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State, Federal and Interstate Roles In Conservation

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

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

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

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

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

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

Intrastate Coordination

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

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

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Hybrid Vigor In Dairy Herds By Crossing in Breed

W. A. Regan

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

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

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

Inbred Jersey Purebreds

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

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

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

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

A. J. Winkler

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

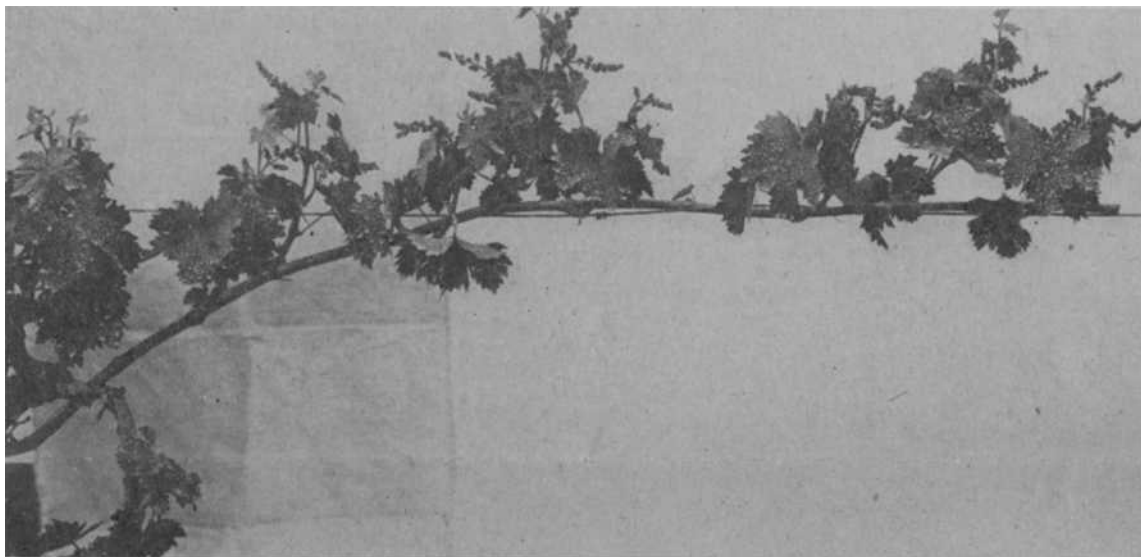
With fruits again moving freely in the normal channels of trade, buyers are becoming quality conscious. The demand for better quality was evident in all markets where fruits and grapes were sold during 1946.

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

ment of color may be retarded.

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

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



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

The offering of grapes fell short of expectations at times during that season. Some difficulty was had with the conditions and maturing of a considerable volume of grapes, in particular, with girdled Thompson Seedless.

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

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

Improving Fruit Quality

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

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

Pruning

The pruning season is practically over, but the importance of careful

thinning in the regulation of the crop of table-grape vines.

Suckering

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

Leaf Removal

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

Opening for Color

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

Should many leaves be removed before the fruit reaches the minimum sugar content for harvesting, its maturing as well as the develop-

ment of color may be retarded.

Thinning

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

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

Girdling

Girdling—or ringing—consists in removing a complete ring of bark $\frac{1}{8}$ to $\frac{1}{4}$ inch wide from the trunk, arm, or cane below the fruit which it is intended to affect. As a result, the carbohydrates elaborated in the leaves will accumulate in the parts above the wound, including the fruit, and will influence its development.

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

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

The berry size of seeded varieties like Ribier, Malaga, etc., is influenced

Constant Research For the Control Of Citrus Thrips

W. H. Ewart

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

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

Injury to Fruit and to New Growth

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

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

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

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

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Investigations in Poultry Disease Problems Reported

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

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

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

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

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

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Constant Research on Use of Insecticides Necessary for the Control of Citrus Thrips

