

BETTER FRUIT

VOLUME XVI

DECEMBER, 1921

NUMBER 6

Barnett C. R. Aerie
Comp. Dept. of Agric. Bldg.



Greetings of the Season

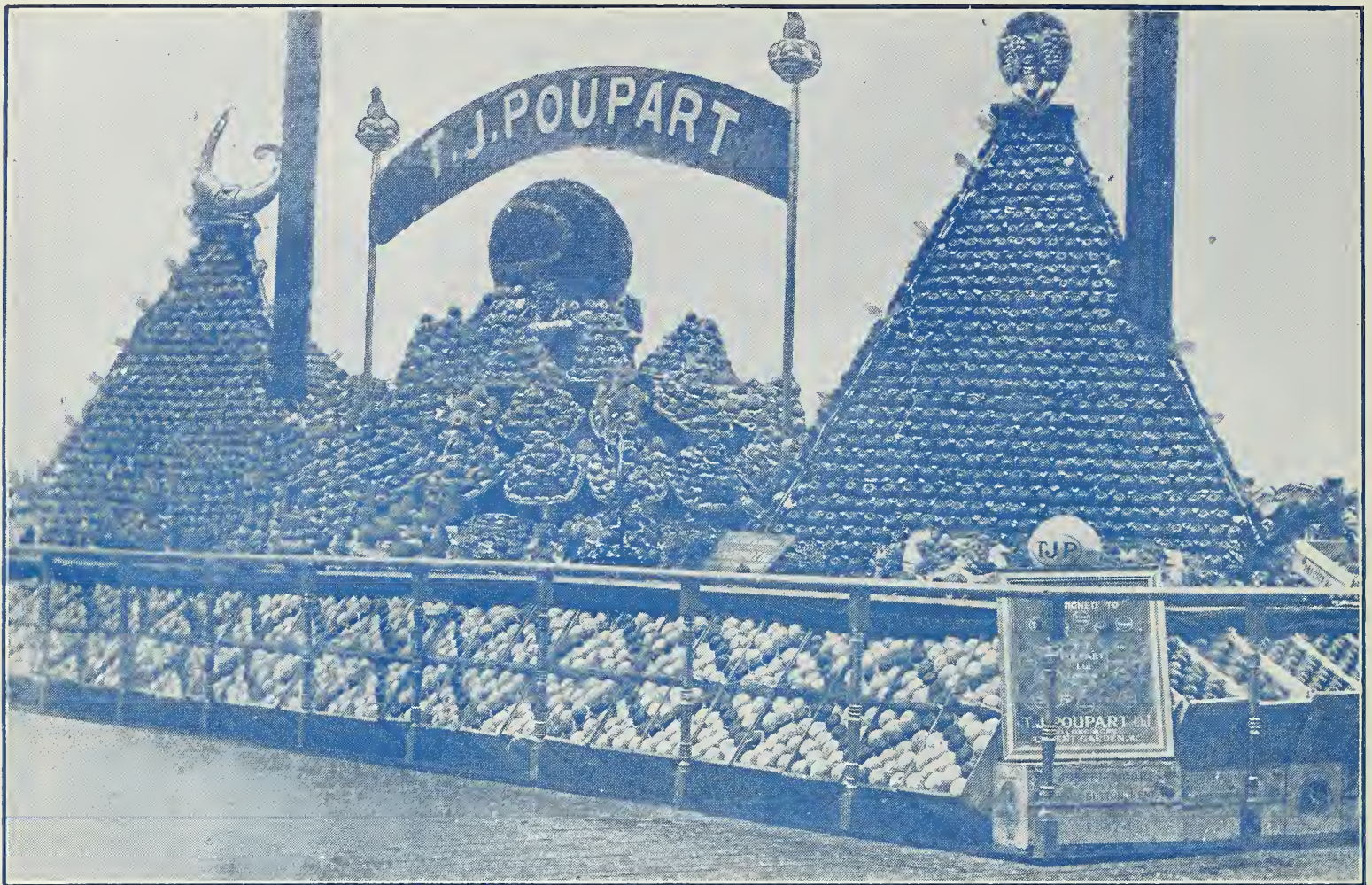
Features in This Issue:—

Winter Injury to Fruit and Nut Trees
Timely Suggestions for Pruning Apple Trees
Slipshod Practices in Marketing Fruit
Bud Selection and Frequency of Mutations
Elemental Treatise on Pruning the Apple
Northwest Fruit Exposition

