

# California

# AGRICULTURE

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## Processing Milk Powders For Their Particular Uses

Helge Shipstead

The first successful milk drying process was the atmospheric double drum dryer.

The advantage of this dryer is its simplicity and low cost of investment. No precondensing is required. The roller powder has a very cooked flavor and the colloidal property of the milk proteins are greatly reduced. The nutritive value, however, is largely preserved and this type of powder is well suited for bread making.

The spray drying process became commercially successful after the introduction of precondensing the fluid milk. Whole milk powder made from precondensed milk has a much better keeping quality than that made from fluid milk. The particles of the precondensed whole milk are larger and heavier and present a much smaller surface of exposure to the air.

### Keeping Quality Improved

Elimination of copper and iron contamination resulted in a great improvement in keeping quality. In spite of this, and other improvements, it was not possible to keep whole milk powder at room temperature for more than three to six months without development of a tallowy flavor. It was evident that this flavor was caused by oxidation of the butterfat contained in the whole milk powder.

Plotting the flavor score of the powder against the amount of oxygen absorbed revealed the critical level of oxygen absorption to be around 5 cc per pound of powder. This meant it would be necessary to remove the air from the can of whole milk powder to reduce the total remaining free oxygen to below 5 cc.

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## Vitamin A Content Similar In Yellow Or White Butterfat

W. A. Regan

A conclusion drawn in error some thirty years ago misled the milk consuming public, and the dairymen followed suit.

Carotene was found to be the pigment that gave milk its golden yellow color. Later it was discovered that carotene, derived from plants, was the precursor of vitamin A.

The conclusion was drawn that yellow milk was distinctly superior to white milk in its vitamin A potency.

Dairymen with high producing Holstein herds and unable to purchase Guernsey females because of their scarcity and high price, resorted to cross-breeding, placing Guernsey bulls at the head of their herd. Other dairymen, finding it difficult to maintain two breeds on the same ranch, adopted the easy way out and resorted to cross-breeding.

More recently it was shown that the white butterfat of the Holstein was approximately the same vitamin A value as the yellow fat of the Guernsey, when the cows are on the same feed. The Holstein converts the carotene into vitamin A.

### Market Demand Complicates Production

The situation is further aggravated by the demand for market milk of a fat content not typical of

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## Investigations On The Control Of Codling Moth On The Payne Walnut In Central California

A. E. Michelbacher and W. W. Middlekauff

The codling moth, *Carpocapsa pomonella*, occurs throughout California and is one of the most important pests of walnuts.

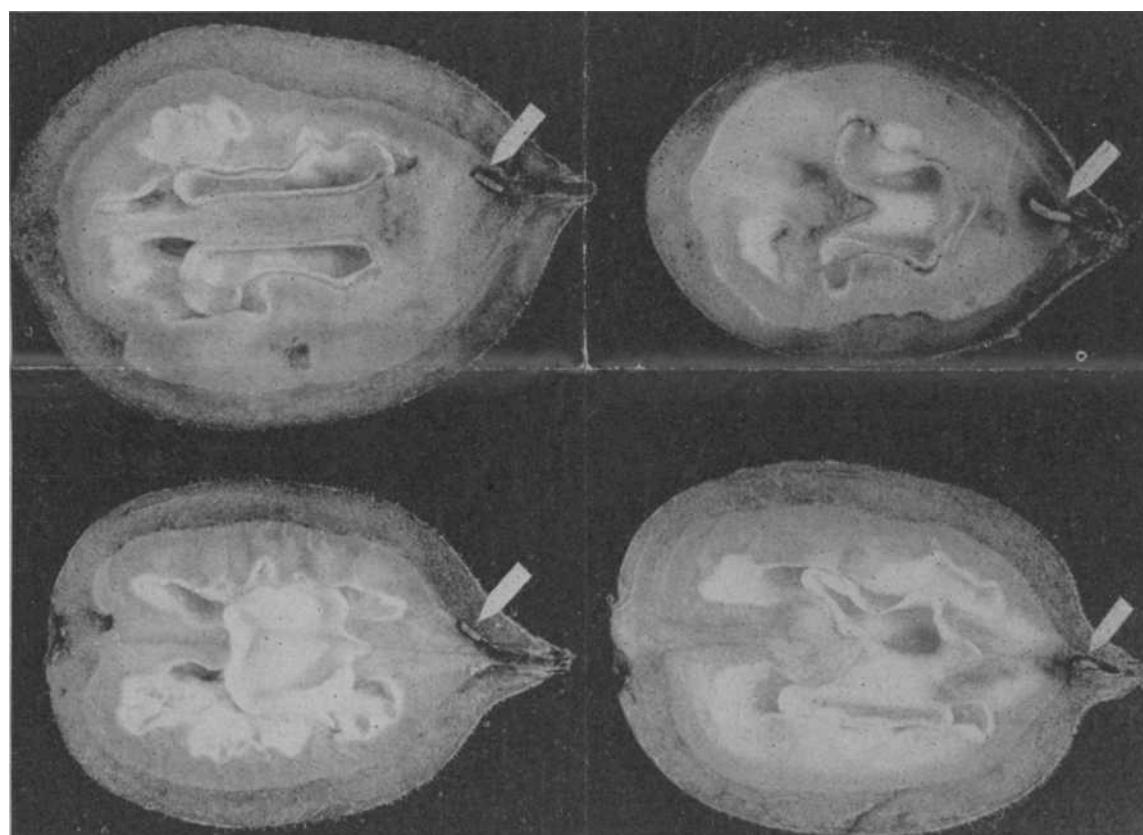
In southern California investigations on the control of this pest have been conducted by members of the entomological staff at the Citrus Experiment Station, Riverside, while in central California the study has been carried out by members of the entomological staff at Berkeley.

