

# California

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## Stone Fruits On Peach Root Resist Bacterial Canker

Leonard H. Day

Stone fruit growers should consider the use of peach roots in areas where bacterial canker—commonly known to growers as Sour Sap and bacterial gummosis—is a major problem.

To be considered are the compatibility of the peach root with the desired fruit variety and whether the soil and other conditions prevailing are favorable.

### Bark Cankers

The most conspicuous phase of the disease is the development of bark cankers on scaffold branches or on the trunks above the graft unions, with or without copious exudation of gum.

When a branch or trunk is completely girdled by the disease the parts above soon wilt and die.

That type of the disease without copious gumming is commonly called Sour Sap by the growers.

The cankers do not progress downward more than an inch or two below ground, and the infections seldom begin in the rootstocks.

In case of susceptible rootstocks, and with the graft union well above

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## Leased Farm Lands In California Now Less Than In 1940

Arthur Shultis

Extract of talk given before the California Chapter, National Institute of Farm Brokers, Davis, June, 1947.

Much of California's leased land, particularly rice, grain, and grazing land, is farmed by part-owners who own farms and lease additional land.

Tenants who lease all the land they farm, declined from 19% of our total farm operators in 1940 to 12% in 1945.

In 1940, 41% of our total land in farms was rented and this declined to 34% in 1945—the lowest since 1925.

### Decline In Leasing

The decline in leasing is the result of good farm incomes during the war years, which enabled more farmers to buy their farms or to buy additional land that was formerly rented.

Farms formerly held by financial institutions and rented temporarily have practically all been sold to farm operators.

The relocation of Japanese farmers in 1942 may also have contributed somewhat to this decline in tenancy.

There also has been considerable purchase of California farms by newcomers and new farmers from other occupations.

### Land Values Leveling Off

It is probable that leasing of farm lands in California is at its lowest point for some time.

Land values are about at their peak and are expected to decline somewhat with the expected decline in prices of farm products. Buyers will wait in a declining market.

Some of the farms recently purchased may become distressed through heavy indebtedness or improper operation and come back in the market for sale or leasing.

Even with some decline, land values will remain high and young farmers will find it easier to rent rather than to buy.

### Leasing Worthwhile

As practiced in California, leasing of agricultural land is a worthwhile device for the gradual transfer of

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## Yield And Quality Of Raisins Improved By Harvesting When Grapes Are At Full Ripeness

H. E. Jacob

The most advantageous time to pick raisin grapes for sun drying represents a compromise between two considerations: (1) The larger yields and better quality obtained from

whereas at 24° Balling, 547 pounds may be expected—a difference of 91 pounds, or 20%.

In California the average yield of Thompson Seedless grapes is about

Well-ripened grapes not only give greater yields of raisins than unripe grapes, but the quality of the raisins is also better.

It can be said for natural sun-dried



Turning grapes on wood trays. An empty tray is placed upside down over a full one, then both are "flipped" over as illustrated. (Photo by Laval)

well-ripened fruit, and (2) The more favorable drying conditions early in the season.

The main constituents of ripe grapes are water and sugars. Other substances—acids, cream of tartar, proteins, fats, minerals, aromatic compounds, fiber and other insoluble materials—are present in smaller amounts.

Water constitutes 70% to 80% of the grape. Sugars, mainly dextrose and levulose constitute about 15% to 25%. As maturity of the grapes advances the sugar content increases, and the water decreases.

When grapes are dried into raisins, from 90% to 95% of the water in the fresh fruit evaporates, but nearly all of the sugars and other solid materials remain in the raisins.

Dry raisins contain only about 15% water, and from 62% to 72% sugar according to the variety of grapes and the method of drying used in making the raisins.

### Sugar Content and Yields

The approximate sugar content of fresh grapes is usually measured by means of an hydrometer test of the juice pressed from the fruit.

The hydrometer—Balling or Brix—is calibrated to read "per cent sugar," but since all dissolved substances affect the reading, the result is more properly termed "degree Balling" or "degree Brix" or per cent soluble solids. It is always from one to two degrees higher than the true sugar content of the grape juice.

