

California

AGRICULTURE

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

Vol. I

DECEMBER, 1947

No. 13

California Prune Industry May Face Market Adjustment

S. W. Shear and George B. Alcorn

During the next few years the California prune industry will probably go through a period of difficult adjustment largely because of the poor and uncertain foreign market outlook. Demand for California dried prunes will have to be increased or bearing acreage and average production decreased before prices can be expected that, without government support, will encourage efficient growers to maintain most of the good prune orchards in the state. During the next few years prices and overall demand for California dried prunes will probably continue to be held down: 1. At home, by keen competition from very plentiful supplies of fruits and popular fruit products; 2. Abroad, by considerably lower commercial demand and imports for our prunes than prevailed before the war, particularly in European markets.

Prune orchards with old and low-yielding trees, producing fruit of poor quality and small size, will probably be unprofitable again as before the war. Owners of these poor prune orchards should, therefore, give careful consideration to replacing them with other crops to which their land is adapted and for which better returns might be expected in the long run than from prunes. However, growers with good-sized fruit probably should not replace their prunes with other crops unless they are convinced that by so doing they can increase their returns significantly during the next 10 or 15 years. There is some probability, although no absolute assurance, that reduction in prune acreage and production within the next five years may more than offset the expected low level of domestic demand and of decreased exports, so that the supply and demand for California prunes may come into balance at prices that will give efficient growers with good orchards as

(Continued on page 2)

Beet By-products In Mixed Rations As Livestock Feed

The sugar-beet industry offers two important by-products to the livestock industry: sugar-beet tops and siloed beet pulp. Both of these by-products are recognized as important feed resources. Their utilization is of mutual interest to livestock raisers and sugar-beet growers.

Sugar-beet tops harvested and siloed or stacked may be successfully used for fattening cattle or lambs, wintering pregnant ewes, or feeding dairy cattle when fed in mixed rations, they yield 150 to 250 pounds of beef or lamb per acre, two or three times as much as when tops are pastured.

Siloed beet pulp contains 76.4 per cent total digestible nutrients on a dry basis. The addition of molasses to the siloed pulp has been found to improve feeding efficiency.

These large food resources, if properly used, not only might promote an increased production of animal products, but also might increase the productive and economic stability of the beet-growing and sugar-manufacturing industries. Results of research on means of conserving and utilizing these sugar-beet by-products are presented in a new bulletin published by the College of Agriculture. (See page 4).

Research On Granulation Of Valencia Oranges Shows Only Limited Control Measures Exist

E. T. Bartholomew, W. B. Sinclair and F. M. Turrell

Granulation of Valencia oranges is not caused by a fungus, a virus, or a bacterium. It is definitely related to the growth activity of the tree and fruit.