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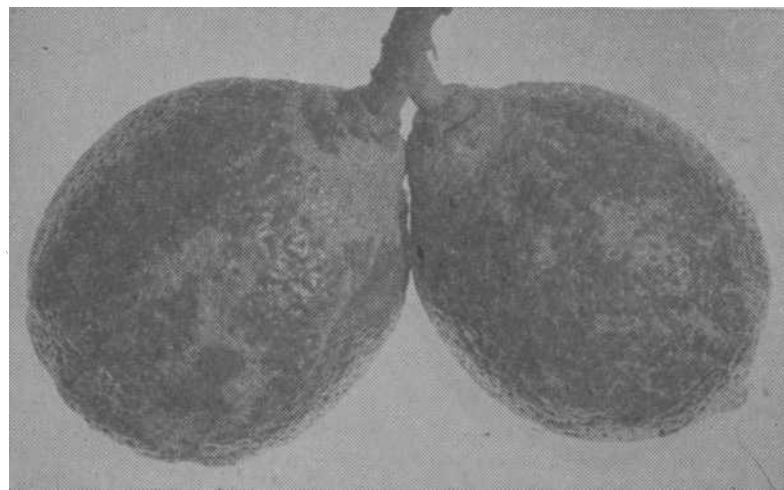
eggs and continues throughout the summer and fall.

Tartar Emetic-sugar Sprays Developed

Spray duster applications of tartar emetic-sugar sprays, developed by the University of California Citrus

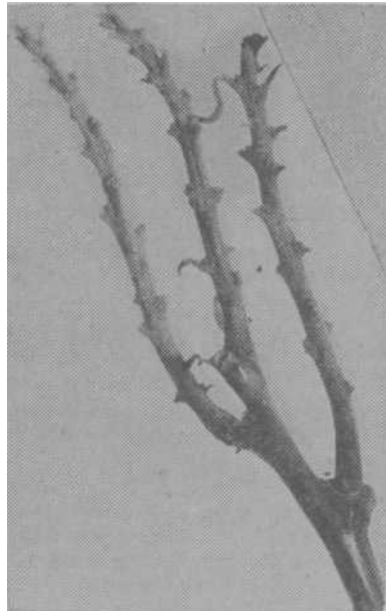
Since tartar emetic-sugar sprays could be applied without tree or fruit injury during the summer months in the San Joaquin Valley and at any time in the Coachella Valley, or in southern California on lemons, it appeared to be the perfect treatment

tain areas, which was demonstrated to be the result of the development of tolerant or resistant strains of thrips.



Experiment Station, largely replaced the lime-sulfur sprays or sulfur dusts in general use prior to 1939.

for thrips control. However, within three seasons unsatisfactory control occurred in cer-



Injury to fruit and new growth of lemons by citrus thrips. Note the scarring of the fruit, shown at the left.

Nicotine-sugar Sprays

Following the failure of tartar emetic-sugar sprays, further work by the University's Citrus Experiment Station showed that sprays containing commercial nicotine preparations remained effective against thrips for several days if sugar was added.

Results have been fairly satisfactory with spray-duster applications at the rate of 100 gallons per acre of a spray containing seven pounds of Blackleaf 155—or one quart of nicotine sulfate—plus four pounds of sugar for every 100 gallons of water.

There have been some failures with nicotine-sugar sprays and further work has been in progress in an effort to find a more satisfactory treatment.

DDT-Sulfur Dust or DDT Spray

The development of DDT as an insecticide has given the citrus industry another treatment which shows promise for the control of thrips.

Three years' experimental results have shown that a two per cent DDT-sulfur dust applied at the rate of 100 pounds per acre or a suspension of four pounds of 50% DDT wettable powder in 100 gallons of water per acre applied with a spray duster is very effective in controlling thrips to prevent fruit scarring in the San Joaquin Valley.

Spray-duster applications of DDT appear to be no more satisfactory in summer treatments for thrips in the San Joaquin Valley or on lemons in southern California or on grapefruit in the Coachella Valley than standard nicotine-sugar treatments.

Even at its best, DDT in either sprays or dusts has not shown the effectiveness of the tartar emetic-sugar spray at its best.

An outbreak of cotton cushion scale occurred in certain groves in the San Joaquin Valley following DDT applications in 1946, apparently the result of killing off the vedalia ladybird beetle. It is thus evident that DDT in its present formulations is not the perfect treatment for thrips control.

Constant Research Necessary

Many more of the newer insecticides have also been tested as thrips treatments and while several of them show promise in preliminary tests, further work is necessary before their value as thrips control measures can be established.