Grapes are usually harvested for raisins when the juice tests somewhere between 20° and 24° Balling.

A ton of fresh Thompson Seedless grapes at 20° Balling will make 456 pounds of natural sun-dried raisins,

6.5 tons of fresh grapes per acre.

If the grapes were harvested at 24° Balling, the yield of raisins from an average acre of vineyard would be about 591 pounds greater than if they were harvested at 20° Balling—the difference of 91 pounds multiplied by the average yield of 6.5 tons.

At the 1942 raisin price level of \$113.00 per ton—the \$312.00 price of 1946 is now only a memory—the increased yield would be worth about \$33.39 an acre.

### Drying Time

As the season advances, the days become shorter, the temperature becomes lower, and occasional damaging rains are more probable.

At Fresno, the mean temperature for August is about 79.5°F; for September, 72.0°; and for October, 62.3°.

Average Thompson Seedless grapes will dry in about 12 days with a mean daily temperature of 80°F; but at 70° about 20 days are required. At 60° about 40 days are needed for drying. These figures apply only to the natural sun-drying process. Dipped grapes dry more rapidly. Muscat grapes require about a half-longer time to dry than Thompson Seedless.

Thompson Seedless grapes picked in early September may be expected to dry in two to three weeks. Those picked in late September are likely to require four to six weeks, and any grapes picked in October are likely to be damaged by rain if they are sun-dried.

In the 24 years of 1913 to 1946, inclusive, the earliest rain apt to cause serious damage to raisins in the Central San Joaquin Valley, occurred on September 19, 1939. Eight of the 34 years had rain by September 30th and 14 years had rain by October 10.

raisins not damaged by rain, that the riper the grapes the better the quality of the raisins.

Raisins made from grapes of less than 20° Balling, are nearly always inferior or substandard in quality. Raisins made from grapes of 21° to 23° Balling, are usually of average or standard quality. Those made from grapes over 23° Balling, usually are of superior quality.

Raisins dried by other processes, such as "golden bleached," do not always follow the rule for naturals that the riper the grapes the better the quality of raisins. In "golden bleached" raisins, the color of the raisins assumes great importance, and overripe grapes which may have some partially dried berries will produce raisins of nonuniform color.

For such raisins, a uniform yellow color of the fruit is probably the best index of maturity, so far as quality of the raisins is concerned.

Yields of "golden bleached" raisins follow the degree Balling of the fruit, not the color.

### General Rules

On the basis of the information now at hand, several general rules regarding the time to harvest raisin grapes may be formulated:

(1) Grapes of less than 20° Balling should not be dried for raisins except as a salvage operation to avoid loss.

(2) Grapes for natural sun-dried raisins should reach 23° or 24° Balling, if such maturity can be attained by September first or soon thereafter. Picking should start soon after the grapes reach 23° Balling or September first, whichever is the earlier.

(3) All Thompson Seedless grapes for natural sun-dried raisins should

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## Suggestions For Grazing Lambs On Irrigated Pasture

Robert F. Miller

The fattening of lambs on irrigated pastures is not without its problems.

There have been some heavy losses due to a feed reaction when lambs were first turned into rich clover fields, trouble from parasites, particularly coccidiosis, from overstocking and possibly from bloat.

### Suggestions

Experience in the handling of lambs on irrigated pasture is important.

Following are a few helpful suggestions in grazing lambs on irrigated pastures:

(1) Provide ample forage at all times. Do not overstock—10 to 12 lambs per acre is generally about right.

(2) Thrifty, fleshy feeders averaging about 70 pounds do best. Thriftiness is more important than size.

(3) Maturity of forage is important. Clover blossoms are high in nutritive ingredients. Short, immature clover lacks fiber for proper digestion and is also low in nutrients.

(4) In rotation grazing, change fields frequently. Keeping the feed uniform eliminates feed reaction.