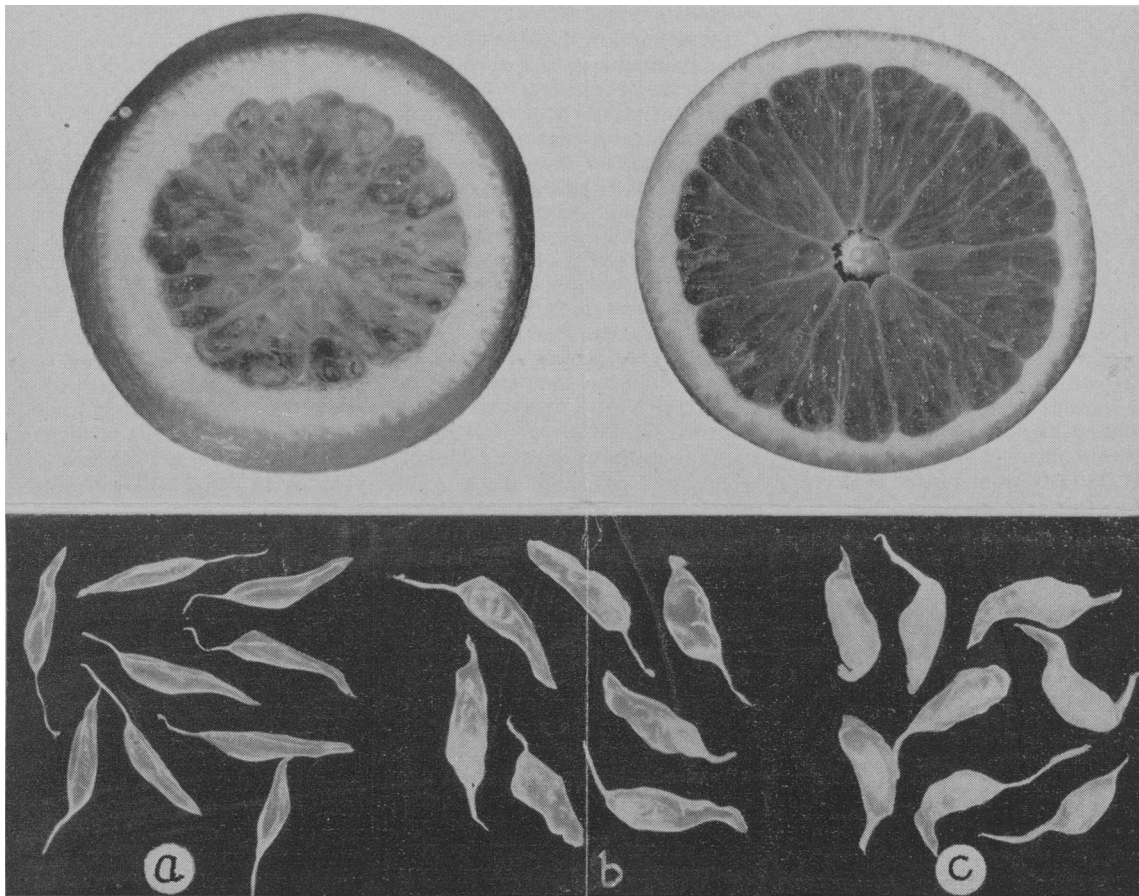
Since 1930 over 200,000 Valencia

Rough lemon rootstocks produced the most granulation—34% for the first, and 31% for each of the others—while Sampson tangelo produced the least—10%.

At Riverside a four-year average

In each case the percentage of granulation produced on the wet plots was a little over twice that produced on the dry plots.

Lime spray at 50 pounds per 100 gallons reduced the amount and sev-



Granulation in a Valencia orange. ABOVE LEFT: Granulation shown in a cross section of the stem end. ABOVE RIGHT: Cross section of the same fruit cut near the center, with no indication of granulation. BELOW: Showing (a) healthy juice sacs; (b) moderately granulated sacs; and (c) badly granulated sacs.

oranges—from approximately 2,000 trees in 75 groves—have been examined in studies to determine causes and possible means of control of granulation.

The cutting of a total of 61,900 fruits over a period of seven successive years showed the following percentages of fruits of different sizes to be granulated:

Fruit Sizes	Per cent granulated
100's	79
150's	54
200's	33
288's	18
344's	7

Over a period of nine successive years the cutting of 72,145 fruits showed 60 per cent to be slightly granulated, 25 per cent moderately so, and 14 per cent badly granulated.

Under these classifications slightly granulated fruits come within the tolerance limit set for high grade fruits. At least a large portion of the moderately granulated fruits can be shipped in an "off-brand," but badly granulated fruits have to be discarded or sent to the products plant.

Field Studies

Valencia orange trees were started on nine different rootstocks with buds from the same parent tree. Half of the trees were planted at Tustin, for the coastal area, and the other half were planted at Riverside, for the interior area.

At Tustin, a three-year average showed that the trees on Brazilian sour orange, trifoliate orange, and

revealed that the trifoliate orange and the Rough lemon were noticeably the two highest producers of granulation—37% and 24%, respectively—while C. E. S. 343 grapefruit produced the least—3%.