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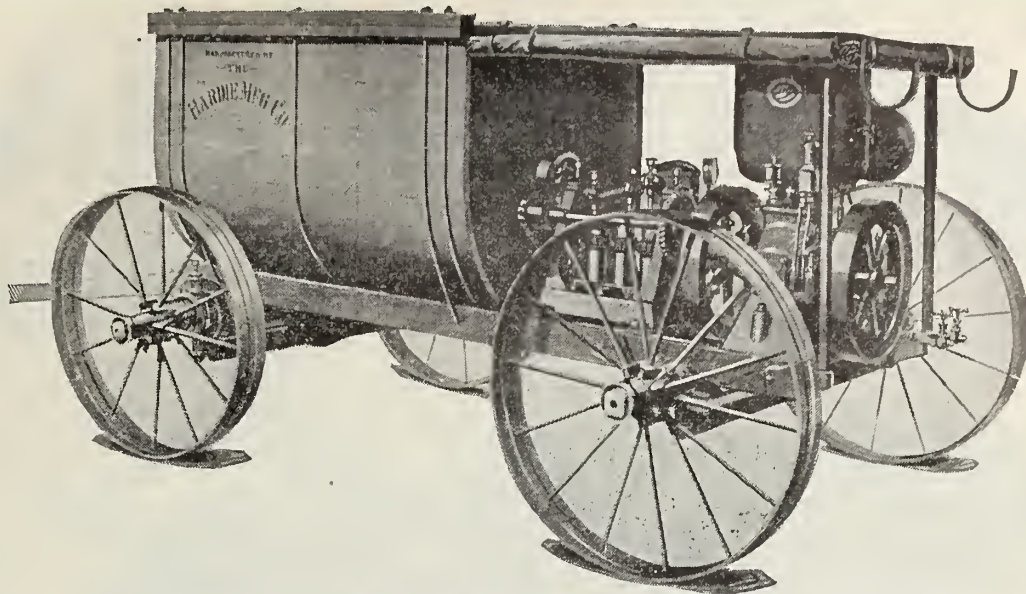
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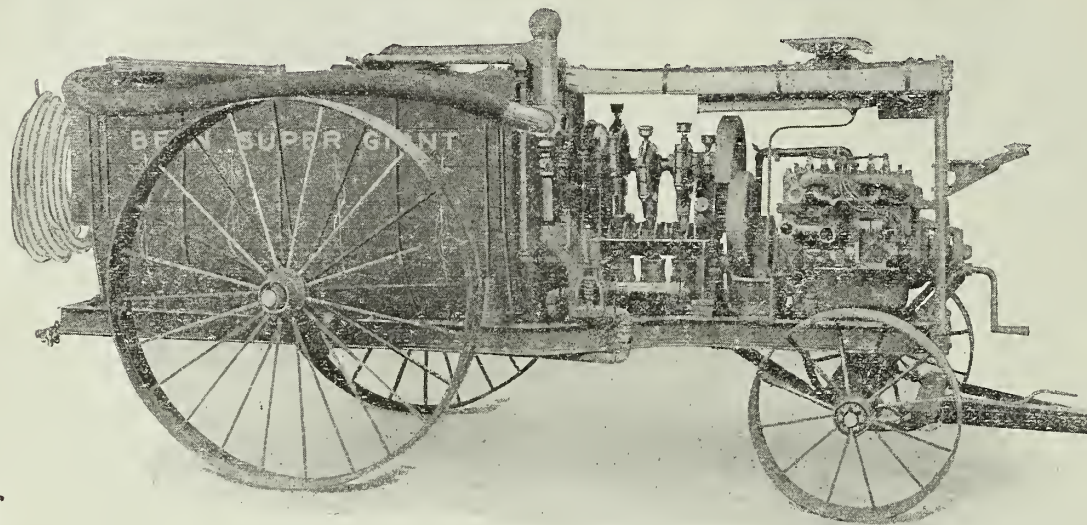
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BETTER FRUIT

Pioneer Horticultural Journal of the Pacific Northwest

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VOLUME XVI

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NUMBER 6

Winter Injury to Fruit and Nut Trees

By D. F. FISHER

Pathologist Fruit Disease Investigations, U. S. Department of Agriculture

As in every known fruit growing section outside the equatorial belt, one of the key problems of the Pacific Coast region is that of learning how best to minimize loss from cold weather. The grower who knows most about minimizing or escaping effects of severe weather in his orchard has a big lead over the grower who trusts his fate to guesswork. In this article, from a paper prepared by Professor Fisher, is presented a careful discussion of what happens to your fruit and nut trees in a freeze and why it happens. The facts and deductions have practical application because obtained from study of effects of the cold snap of two winters ago in Oregon and Washington. The article will have most timely interest for those who were in the path of last month's early snow and storm.

LESSONS of importance were gleaned from study of effects of the extremely cold weather in many parts of the Pacific Northwest two winters ago, which may well be impressed on the mind of every fruit grower. When reports of the very general freeze reached the Department of Agriculture, together with requests for advice as to methods of procedure in handling the injured trees, the writer was assigned to make a survey of the situation and render possible assistance.