If the early spray is neglected, observations have shown that under conditions of severe attack, 25 per cent or more of the walnut crop may be infested before the end of May. This well illustrates the importance of applying an early spray in those areas where the codling moth is a major pest.

First brood caterpillars mostly enter the nuts at the blossom end, and the great majority of these nuts are

doubtful whether the results justify the added expense.

In 1946 a number of growers in the Linden area applied the standard lead arsenate treatment to at least a portion of their planting. No injury whatever was reported and the program will be further tested on a commercial scale in 1947. However, unrestricted recommendations for substituting standard lead arsenate for basic lead arsenate must wait



Walnuts cut through blossom end to reveal young codling moth caterpillar injury to developing nuts. The caterpillars are indicated by the white arrows.

The information contained in this report covers only the work done by the Berkeley station and is applicable to central California conditions. The investigations were started in 1941 and have been conducted principally at Linden on the Payne variety of walnut.

### Timing Spray Applications

A study of the habits of the codling moth in relation to the timing of spray applications was undertaken.

Moth flights have been determined through the utilization of bait pans for trapping the adults. Records for the years 1943 to 1945 inclusive show that there are two broods of moths that must be considered. The first occurs in late April or early May and the second in July.

In order to protect the walnut crop from the first brood it is necessary to apply a spray in early May, at a time when the developing walnuts are still very small.

Basic lead arsenate used at the rate of 4 pounds to the 100 gallons of water has been the standard insecticide used. In order to obtain satisfactory control with this material a second spray is necessary.

Investigations have shown that this second treatment can be applied with good results any time from the latter part of May until about the middle of June.

not involved in the harvested crop because they either drop from or dry up on the trees well in advance of harvest. Nevertheless, these wormy nuts represent a direct loss to the grower.

Second brood caterpillars mostly enter the nuts at the side and stem end. Where sprays are thoroughly applied and the two spray program is followed, wormy drops as well as caterpillar infestation in the harvested crop is not likely to be serious.

### Standard Lead Arsenate Spray

Standard lead arsenate is more effective against the codling moth than is basic lead arsenate.

There is danger, however, of standard lead arsenate causing tree injury. In order to avoid this hazard it has been used in combination with a commercial basic zinc sulfate safer that contains 50 per cent zinc expressed as metallic. This combination has been used at Linden for the past five years without any trace of tree injury. The control obtained has been excellent.

A single, thoroughly applied, spray during the first week in May has resulted in successful control for the entire season. The control has been about as good as that which has been obtained with the two spray basic lead arsenate program.

A second standard lead arsenate spray improves the control but it is

until the treatment has been further subjected to the test of time. Under no conditions should it be used in the coastal regions until investigations that will be undertaken in 1947 show that it can be applied safely.