The average amount of granulation produced by all rootstocks was 26% at Tustin and 14% at Riverside. The percentages given here are relatively high because only large fruits were examined.

Some trees in a given grove constantly produce little granulation, others produce much granulation, while still others may produce little granulation one year and much the next.

Fruits on the north side of the tree are more likely to be granulated than those on the south side.

Freezing temperatures may cause an increase in the amount of granulation in some individual fruits but low temperatures are not the direct cause of granulation.

Scaly bark does not cause granulation. A scaly-bark tree that produces much granulation does so because it had done so previously.

Over a period of years the soil in certain "dry" plots was kept just above the wilting point in the fourth foot while adjacent "wet" plots were kept above the wilting point in the first foot.

After a time the water applications were reversed, the dry plots became wet plots and the wet plots became the dry plots.

erity of granulation about half. This treatment is not recommended because the treated trees lost excessive amounts of leaves during the fall winds.

During a period of seven years, oil sprays were found to augment the amount and severity of granulation. Their use should be avoided where possible.

HCN—hydrogen cyanide—tested at the same time, did not affect the production of granulation.

(Continued on page 4)

Poultrymen May Have More Market Competition Ahead

E. C. Voorhies

California does not produce enough eggs to keep up with the demand.

We must ship in eggs from other states. This puts the local producer in a favorable position because he gets a better price, and the consumer gets better eggs. The top quality ones are no longer shipped to eastern markets. Our in-shippments, on the other hand, do not come only from the Western states, as formerly, but in increasing numbers from those farther east, mainly the Mississippi Valley.

People have now developed a taste for good eggs. This taste was encouraged by wartime emphasis on eggs as a protective food, plus the fact that meats were rationed and were relatively higher in price. The buyer still wants, and has the money to buy, good eggs. It is up to the poultryman to see that he gets them.

If the producer keeps the quality up, people will continue to eat more eggs. If quality drops, consumption and prices will go down.

Changed Market Conditions

If domestic consumption is lowered, the poultryman cannot count on foreign exports to take up the surplus. Europe, the chief wartime market, cannot afford to import eggs now, and we no longer have lend-lease and large military demands for them. During the war, large quantities of eggs were dried for overseas shipment. Dried egg production, largely carried on in the middle west, has now taken a big drop, which means more midwestern eggs for domestic markets. Good quality, continued good advertising, and good prices as compared to meat can help keep the demand for eggs at a high level.

Over a period of years, the number of shell eggs being held in storage has been going down. This is an advantage for the producer during the fall and winter months because his fresh shell eggs do not compete directly with the cold storage ones.

California now does not have a corner on new production methods. At one time, the state could send out eggs between October and February—the period of low production in other sections of the country. But poultrymen in other states, especially our chief competitors in the Mississippi Valley, have also developed improved management practices so that they do not have such big gaps between laying periods. This means that there is less difference between the year's highest and lowest egg prices. This

(Continued on page 2)

Ladybirds, Lacewings, Parasites Tested As Long-tailed Mealybug Controls In California Citrus

Paul DeBach and C. A. Fleschner

The long-tailed mealybug, *Pseudococcus longispinus*, is a relatively recent pest of citrus and occurs principally in coastal areas of Orange, Los Angeles, and Ventura counties.

The first minor outbreak of the long-tailed mealybug was found on citrus in 1933 in the Rivera-Downey section of Los Angeles County. Parasites were introduced to combat this pest and it was generally thought they were keeping the mealybug in check.

In 1943 another build-up of the long-tailed mealybug occurred on citrus; this time in the Anaheim area of Orange County. This infestation

increased in area in 1944 and 1945 until perhaps 1,000 acres were infested to a greater or less economic degree.

Coastal areas of Ventura County were experiencing similar increases in long-tailed mealybug populations on citrus during this same period.