(5) Sort lambs at the end of two

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## Present and Future Research In Dairy Industry Problems

The following abstract is from an address given before the Quarterly Meeting of the Dairy Institute of California at Eureka, August 21, 1947, by E. L. Jack, Chairman of the Division of Dairy Industry, College of Agriculture.

Now under way in the Division of Dairy Industry are technological researches endeavoring to improve processing techniques in the following products: control of flavor defects in market milk, processing methods to improve the nutritive value of cottage cheese, the use of carotene as a coloring agent for butter, the improvement of flavor and color in evaporated milk, improved processing methods for dry milk, the control of physical defects in ice cream, and the correct usage of water softening and cleansing agents.

### New Basic Knowledge Sought

In addition to the above researches on specific dairy products we are seeking new basic knowledge with respect to the effect of heat on milk proteins, the chemistry and nutritional value of milk fat, the nature and mode of action of milk enzymes, and the chemistry and interaction of lactose and the milk salts and proteins.

### Cooperative Studies

In cooperation with the Department of Home Economics studies are being made of the food uses of milk proteins, particularly dry milk.

With the Division of Agricultural Engineering we are studying the bulk handling of milk from ranch to factory.

The Division of Animal Husbandry and the Division of Dairy Industry are cooperating on problems of animal physiology related to milk quality.

The Division of Chemistry is cooperating on physico-chemical problems in frozen dairy products.

Cooperative studies with the Division of Poultry Husbandry are being made of the problems in food acceptance and nutritional values.

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## Stone Fruits On Peach Root Resist Bacterial Canker

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ground, the infections occasionally begin below the graft union.

### Less Serious On Peach-rooted Trees

Observations extending over 25 years show that apricot, plum and prune trees on peach roots have considerable resistance to the disease.

In Kings County in 1919 bacterial canker was observed to be confined largely to apricot on Myrobalan roots and was much less injurious when the apricots were on peach roots. The frequency of infections on apricot roots was intermediate between those on Myrobalan and on peach.

One affected orchard had trees on all three roots under identical soil conditions.

Since then this same order of frequency of infection of apricot trees on the three stocks has been observed many times throughout the Sacramento and the San Joaquin Valleys.

In San Benito County it was observed to be more common on Myrobalan-rooted apricot trees than on those of apricot root but there were no apricot trees on peach roots for comparison.

The disease occasionally affects French prune trees and many times it has been observed that whenever they are on both Myrobalan and peach roots under identical soil conditions it is less serious on peach-rooted trees.

### Peach Top-worked To Plum

During experimental control work in Placer County it was noted that the disease on plum trees was much less common when on peach roots, particularly when the plums were top-worked high upon peach varieties.

Several growers who noted that certain peach varieties were seldom injured by bacterial canker have planted the varieties on peach seedling roots and after they had grown in the orchard for three or four years, top-worked them to the desired plum varieties.

Salwey is the peach variety most favored for this work. Some of the trees on Salwey are now up to 16 years of age and have been practically free from the disease.

In the fruit districts of Placer County are many instances of peach orchards that were top-worked to plums many years ago and the disease is conspicuously less severe in these than in adjacent plum trees on Myrobalan roots.

**Susceptibility of Varieties**  
Peach seedlings are usually more resistant than Myrobalan seedlings and Marianna plum but are not uniformly free from the disease.

Susceptible plum varieties top-worked in the orchard upon Myrobalan seedlings and upon Marianna plum are perhaps not more free from the disease than are those worked at the ground on these same stocks.

Santa Rosa, Duarte and President plums are particularly susceptible to the disease, whereas Kelsey and Beauty are seldom injured, regardless of the rootstocks upon which they are growing.

### Scion Roots

Many years ago it was noted in orchards in Placer County that Santa Rosa and Duarte plums, originally planted on peach roots, had grown strong plum scion roots above the unions.

Such trees were more susceptible to bacterial canker in the scaffolds and trunks than were those trees which remained entirely on peach roots.

One grower was furnished with 30 Santa Rosa trees grown on their own roots by cuttings and by layering. The trees were used as replants in a Santa Rosa orchard on Myrobalan roots in which the disease had been killing trees over a period of many years and in which replanting with Santa Rosa on peach roots was commenced.

