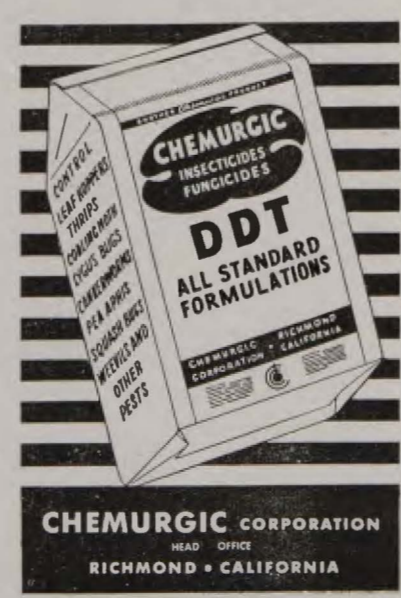
It has become fashionable to believe that such favorable investment weather will continue indefinitely. But experience and common sense tell us that it never goes that way even though we occasionally have a false or "Indian summer."

Might it not be prudent to consider taking profits on some of your "straw hat investments"?

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Insecticide Supplies

CALCIUM arsenate became more critical, while copper fungicide and rotenone prospects improved, as the supply situation shifted in the past month.

Calcium arsenate supplies are becoming increasingly tight in the face of a mounting demand because of threatening boll weevil, flea hopper, bollworm and leafworm infestations in the Cotton South. Because of earlier strikes in raw arsenic production, this season's supply of finished calcium arsenate was only about two-thirds of normal.

White arsenic is now beginning to reach insecticide manufacturers and will enable some later shipments. These however would be far from sufficient if infestations continue. Localized shortages are likely to be extreme, and both industry and USDA are urging growers to make the most economical use of available stocks.

For the first time in months, major producers of copper fungicides are now optimistic; their raw materials are once more available.

The same thing is true in rotenone. Shipments of root are beginning to arrive and while some were held up on New York docks by waterfront labor troubles, these have been released. These roots are now being processed. Production and distribution of finished insecticides will follow with all possible speed. While the first shipments of these will go to acute emergency areas, caused by the long shortage, the outlook farther ahead is bright and the next season's supply is expected to be greater than in any previous period except possibly 1941.

Civilian Production Administration is endeavoring to provide enough raw lead for current production of lead arsenate.—A. I. F. News.

DDT and Citrus Thrips

DDT HAS not proved to be as effective as the tartar emetic-sugar treatment in control of citrus thrips during the summer in localities where thrips have not become resistant to tartar emetic.

In cases where DDT will be used for control of citrus thrips this summer, the Citrus Experiment Station of the University of California suggests four pounds of actual DDT in 100 gallons of water per acre applied with a spray duster. This would mean eight pounds of 50 per cent wettable DDT.

Preliminary studies with DDT dusts indicate that four per cent DDT-talc mixture applied at the rate of 100 pounds per acre offers promise in control of citrus thrips during the summer season. More work is necessary to determine the most satisfactory diluting materials and most effective concentration of DDT in mixtures. Further studies are in progress.

"DDT has not been as effective as nicotine-sugar sprays in control of citrus thrips in central California during the summer season," says A. G. Salter, Farm Advisor.

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Biological Control

(Continued from Page 415)

life of the parasite, stages upon which it can develop do not exist. Therefore, the parasite population is reduced almost to the point of extermination, and because of this the species in these areas is unable to overtake its host when susceptible stages do become available. The parasite *Macrocentrus ancyliivorus* overwinters largely in hosts other than the oriental fruit moth. In many localities these alternate hosts occur only in very small numbers and consequently the parasite lags too far behind the pest in abundance. In some instances climatic conditions produce differential effects on host and parasite. This is true of one of the *Typhias* introduced to control the Japanese beetle, where the parasite emerges too early in the autumn, in relation to the host population.

In some of these cases it is definitely known, and perhaps it is true of all, that were it not for this faulty synchronization of host and parasite populations, the parasite would give satisfactory control. It would appear to be a sound program therefore to attempt to remedy this defect by the mass colonization of the beneficial species at the proper time in relation to the host population. This has been done with *Metaphycus helvolus* for the black scale, with *Cryptolaemus montrouzieri* and *Leptomastix dactylopii* for the citrus mealybug, and with *Macrocentrus ancyliivorus* for the Oriental fruit moth, with gratifying results.

It is my belief that there are many other pest control problems where the method should be given more serious consideration than has so far been the case. The feasibility depends primarily, among other things, on sufficiently cheap methods of production. That such methods could be devised in many instances is demonstrated by the development of the notato sprout method of growing mealybugs and black scale, and the notato tuber worm method of growing the Oriental fruit moth parasite *Macrocentrus ancyliivorus*. In the latter instance the cost of production has been lowered roughly to one-twentieth of that prevailing before the development of the method.