Studies Started

Studies started late in 1945 were designed to determine why the mealybug was increasing.

During 1946 and 1947 detailed population samples of the long-tailed mealybug and all its natural enemies have been taken monthly. At the

(Continued on page 3)

Summary Of Study Of Granulation Of Valencia Oranges

(Continued from page 1)

To determine whether granulation might be avoided by the proper selection of buds, trees on both sweet and sour orange stock were started in 1934 and 1935.

The buds for these trees were taken from parent trees known to be either high producers or low producers of granulation. The parent trees were then cross topworked.

The fruits on the specially budded trees and the topworked trees were examined each year from 1941 to 1946, except in 1943.

The results of this experiment combined with those of the other field studies mentioned, indicate that there is not much immediate hope of developing a "strain" of Valencia that will not produce granulated fruits.

Laboratory Studies

Laboratory studies showed that:

a. The volume of a granulated juice sac may increase until it is two to three times that of a healthy juice sac;

b. A granulated juice sac may be 20 times as hard to crush as a healthy juice sac;

c. The walls of the cells in the granulated juice sac may increase to many times their usual thickness;

d. Gas bubbles which form in granulating juice sacs look like crystals, and it was probably for this reason that in the past the affected fruits were said to be crystallized;

e. During the process of granulation the affected juice sacs lose or use up almost one half of their sugars;

f. The badly granulated juice sacs have lost about 70% of their acid;

g. Granulation does not materially change the nitrogen content of the juice sacs;

h. During granulation the total pectin content of the affected sacs is almost doubled;

i. Although not much juice can be reamed from the badly granulated portion of the fruit, the granulated juice sacs actually contain a little higher percentage of moisture than the healthy sacs;

j. Based on equal weights of granulated and healthy juice sacs the increase in dry weight of the granulated sacs was not over 3%, but when determined on a size basis of individual sacs the increase was at least 200%; and

k. Inorganic substances, such as calcium, magnesium, sodium, and potassium—especially calcium and magnesium—accumulated in excessive amounts in the granulated sacs.

Control Measures Inadequate

Unfortunately no adequate control measure has been discovered. Granulation has been reported from 13 foreign countries, but none of these countries has suggested control measures by means of which it can be avoided.

Any factor that will affect growth, such as climate, amount of soil moisture, oil sprays, and rootstocks, will influence the amount of granulation produced.

The nearest approach to a control measure in California is to pick the large fruits early, especially on the north and inside of the trees. The longer the fruit remains on the tree the more likely it is to become granulated.

As a rule, young groves and groves on light soil should be watched most closely.

Limited tests in Orange County have shown that the amount and severity of granulation may be noticeably diminished by reducing to a practical minimum the amount of irrigation water applied.

It is recommended that when starting new Valencia trees all buds be taken from trees that were known to be low producers of granulation when they were young trees.

E. T. Bartholomew is Professor of Plant Physiology, Plant Physiologist in the Experiment Station, Riverside.

W. B. Sinclair is Associate Biochemist in the Experiment Station, Riverside.

F. M. Turrell is Assistant Plant Physiologist in the Experiment Station, Riverside.

Mimeographed copies of this article in slightly greater detail may be obtained, without cost, through the Farm Advisor's office in counties where citrus is grown.

INDEX

Volume 1, December 1946, to December 1947, Inclusive

With the exception of Vol. 1, No. 1, December 1946, which is out of print, a limited supply of each issue of CALIFORNIA AGRICULTURE is available. Requests for back numbers will be filled, without charge, so long as the supplies last. Address all requests to CALIFORNIA AGRICULTURE, 331 Hilgard Hall, University of California, Berkeley 4, California.

ACORN CALVES

Nutritional deficiencies in dams
Feb., page 2.

AGRICULTURAL OUTLOOK

As of Dec., 1946
Jan., page 1.

In mid-1947
Oct., page 1.

ALFALFA

Costs of mechanized harvesting
Aug., page 1.