The composition of the standard lead arsenate spray per 100 gallons of water is as follows:

Standard lead arsenate.....3 lbs.  
Commercial safer (basic zinc sulfate containing 50 per cent zinc expressed as metallic) 1 lb.  
Medium summer oil emulsion (83 per cent oil).....1/3 gallon.

Order of mixing: Standard lead arsenate and safer slurred added to tank when 1/2 full followed by the oil. A wetting agent can be used, but if so, the manufacturer's recommendations should be followed carefully.

### New Insecticides

Extensive investigations have been conducted with DDT, DDD and other new insecticides.

DDT at dosages of 1/2 and 1 pound of actual material per 100 gallons of spray have resulted in phenomenal control of the codling moth. However, the treatments have resulted in destructive mite populations. Also, there has been a serious increase in the frosted scale population where

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## Effects Of Plant Growth Regulators On Orange Drop

W. S. Stewart, L. J. Klotz, and H. Z. Held

In citrus, fruit drop may be considered a continuous process from the time of flowering to fruit maturity.

Superimposed on this background of continuous fruit drop are three periods during which drop is most intense. These are fruit set, June drop, and preharvest drop.

### Preharvest Drop Reduced

The first extensive experimental plots reported here, using water sprays of 2,4-D to reduce mature fruit drop in citrus were established in Valencia orange orchards in May, 1946.

Concentrations of 2,4-D tested, ranged from five pounds of 2,4-D in one million pounds of water, to 40 pounds per million. In these as in numerous subsequent tests, a reduction in drop of mature fruit was found even when the spray was applied two weeks after a heavy drop had been in progress.

In this respect the data are very consistent. The amount of reduction in fruit drop was variable, ranging from 28 to 78 per cent in eleven plots distributed throughout southern California.

This was to be expected, considering the variation in drop observed among individual orchards, and considering that some plots were harvested before severe drop from the nonsprayed trees occurred.

Similarly fruit drop reductions, ranging from 27 to 96 per cent were obtained in 23 plots of navel oranges using 2,4-D sprays of 25 p.p.m. or less.

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## New Vegetables For California Farms Result Of Research

Glen N. Davis

A number of varieties of vegetables have been developed in recent years, either individually or jointly by members of the University of California Agricultural Experiment Station and the United States Department of Agriculture. Some of the varieties mentioned here have been available for several years. Others are of more recent origin.

### Cantaloupes

Powdery Mildew Resistant No. 45 is resistant to form No. 1 of the powdery mildew but is not resistant to form No. 2 and can not be recommended as a resistant type.

Powdery Mildew Resistant No. 5 is resistant to both forms of the powdery mildew. Under good cultural conditions it has produced over 200 crates to the acre. Its high quality is reflected in refractometer readings of 13 to 14 per cent soluble solids—mostly sugars. It is not as early as some varieties nor is it completely immune from mildew. If the melons are not harvested at the first indication of the "slip" they tend to become overmature quickly.

Powdery Mildew Resistant No. 6 and No. 7. No. 6 is well netted and well shaped. It has a larger seed cavity than No. 5 and the flesh has less quality and flavor. No. 7 produces a small oblate melon and in comparison with No. 5 and No. 6 is somewhat later in maturity. The seed cavity and flesh are comparable to No. 6. (Continued on page 4)

## New Vegetables For California Farms Result Of Research

(Continued from page 1)

**Baby Persian** is noted for its uniformity of type and size of fruit. The mature melons are almost round with typical Persian netting and weigh six to eight pounds. The quality of this variety is not as high as the commercial variety from which it was selected.

### Watermelons

**Striped Klondike No. 11** has uniform type and skin color, a rind moderately thick and tougher than the old commercial Klondike, deep red flesh color and high sugar content. It is one of the sweetest varieties grown at Davis in comparative trials involving over thirty varieties. It is not resistant to Fusarium wilt.

**Klondike R-7** produces a comparatively small, uniform, blocky fruit weighing 18 to 22 pounds at maturity. The skin color is a dark green which is covered with a slight grayish bloom. The rind is thin and only moderately tough. The flesh is deep red, desirable in texture and very sweet. R-7 has proved wilt resistant wherever grown.

**Blue Ribbon** was developed because of the need for a wilt resistant variety of the Striped Klondike type. Blue Ribbon produces somewhat larger fruit than R-7 and is the sweetest variety ever grown in the variety trials at Davis. It is wilt resistant.