It is thus apparent that at the present time there is no control measure for citrus thrips that is entirely satisfactory in all areas where it is a serious pest.

It is evident from past experience that any treatment, no matter how efficient it may appear to be at first, will probably need revision or replacement sooner or later and that constant research is necessary for the development of new methods of control if losses from citrus thrips are to be prevented.

W. H. Ewart is Assistant Entomologist in the Experiment Station, Riverside.

Pear Production Problems Confronting Growers Receive Extensive Research Study

Warren P. Tufts

Probably more time and effort have been devoted to a study of the pear in California, than of any other deciduous tree fruit.

This has resulted not because of the size of the industry, which from the standpoint of the acreage involved is of less importance than the prune, walnut, peach, almond, or apricot, but because of the very definite and serious problems which have confronted the pear growers of the state.

Fire-blight

Undoubtedly fire-blight has been the most serious single menace to the success of the pear industry.

In cooperation with the United States Department of Agriculture, the Pomology Division has under way an extensive breeding program designed to combine blight resistance with fruit quality.

The use of Old Home and other resistant varieties for trunk and scaffolds has been adopted generally.

Black End

The use of the oriental stocks (*Pyrus serotina*, *P. ussuriensis*, *P. betulaeifolia*) in order to secure greater blight and aphid resistance in the root system introduced the problem of Black End which for many growers was more serious than blight.

A certain percentage of all varie-

ties of the commercial pear districts of the state.

This is also true of irrigation and cover crop experiments. The use of permanent covers, no cultivation with weeds controlled by oil sprays, and irrigation by sprinklers are now under investigation.

There have appeared from time to time and in different parts of the state baffling disorders which for lack of better terminology, were formerly classified as physiological diseases.

The cause for most of these has now been determined as due to the excess or deficiency of certain minor elements—boron, iron, zinc, and copper—so-called because of the extremely small amounts usable by the plant.

Tests for Determining Fruit Maturity

Definite minimum maturity standards based upon color changes, rate of softening and increase in soluble solids have been suggested after extensive field and laboratory study.

With the fall and winter varieties the pressure test used to determine the relative firmness of the flesh offers a definite means of measuring maturity, and pressures for harvesting the more important varieties have been published.

With the Bartlett, grown under a



Fruit on the tree on November 26, 1946 when this photograph was taken.

ties, with the exception of the Hardy, has shown susceptibility to this disorder when propagated on the above-mentioned stocks.

Investigations are continuing with pear rootstocks, not only from the standpoint of blight and pear root aphid resistance but also for better adaptation to various adverse soil conditions.

Delayed Foliation

Delayed foliation following relatively warm winters, is now recognized as often being responsible for blight epidemic years.

The absence of a sufficient amount of chilling weather (under 45 Deg. F) during the winter months results in a protracted bloom which in extreme cases may extend over a period of a month.

The Bartlett of all the varieties grown in California has the most profound rest.

The use of oil sprays has in certain winters been somewhat effective in breaking this rest, but present data are insufficient on which to base definite recommendations for the use of oil sprays for this purpose alone.

Pollination

The problem of pollination requirements of pear varieties still presents new angles and a study is being made of the feasibility of applying pollen artificially in water suspensions or in some inert dust as a carrier.

It has been demonstrated repeatedly that a heavier set of Bartlett pears will result from cross-pollination but such fruits have a higher seed count which results in a relatively short pear.

Fertilizer, Irrigation and Cover Trials

Intensive fertilizer trials with nitrogen, phosphorus, and potash have been and still are in progress in many

diversity of conditions, no single maturity test seemed adequate.

Sprays

Three years ago, with the advent of the almost universal use of hormone sprays for the preharvest drop of Bartlett pears, a new problem arose.

Not infrequently a considerable number of fruits in any one box would become soft and watery before the others were ripe.

Experimental trials have shown conclusively that this breakdown is caused by over-maturity due in large measure to the fact that sprays for the preharvest drop hold certain fruits on the tree beyond the proper time of harvest.

There seems little doubt but that the sprays have a direct effect in hastening ripening generally, and where used, the normal period of harvesting should be reduced.

In experimental trials little, if any, breakdown has occurred in pears picked during the first half of the harvest season.

The possible influence upon ripening of summer oil sprays and of some of the newer developments for the control of codling moth are also other problems under investigation.