It is not entirely fantastic even to believe that in some cases faulty synchronization of host and parasite populations might be corrected by the artificial colonization of the host insect itself. We have one project of this kind which may be of interest. It was previously mentioned that in certain interior areas the parasite, *Metaphycus helvolus*, did not give satisfactory control of the black scale because the susceptible stages of the host do not exist in the citrus and olive groves for several months during the summer. The possibility of correcting this situation by colonizing young black scale on the trees during the season when they are not there naturally, is being explored. It is easy to grow the black scale cheaply but the problem is whether it can

be made to persist on the tree at a time when it does not occur there normally. This process is somewhat analogous to vaccination, in that it involves attempting to prevent a serious infestation by providing a mild one artificially.

In view of what has already been accomplished in biological control, considered together with the difficulties encountered as a result of the adverse effects on the host plant of some insecticides, and the development of resistant races which require increasing dosages for control, it seems evident that the entomological research program in the country as a whole has been out of balance. While in California biological control work has received generous support, even here we have felt the need to

broaden and intensify our efforts in this branch of economic entomology.

While the war has practically made foreign exploration impossible, we plan definitely to renew this work just as soon as transportation becomes available. Arrangements are under way to send a collector to South Africa for insect enemies of the longtailed mealybug, the red scale and for enemies of phytophagous mites. If and when the international situation permits, it is our hope to expand this foreign exploration to include a search for enemies of *Parlatoria oleae* and other pests in various parts of Asia. These projects are of course carried out in close cooperation with and under authorization from the U. S. Bureau of Entomology and Plant Quarantine.



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In addition to foreign exploration, we have projected a considerable expansion in the phase of biological control concerned with mass production and periodic colonization of entomophagous species. It is probable that at the end of this fiscal year the large scale production at the Albany Insectary of *Macrocentrus ancyliivorus* for orchard colonization will be placed on a research basis only. It is our plan to devote the facilities at Albany primarily to mass production of parasites which attack the codling moth in its cocoon. An attempt will be made to determine whether this number one pest of deciduous fruits can be controlled by one or two early sprays followed by heavy colonization of parasites. We have already demonstrated that at least one such parasite of the codling moth larva can be produced far more cheaply than can *Macrocentrus*.

At the Riverside insectary the mass production work is planned to stress primarily enemies of the red and purple scales and the citrus red mite. Among all the numerous insect enemies of these pests in various parts of the world, we hope to find some that are adapted to the program of mass production and periodic colonization in the groves. These pests have become such serious problems for the citrus growers that economic entomologists must explore all possibilities of control.

Along with this expansion of the regulation methods of biological control we have, during the past biennium, embarked on two new lines of work. These are the study of insect diseases and the control of weeds by the biological method.

A laboratory of insect pathology has been organized at Berkeley, and it is the intention to develop this

phase of biological control along sound scientific lines in the hope ultimately of adding this weapon to the arsenal of California agriculture. The success achieved in the eastern states with the milky disease of the Japanese beetle certainly justifies the belief that entomologists, in general, have taken too pessimistic a view of the possibilities in this field.

In cooperation with the U. S. Bureau of Entomology and Plant Quarantine, we have undertaken for the first time in this country the biological control of weeds. At present our efforts are devoted to control of the Klamath weed (*Hypericum perforatum*) and the prickly pear (*Opuntia spp.*), but it is hoped that this promising line of attack can soon be enlarged to include other species of weeds, particularly those affecting range lands and pastures.

With the expansion just outlined in the biological control field we believe that our research program in economic entomology in California will be reasonably well balanced.

The possibilities of biological control of pests are far from exhausted. In fact, I believe the field has scarcely been scratched. It is the responsibility of the professional economic entomologist to protect agriculture from losses by pests to the greatest possible extent, by whatever means he can discover or develop, at the lowest possible cost and with the least possible injury to the host plant. Where successful, biological control seems to fulfill these requirements better than any other method. It should be our goal then as economic entomologists to explore this field thoroughly. This involves, first the search for, and attempted establishment of, the principal enemies and diseases, from all parts of the world, of each of our

important pests, up to the point where it is brought under control. Second, where satisfactory control is not achieved by this mode of attack and when failure is due to a synchronization of host and enemy populations, the possibilities of mass-propagation and periodic colonization of enemies and diseases should be explored. Until this has been done with each important pest we will not have discharged fully our responsibilities to agriculture.

However, enthusiastic as I am regarding the future of biological control, I want to avoid giving the impression that I feel there should be any reduction in emphasis on toxicological methods of reaching the same goal. On the contrary, we need to give more and more attention to control by use of insecticides. The great advances in this field during the war years leave no room for argument on that score. But, it seems to me that as a profession, we have been too easily discouraged by a few

failures to apply biological control methods successfully and have minimized the great economic value of the successes. Experience with *Trichogramma* and with fungus diseases of the chinch bug and fungus and bacterial diseases of grasshoppers have tended to cause doubt in the minds of many entomologists as to the economic possibilities of the mass-production principle. This doubt, I am convinced, is not justified and should be dispelled. There is no fear that the insecticide research will be neglected. The increasingly important position in this field assumed by the great chemical and oil industries will make its imprint. But it is the responsibility of the profession to see that the various lines of attack are maintained in proper balance, and this I think we have not done in recent years.

The farm resident accidental death total for 1945 was 16,000—an 8 per cent increase from 1944, according to the National Safety Council.

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