### Tomatoes

**Cal. 55** is high yielding, but rather late in maturity. The fruit though improved and well colored is inclined to be rough and very large and flat with a tough core.

**Pearson** tomatoes are a slightly flattened globe, deep red, smooth, with a tough skin, heavy walls and numerous cells and it seldom cracks. It is a very valuable variety for green wrap shipment.

Commercial seed growers by individual plant selection have developed Pearson to its present degree of excellence.

### Onions

**Red 21** is a particularly desirable strain. Red 21 has proved, repeatedly in several districts, superior to commercial stocks of California Early Red. It matures somewhat earlier, is more uniform in size and shape, color and time of maturity, and keeps better in storage than the older strains of this variety. The scale color is red, the flesh pink.

**Stockton G-36** bulbs are yellow, slightly conical with top somewhat flattened and mild in flavor. It is particularly noted for its nonbolting habit in any district where grown.

**Lord Howe Island** leaves have a characteristic rigid, upright, habit of growth. The bulbs are deep red, oblate and very mild flavored. The variety matures about the same time as Crystal Wax or Yellow Bermuda. It is well adapted to certain districts in southern California and may be important where an early red onion is preferred.

**Crystal Grano** should be popular among growers who have a market for a white type of Early Grano. It is rapidly gaining favor as a green bunching onion.

**Brown 5** was selected to secure a strain with uniformly chestnut brown scales that adhere tenaciously, a lemon flesh color, good keeping quality and uniform type. It is a high seed yielder.

**San Joaquin** is an early maturing, nonbolting, high yielding variety especially adapted to the Southwest. Its foliage is semiglossy and vigorous. Mature bulbs are light yellow, intermediate in shape between a full globe and the Grano type. The flesh is soft and mild in flavor. Keeping quality is poor. It is an exceptionally high yielding variety.

**Excel** is best suited to southern California or equally southern districts. It is a Bermuda type in respect to bulb size, shape and color but matures 10 to 14 days earlier than standard Bermuda types. It produces very few splits, doubles and bolters, when properly grown.

**California Hybrid Red No. 1** is the first true F1 Hybrid onion ever re-

## Family Selection And Progeny Testing Of Poultry Worthwhile For Higher Egg Production

An abstract of a talk delivered at the Annual Convention of the California Baby Chick Association at Santa Barbara, June 16, 1947 by I. Michael Lerner.

The 1947 production index of the University's production-bred Leghorn flock averages 220 eggs per hen per year.

Before 1933 the annual average production index was somewhere near 120 eggs per hen.

In that year the Division of Poultry Husbandry started a system of family selection and progeny testing. The production index was recorded for 12 successive years. The production index is the number resulting when the total number of eggs laid by the flock is divided by the number of pullets originally in the flock.

### Production Gains

The average annual increase of the University's flock as shown by the production index was 5.6 eggs a year, taking into account the chance rises and falls of production.

Statistical analysis showed that the figure of 5.6 is accounted for by gains due to five different bases of selection: (1) the dam's own production record, (2) the record of the

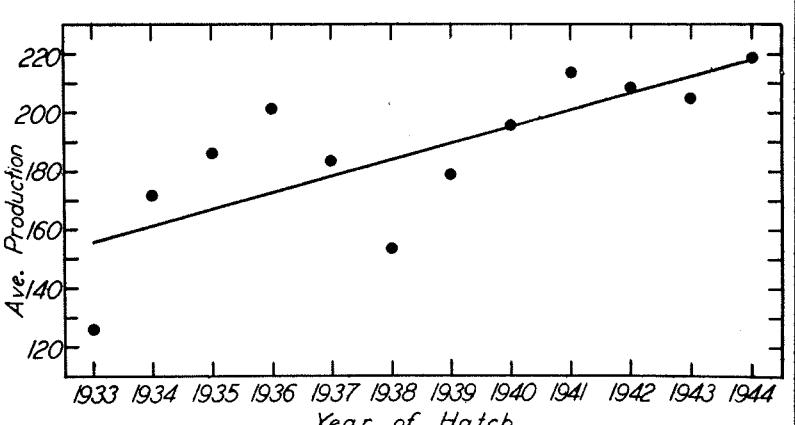
tial—which is the extent by which the selected parents are superior to the flock from which they originated, and (4) the heritability—the accuracy with which the hereditary constitution of a breeding bird can be identified by the standard of selection used.