The own-rooted Santa Rosa trees grew well but were very subject to bacterial canker. Three years after the planting was made, all of the own-rooted trees had been killed by the disease and only a small number of the replants on peach roots had been injured.

Nine years ago one grower cut off the scion roots of Santa Rosa and Duarte trees which were originally

# Branch Wilt Of Persian Walnut Trees Resulting From The Fungus Which Attacks The Bruised Bark

E. E. Wilson

A branch wilt disease affecting Persian Walnuts in California was first noticed about ten years ago in the southern San Joaquin Valley. Probably it was present in the Sacramento Valley at the same time.

Within the past five or six years it has become a major disease of certain walnut varieties throughout the central valleys.

The outer branches — not the limbs or the twigs nor the entire tree — are commonly affected. For

branch wilt was found in Amador, Lake, and Contra Costa counties. No reports of the disease were received from southern California nor from the counties of Sonoma, Napa, Alameda and Santa Clara.

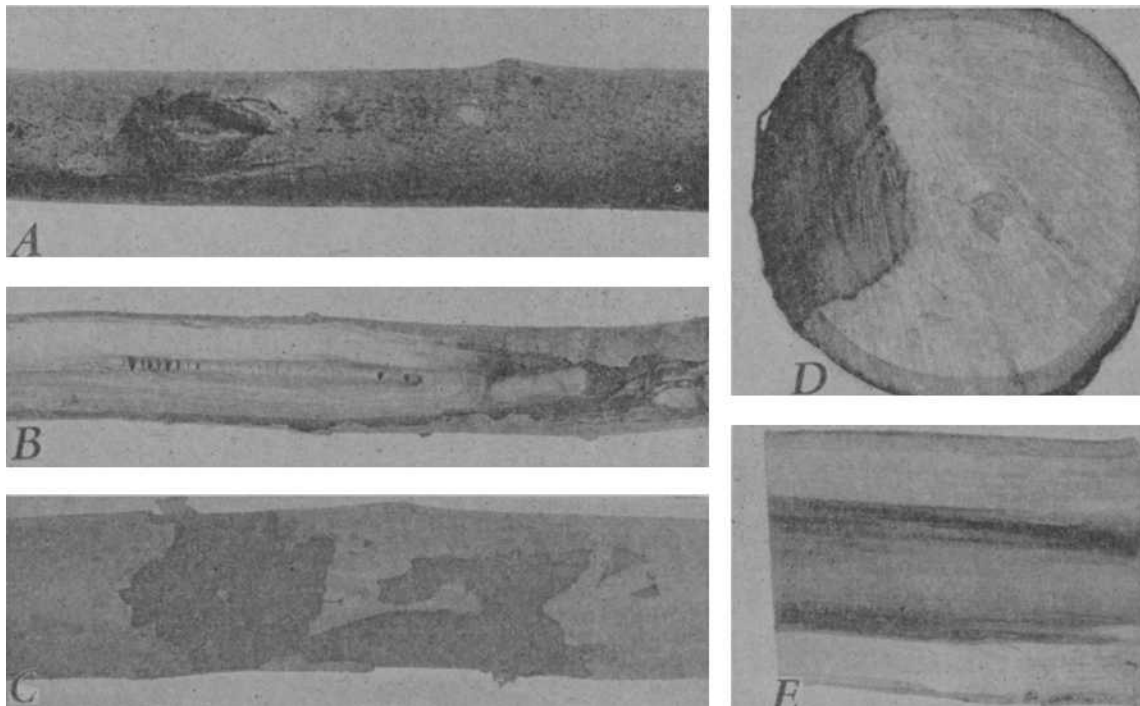
### Relationship To Tree Vigor

Unthrifty trees are noticeably more subject to infection by branch wilt than vigorous ones. For examples, trees weakened by Armillaria root rot or crown canker contract the disease more quickly and become involved by

Sometimes it starts at a sunburned spot or around an injury made by the hooks or poles in harvesting.