Lygus bug injury on growth of,
March, page 3.

ALMONDS

Tunnel type drier
July, page 3.

ARMILLARIA ROOT ROT

Control in citrus
July, page 1.

AVOCADO

DDT dust with sulfur for greenhouse thrips
May, page 1.

Tree decline
Dec., 1946, page 3.

BACTERIAL CANKER

Stone fruits on peach root resist
Sept., page 1.

BEES

As pollinizers
April, page 4.

Spring management
March, page 1.

BORON DEFICIENCY

Readily supplied
Jan., page 3.

BRANCH WILT

Persian walnut trees
Sept., page 3.

BRUCELLOSIS

Control of bovine
Jan., page 3.

Effect on reproduction in swine
July, page 4.

BUTTER

Carotene as coloring agent
Nov., page 2.

BUTTERFAT

Vitamin A content
June, page 1.

CAROTENE

Coloring agent for butter
Nov., page 2.

CARROTS

Oil spray as weed control
June, page 4.

CATTLE

Abortion, Trichomoniasis
Oct., page 1.

Acorn Calves
Nutritional deficiencies in dams
Feb., page 2.

Beef

Nutrients for,
Dec., 1946, page 2.

Supplemental feed
Sept., page 4.

Bovine Brucellosis
Jan., page 3.

Dairy

Hybrid vigor by crossing in breed
April, page 1.

Mastitis
One type controlled successfully
Dec., 1946, page 4.

Water intake
Sept., page 3.

High temperatures
Effects of,
March, page 3.

Scab

Control of,
March, page 3.

CECAL COCCIDIOSIS

Sulfaguanadine as control
July, page 1.

CHEMICAL FERTILIZATION

Nutritional value of plants
Feb., page 3.

CHERIMOYA

Hand pollination of,
July, page 2.

CITRUS

Armilaria root rot
July, page 1.

Cost study in Orange County
Oct., page 1.

Fertilization
Differences in Florida and California
Aug., page 4.

Fruits
Small size
Nov., page 1.

Long-tailed mealybug
Control studies
Dec., page 1.

Mites
New chemicals for control
July, page 3.

Thrips
Control of,
April, page 1.

Valencia Oranges
Rind spot and drop,
Nov., page 2.

CODLING MOTH

Control of, on apples and pears
Feb., page 3.

On the Payne Walnut
June, page 1.

COLLEGE OF AGRICULTURE

University president discusses work
Dec., 1946, page 1.

CONSERVATION

State, federal and interstate roles
April, page 1.

COTTON GROWING

Mechanization
March, page 1.

DAIRY INDUSTRY

Economic outlook
Feb., page 1.

Research
Sept., page 1.

Seven new projects
Dec., 1946, page 1.

DEHYDRATION

Almonds
Tunnel type drier
July, page 3.

Fruit
New methods developed
Dec., 1946, page 3.

ECONOMIC OUTLOOK

As of Dec., 1946
Jan., page 1.

Dairy industry
Feb., page 1.

In Mid-47
Oct., page 1.

Prune Market
Dec., page 1.

EGGS

Family selection and progeny testing
June, page 4.

ENZYMES

In commercial processing
Jan., page 4.

EVOLUTION

Study of, aided by research
June, page 3.

FARM

Income Reflected
Dec., page 2.

Leased lands
Sept., page 1.

Soil Surveys
Dec., page 2.

FERTILIZER APPLICATION

Liquid manure
Nov., page 1.

FORAGE GRASSES

Improved, in field trials
March, page 1.

FOREIGN TRADE

Farm products affected by,
Nov., page 1.

FROZEN MEAT

Pretreatment of,
June, page 2.

Wax-wrap for,
July, page 2.

FRUIT

Dehydration
New methods developed
Dec., 1946, page 3.

Handling
Storage, shipping and precooling of
stone fruits
Aug., page 1.

Propagation
Methods of plant,
May, page 4.