The higher the selection differential and the heritability, the greater will be the improvement.

On the other hand, increased average age of the parents leads to a longer interval between generations. That means a reduction in the average gain per year.

### The Progeny Test

The progeny test increases by a considerable amount, the ability of the offspring to inherit the characteristics of the selected parents. The accuracy of the estimate of the heredity of a dam is three times as great when judged on the basis of a progeny test of eight daughters than when it is made from the basis of her own record.



Graph showing the production record of the University's production-bred Leghorn flock, from 1933 when a system of family selection and progeny testing was started, to the end of the 12-year study.

dams sisters—the dam's family record, (3) the record of the dam's daughters—the dam's progeny test, (4) the record of the sire's sisters—the sire's family record, and (5) the record of the sire's daughters—the sire's progeny test.

### Four Factors

The amount which each of the five selection bases adds to the gain in production depends on four sets of statistics: (1) the proportion of the flock from each type of selected parents, (2) the average age of the parents, (3) the selection differ-

ence, (4) the record of the dam's daughters—the dam's progeny test, (5) the record of the sire's sisters—the sire's family record, and (6) the record of the sire's daughters—the sire's progeny test.

**Calred** is a mildew resistant variety, seed of which is to be released to commercial seed growers during 1947. It is intermediate in maturity, highly nonbolting, a deep, almost black, red in color with outer scales slightly lighter. Bulb shape is a deep flat and flavor is mild.

The seedstalks of Calred are highly resistant to the onion downy mildew present in California, with the foliage moderately resistant.

### Lettuce

**Imperial 17** is well adapted to cultural conditions in the Imperial Valley for October first to 10th planting and February harvest. It makes large well covered heads during the mid-winter season when other strains are apt to be small. The interior of the head is well bleached and the base tends to be flat with inconspicuous ribs. Experience has shown this variety to be adapted only for culture in the Imperial Valley and possibly the Yuma Valley in Arizona during the period of low temperature. It will not form heads under relatively high temperature.

Glen N. Davis is Assistant Professor of Truck Crops and Assistant Olericulturist in the Experiment Station, Davis.

Peach varieties which require but little winter chilling are being propagated.

The use of the progeny test must increase the interval between generations.

The question arises as to which of the opposing forces exercises the stronger pull in raising the production index.

Does progeny testing add more to the gains by increasing heritability than it reduces progress by lengthening the interval between generations?

An accurate and full answer to the question would require one of two things: (1) an actually performed long-range experiment to compare different breeding systems, or (2) some exceedingly elaborate computations.

A partial answer is found in an analysis of how much each of the selection bases contributed to the gains observed in the University flock during the 12-year period studied.

Perhaps the easiest way to visualize the effects of each selection bases is to compute the percentage of the gains due to each one of them. The figures are:

Basis of selection	Proportion of flock	Percent of total gain
Sire's sisters	100%	19%
Sire's daughters	46	25
Dam's record	100	22
Dam's sisters	100	27
Dam's daughters	32	7
		100

It may be seen that family selection accounted for more than three-quarters of the improvement—19+25+27 and 7 per cent. At the same time, progeny testing accounted for about one-third—25 and 7 per cent.

The poultry breeder can draw his own conclusions as to whether family selection and progeny testing are worth his while.

I. Michael Lerner is Associate Professor of Poultry Husbandry and Associate Poultry Husbandman in the Experiment Station.

Methods of processing and packaging whole milk powder and ice cream mix to prevent oxidation, stalting, and browning are under investigational study.

## Oil Spray As Weed Control In Carrot And Related Crops

A. S. Crafts

Weeding is a costly and laborious operation in the growing of vegetable crops. It usually requires much hand labor.

Certain oil fractions are selective weed killers—they will kill weeds with little or no harm to the crop.

During the war, when labor was scarce, oil spraying of carrots became a common practice in Salinas and Imperial valleys and other carrot-growing regions.

### Selective Oils

Selective oils are those that contain enough unsaturates to kill the susceptible weeds but not enough to harm the more tolerant crops.

Research on the weed killing properties of oils carried on at the University Farm, Davis, explained some of the reasons why oils kill weeds, and why some oils are selective while others kill all plants, including the crop.