Wood underlying the diseased bark is discolored to a dark gray and black. The discoloration in the wood often extends up and down the branch beyond the area of dead bark. Elements of the diseased wood are filled with a dark brown substance.

A noticeable feature of diseased branches is the loosening and sloughing away of the outside layer of



The bark and wood of wilt affected walnut branches. (A) A wound, probably made by a harvesting hook, surrounded by a branch wilt canker. (B) Grayish discoloration of the wood in a branch recently killed by branch wilt. (C) Periderm sloughed away exposing the cortex, which is covered by a sooty layer of fungus spores. (D) A diseased area extending into the wood from one side of a branch. (E) Black discoloration extending through the heartwood of a diseased limb.

that reason the disease is usually referred to as "branch wilt."

### Varieties Attacked

Franquette and Mayette are the varieties chiefly affected by branch wilt, though Payne, Eureka, Meylan, Blackmer and Bijou are attacked.

The Concord appears to possess some resistance.

### Localities Infested

Branch wilt is common in the San Joaquin and the Sacramento valleys in both orchard plantings and on trees bordering roadsides and fields.

It is most prevalent in Tulare County and along the Sacramento River in Colusa, Glenn, Butte, and Tehama counties.

In the important walnut districts of Sutter, San Joaquin and Merced counties, branch wilt was not found though it is present in other sections of these counties.

Outside the interior valleys, the

planted on peach roots. This treatment has apparently prevented further serious injury though the disease is continuing to kill trees in adjacent orchards.

The grower reports that scion-rooted Santa Rosa trees are not as fruitful as those remaining on peach roots nor is the fruit so large.

Several other growers are so convinced of the good results accruing from cutting off scion roots in this orchard that they are adopting the practice with trees in which the scion roots have not become too large.

Leonard H. Day is Associate Pomologist in the Experiment Station, Davis.

Cotton planters, blockers, both mechanical and flame, and mechanical harvesters are being studied by the Division of Agricultural Engineering.

Research on mastitis, anaplasmosis, brucellosis, and keratitis in cattle is under way in the Division of Veterinary Science.

Studies to promote greater usage of non-fat dry milk solids are being conducted by the Division of Dairy Industry.

Walnut limb wilt, leaf scorch, crown rot, and black line are being investigated by the Division of Plant Pathology.

a more severe form of branch wilt than do thrifty trees.

In one orchard in Tehama County, eleven trees were sparse in foliage and obviously weak. At least three had been attacked by Armillaria root rot, while the rest bore symptoms of crown rot. During the 1945 season, branch wilt killed 88 branches in the weakened trees, but only 25 branches on a corresponding number of the surrounding vigorous trees.

Roadside trees which border unirrigated fields, and are subject to low soil moisture during the summer, are sometimes affected by branch wilt while nearby trees in irrigated orchards are free of the trouble.

One case in particular involved a small orchard of Franquette trees that were visibly suffering from lack of soil moisture. Wilted branches were numerous in these trees. In a well-cared-for Franquette orchard across the road, no branch wilt occurred.

### Relationship To Sunburn

A relatively high proportion of cankers appear around areas of bark that have been injured by sunburn.

Sunburning is believed to account for the fact that sometimes there are two to three times as many wilted branches on the south side of the trees than on the north side.

### Relationship To Tree Age

Young walnut orchards that have received proper care usually are less affected by branch wilt than are older orchards.

This seems to hold true of trees up to the age of ten or even fifteen years. On the other hand, some young replants in affected orchards have shown severe symptoms of branch wilt.

### Symptoms

During July and August the leaves on the outer branches suddenly wither and turn a deep brown color but remain attached to the twigs.

Once established in the outer branches, the branch wilt proceeds into the limbs and within a few years may involve most of the treetop. When this occurs, certain limbs are killed outright. Other limbs are so weakened they develop sparse, sickly foliage and eventually die.

The bark on a branch affected by wilt is dead and discolored. The area of dying bark commonly originates on the upper side of the branch.

bark. This exposes large areas of inner bark tissues covered by a dark brown to black powdery deposit which is composed of numerous fungus spores.