Storage
Vapors in, of avocados and citrus
Aug., page 1.

FUNGICIDES

Row crop seeds, decay or damping-off
Oct., page 4.

GENUS CREPIS

Research aided by study,
June, page 3.

GRAIN

Dryness protects farm stored,
July, page 1.

GRANULATION

Valencia Oranges
Dec., page 1.

GRAPEFRUIT

Rootstocks for Marsh
May, page 3.

GRAPES

Improving quality
April, page 1.

Raisins improved by harvesting
Sept., page 1.

GRASS

Forage
Improved, in field trials
March, page 1.

Sudan
Sweet Sudan and Sudan 23
April, page 3.

GREENHOUSE THRIPS

DDT dust with sulfur on avocados
May, page 1.

HEAT-EXPANDED MINERALS

Aids in plant propagation
Sept., page 4.

HERBICIDES

See "Weed Control"

HOGS

Cull limas protein source
Feb., page 3.

INSECT

Pests
Control of, by disease agents
May, page 2.

INSECTICIDES

DDT
Control of peach twig borer
May, page 1.

In livestock industry
Jan., page 1.

Residue from pears and apples
Jan., page 2.

With sulfur for greenhouse thrips
May, page 1.

Internal injuries to plants
July, page 1.

New, for control of citrus mites
July, page 3.

New, for pest control
Sept., page 2.

Plane
Spraying by
Oct., page 3.

IRRIGATED PASTURES

Favorable to livestock parasites
Feb., page 1.

For grazing lambs
Sept., page 1.

IRRIGATION

Extra, in prune production
May, page 1.

Infiltration rates into Yolo loam
Oct., page 1.

Underground water supply
Aug., page 2.

J

K

L

LAMBS

Grazing, on irrigated pasture
Sept., page 1.

LEGUMES

Fertilized, aid following crop
Aug., page 1.

LIMA BEANS

Freezing qualities
March, page 4.

Protein source for hogs
Feb., page 3.

LIVE OAK TREES

Tip mildew
Nov., page 4.

LIVESTOCK

DDT in the, industry
Jan., page 1.

Poisonous range plants
Feb., page 2.

LYGUS BUGS

Control with DDT dusts
April, page 4.

Injury to growth of alfalfa
March, page 3.

MANAGEMENT

Bees
Spring
April, page 4.

Grapes
Improving quality
April, page 1.

Redwoods
Second growth
April, page 3.

Shot-hole borer control
Nov., page 1.

MARKET

Poultry, competition
Dec., page 1.

Prune Outlook
Dec., page 1.

MASTITIS

One type controlled
Dec., 1946, page 4.

MEAT

Frozen
Pretreatment and wrapping
June, page 2.

Wax-wrap
July, page 2.

MELOLAND FIELD STATION

Expansion of,
Dec., 1946, page 1.

MICRONUTRIENT CHEMICAL

Application of, to crop
Feb., page 4.

MILK

Cans
Electric sterilizer tested
Aug., page 3.

Color
Improved in evaporated milk
Oct., page 4.

Handling
Bulk, by ranch-to-factory system
Oct., page 1.

Powder
Processing, for particular uses
June, page 1.

N

NITROGEN

Needs of orchards
Feb., page 1.

NUTRIENTS

Cattle
Beef
Dec., 1946, page 2.

Supplemental feed
Sept., page 4.

NUTRITION

Deficiencies and "Acorn Calves"
Feb., page 2.

Poultry research
Dec., 1946, page 3.

NUTRITIONAL

Value of plants
Not lowered by chemical fertilization
Feb., page 3.

O

OIL FRACTIONS

Toxic effect on plants
Sept., page 2.

OLIVE CULTURE

New program of research
March, page 1.

ORANGES

Drop
Plant growth regulators
June, page 1.

Quick decline believed virus disease
Jan., page 1.

ORIENTAL FRUIT MOTH

Control
Dec., 1946, page 2.

P