Warren P. Tufts is Professor of Pomology and Pomologist in the Experiment Station, Davis.

Hybrid Vigor in Dairy Herds By Crossing Between Inbred Families Within a Breed

(Continued from page 1)

past fifteen years, according to the 1944-45 report of the Stanislaus County Cow Testing Association, averaged 486 pounds of butterfat—the lowest, 442 pounds, the highest, 535 pounds. When they began using our University bulls, their Cow Testing Association average was 324 pounds. These herds average 54 cows of milking age. No three-time milking or other high pressure methods were used.

Inbred Holsteins

About fifteen years ago we began inbreeding our purebred Holsteins. Marked loss of vigor resulted in lowered production, smaller size, and reduced efficiency. The third and fourth generations were a pretty sorry lot. We secured an inbred bull of another purebred Holstein family. His daughters out of our old inbred cows were larger at birth and have grown faster than did their dams.

range ewe, which in turn is bred to a Hampshire or Suffolk ram. The resulting lamb is superior in rapidity of growth and quality of carcass to the lamb of any of the pure breeds. Hybrid vigor annually puts millions of dollars into the pockets of the California sheepmen.

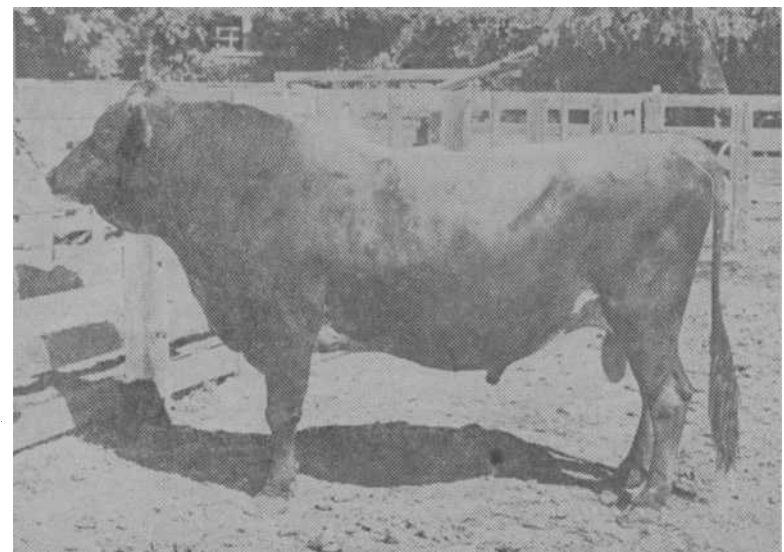
Lawrence M. Winters at the University of Minnesota reports maintenance of hybrid vigor in a three breed cross with swine, where the crossbred females were retained for breeding purposes.

It is theoretically plausible that like success would attend a three family crossing of inbred strains within a single breed of dairy cattle.

Protecting Hybrid Vigor

In a few years we will have two inbred families, our present California Napoleon Nick strain and our new California Romus Rex line.

One reason for establishing the



California Napoleon Nick, herd sire of the first inbred family of purebred Jerseys developed by the Division of Animal Husbandry for a high order transmitting ability for high milk and butterfat production.

The first nine to freshen—none was culled—averaged 557 pounds of butterfat on a mature, ten month, twice daily milking basis. This is a 226-pound increase over the record of their dams under identical feeding and management conditions. We are unable to say at this time how much, if any, of this increase is due to hybrid vigor. The experiment is so planned that we will be able to determine this with accuracy in a few years.

Supporting Experience

Acting on the results of long time research of the University of California sheepmen of the state are making use of hybrid vigor in a big way. Each year a half million spring lambs, most of them crossbreds, are shipped to eastern markets.

Usually a Corriedale ram is bred to a Ramboulet ewe to produce the

second inbred line is to "hedge" against the sudden appearance of vigor decline in our original inbred family. If such should transpire, it could be immediately corrected by using a bull from the other inbred line.

Large progressive breeding establishments might find it profitable to develop three or more inbred families, from which buyers could alternately select herd sires. The same thing might be accomplished by three small breeders in a community, if each developed a separate inbred strain.

Dairymen criss-crossing between these lines would profit by the hybrid vigor generated in their herds.

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