### Fungus Isolated From Affected Branches

In about 200 examinations of specimens collected at various places, the dark-spored fungus was present in the bark and wood of over 90 per cent of recently wilted branches.

The black spore deposit beneath the branch surface bark usually is present when the branch wilts and thus the association of this fungus with the external symptoms of the disease is readily established.

### Trees Killed By Inoculation With The Fungus

Experiments revealed trees inoculated with fungus spores during January, February, March or April did not produce symptoms of branch wilt as did those trees inoculated in June and July.

Young Mayette and Franquette trees were killed within 19 to 30 days after being inoculated in July.

Older trees inoculated in July, showed the sudden wilting of the foliage that occurs on naturally infected branches.

### Control Measures Sought

In an effort to develop control measures the following investigations are under way: 1) Testing the resistance to wilt of strains of Mayette and Franquette varieties; 2) Pruning and fertilizing the trees to increase their vigor; 3) Spraying the trees with suitable fungicides such as bordeaux mixture 16-16-100; 4) Injecting diseased trees with chemicals — sodium bisdithio-carbamate, oxyquinoline benzoate, and p-nitrophenol at various concentrations — which are poisonous to the fungus in the tissues; 5) Removal and destruction of diseased branches from the trees. The Agricultural Extension Service is cooperating in this work. Reports will be published as progress is made and specific results obtained.

E. E. Wilson is Associate Professor of Plant Pathology and Plant Pathologist in the Experiment Station, Davis.

The renewing of California forests by seeding and planting is under study by the School of Forestry.

## High Temperatures Reduce Water Take Of Dairy Cattle

W. M. Regan and S. W. Mead

The water consumption results reported below are the by-product of a large experiment designed to study the affect of changes in environmental temperature on high producing dairy cows.

The trials were conducted in a large room especially equipped for the control of air movement, humidity and temperature.

Maintaining the constant values of 50 feet per minute for air movement within the room and a relative humidity of 60%, the temperature was increased from 40° F to 100° F.

Three pairs of Holstein cows were studied for periods approximating three months and data collected.

A standard diet of hay and concentrates was fed in accordance with individual production and appetite.

Each cow was provided with an individual water bowl to which water was supplied through a carefully calibrated meter.

Daily recordings were made of the feed and water consumption and milk production of each cow.

### Findings

A study of the data collected fails to substantiate the general belief that the water consumption of dairy cows is materially increased in hot weather.

Uniformly constant values were obtained for temperatures ranging from 40° F to 80°. The upper limit of heat regulation for producing Holstein cows is about 80° F.

When the room temperature is maintained above 80° F for more than 24 hours, the animals tend to become overheated, and at the same time there is a reduction of feed and water intake followed by a natural decrease in the milk "flow."

Instead of an increase, there is an actual decrease in the amount of water drunk at the higher temperatures. Cows do not sweat, so larger quantities of water are not needed to replace body moisture released by sweat glands.

It has long been recognized that there is a definite relationship between cow's water requirement and her food consumption and milk production.

When, in the study of the collected data, proper correction was made for the decline in food intake and milk production, there was only a slight correlation between room temperature and water consumption.

These results do not in any way minimize the importance for high producing dairy cows of an ample supply of good clean water at all times.

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## Time To Harvest Raisin Grapes For Improved Yields

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be on the trays by September 15th, and all Muscats by September 10th.

(4) If, for any reason, raisin grapes can not be harvested by September 15th, they should usually be dehydrated rather than sun-dried or should be used for purposes other than raisins.

(5) For the making of "golden bleached" raisins, yellow color of the grapes is a better index of proper maturity for harvesting than in the Baling degree of the juice.

(6) Grapes containing a considerable percentage of raisined berries should be considered overripe for the production of "golden bleached" raisins.

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California Agricultural Experiment Station Bulletin No. 683 discussing factors influencing the yield, composition, and quality of grapes may be obtained by addressing a request to University of California, College of Agriculture, Berkeley 4, California.