Certain unsaturated compounds, termed aromatics and olefins by oil chemists, are highly toxic to all vegetation. Certain plants such as the members of the carrot family tolerate much more of these than do grasses and common weeds.

Many refined oil fractions show selective properties.

Stove oil is such a weed killer in carrot and related crops but gasoline is more selective. It is more volatile and leaves less residue on the carrots. It is too hazardous to use because it is so highly inflammable.

In the East, stove oil is not produced as it is in California. There, vegetable growers experimented and found that other oil fractions, notably cleaning solvents and paint thinners, will kill weeds selectively in carrots.

Diesel fuel is too heavy, though low in unsaturates. It stays on the plants so long that both weeds and crops are killed.

### The Preferred Oil Fraction

The best fraction for killing weeds in carrots, celery, and other related crops is one that boils between 300 Deg. F. and 400 Deg. F. It should contain about 20 per cent aromatic or olefinic compounds and should have a gravity rating of 40 Deg. or above on the A.P.I. scale.

Such a fraction lacks the hazards of gasoline and is free of the heavy compounds that cause injury to carrots when they are sprayed with diesel oil. It is more selective than stove oil and being more volatile it leaves less oily residue. Such oils can be used up to within six weeks of harvest.

### Safety Index for Growers

The fraction just described corresponds closely to a solvent used by the cleaning industry and "350" thinner used in compounding paints. However, production of such solvents and thinners is not controlled with respect to those compounds that kill weeds.

The only safe method for measuring the weed killing power of an oil is the use of experimental test plots.

The growers' safest index is the recommendation of the producer backed up by the test plot experimentation.

### Selective Oil Sprays Commercially Produced

Oil refiners are interested in producing weed killers. Two oil com-

## ABSTRACTS OF NEW PUBLICATIONS

### OLIVES

California has approximately 99 per cent of the olive acreage and production of the United States. Most California olives are more probably pickled than made into oil.

The principal varieties grown in this state are the Mission, Manzanillo, Sevillano, Ascolano, and Barouni. Olives grow well in a wide variety of soil types, but commercial plantings in coastal regions, on areas poorly drained, on saline soils, or where boron is deficient, are not recommended.

Although the tree resists cold, lack of sufficient moisture, and poor soil conditions, the orchard must receive cultural care, pest control, irrigation, and fertilization. It is untrue that the olive will thrive even though neglected.

Choice of location is important. Cool, foggy weather does not favor the olive tree, and it is liable to frost injury at temperatures below 10° F. Green fruit will be damaged at about 28° F., but ripe olives will stand a somewhat lower temperature.

Olives are readily propagated from cuttings or by grafting of seedlings, a process requiring about three years before the trees can be orchard-planted. They come into bearing at about six years of age. Trees already established may be satisfactorily top-worked to new varieties.

Prospective olive growers will do well to plant only varieties known to produce well, and conform to processors' needs, in chosen localities.

The establishment and management of an olive orchard are discussed in the following circular, which also covers the botany, varieties, diseases, and pests of the fruit. This circular is now available at the College of Agriculture.

### OLIVE CULTURE IN CALIFORNIA, by I. J. Condit. Ext. Cir. 135, May, 1947. (36 pages).

### WEED CONTROL

The use of oil sprays for weeding carrots and related crops is discussed elsewhere in this page of California Agriculture. Complete information on this subject may be obtained from the publications listed below. This is the second in a series of circulars dealing with various phases of weed control which will replace Ext. Cir. 97, "Weed Control."

### OIL SPRAYS FOR WEEDING CARROTS AND RELATED CROPS, by A. S. Crafts. Ext. Cir. 136, May, 1947. (12 pages).

Companies have already introduced refined oils for killing weeds selectively in carrot crops. Other oil companies undoubtedly will market similar products in the near future.

Composition of such oils, as determined by refining methods, will be controlled. Additional safeguards to the grower will be the experimental testing of such oils until the producers are certain of the weed killing properties of their products.

A. S. Crafts is Professor of Botany and Botanist in the Experiment Station, Davis.

Plant Succession following the clearing of brush from range areas is being studied to determine the best procedure for the maximum development of forage species.

### DONATIONS FOR AGRICULTURAL RESEARCH

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

American Potash Institute, Inc.	\$4,800.00
Potash	