The office of fruit disease investigations in the Bureau of Plant Industry at Washington has a most complete file of information on frost damage, collected by Dr. M. B. Waite and his staff over a period of more than 30 years, during which the subject was studied in all parts of the country. The writer, in approaching this Northwestern situation was fortunate in having so much accessible data from other sections to draw on in an analysis of local conditions and upon which to base his recommendations.

It would probably be well at this point to sketch briefly the different types of injury produced by cold and the factors that influence such injury in general.

There are several types of frost injury which we may list as follows:

1. Killing of the fruit-buds, either by extreme winter cold or by frost during the blossoming period.

2. Killing of the twig tips usually as a result of winter cold.

3. Browning or blackening of the wood in the branches or body of the tree, produced by winter cold.

4. Bursting of the bark from the trunk of the tree, with or without discoloration of the wood.

5. Lifting of the bark on the south and southwest side of the trunk or branches, this being the condition we know as winter sun-scald. This and the preceding condition is frequently caused by the reflection of the sun's rays off the snow, the consequent warming of restricted areas of the bark and thereby inducing growth activities within the cells, which render such parts most susceptible to the cold of ensuing nights.

6. Girdling, or partial girdling of the trees at the ground line, or just below the ground line, resulting in one of the conditions known as "collar rot." This is brought about when the snowfall is insufficient to insulate the tender areas at the crown or collar of the tree.

7. Winter-killing of the roots of the tree, with or without injury from the ground line upward. This likewise results from extreme cold and insufficient insulation of the roots by snow or otherwise.

IT IS NEVER easy to determine the degree of severity of any type of frost injury, as no doubt some of you can testify from your experience. The severity of injury usually varies from tree to tree and in different parts of the orchard.

The various types of winter injury are the result not alone of the degree of cold, but of a combination of the weather conditions and the condition of the trees, and in most cases the latter factor is the more important. The conditions of the tree which influence its susceptibility to frost damage may be outlined, in the order of their importance, as follows:

1. The degree of dormancy of the principal parts involved. (A completely dormant tree is far more resistant to cold

than one in partially succulent condition.)

2. The species or kind of tree. (For instance, an orange tree is more tender than a walnut, and a peach tree more easily injured than an apple.)

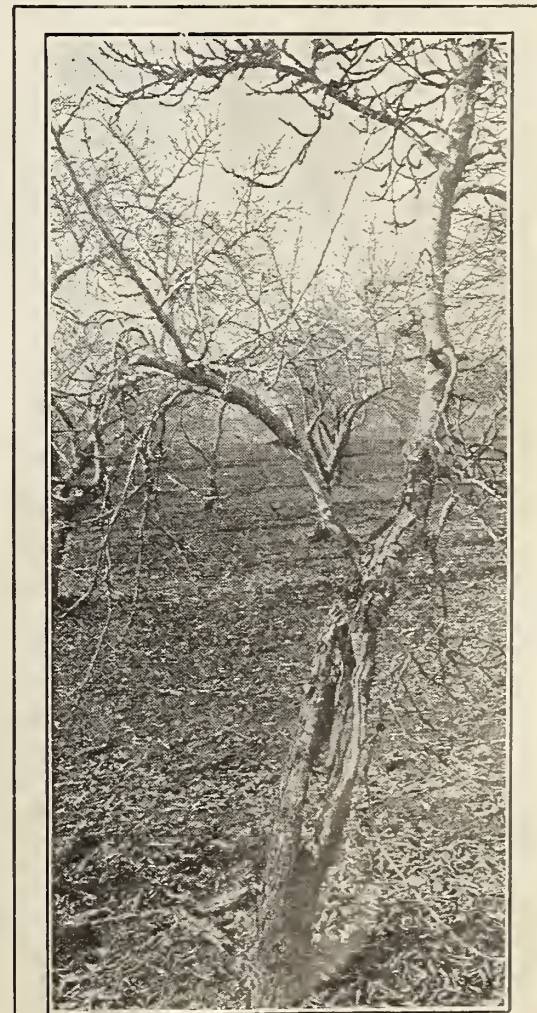
3. The variety. (The so-called Russian varieties of apples like the Red Astrachan and Yellow Transparent are very resistant to cold and survive where others fail.)

4. The age of the tree. (Under some conditions young trees are more resistant than older ones.)

5. Cultural conditions which affect the vigor of the trees, under which we may include the following:

a. Character of the soil and subsoil, especially its moisture holding capacity, which ties this up with (b):

b. Moisture and drainage conditions:



Twenty-five-year-old Italian prune tree ruined by frost damage of 1889 and resultant heart rot, but still living.

c. Fertility and manuring practises:

d. Cultivation and cover crops.

In a perfectly dormant tree, the order in which different tree structures are killed, depending upon the degree of cold and other factors is as follows:

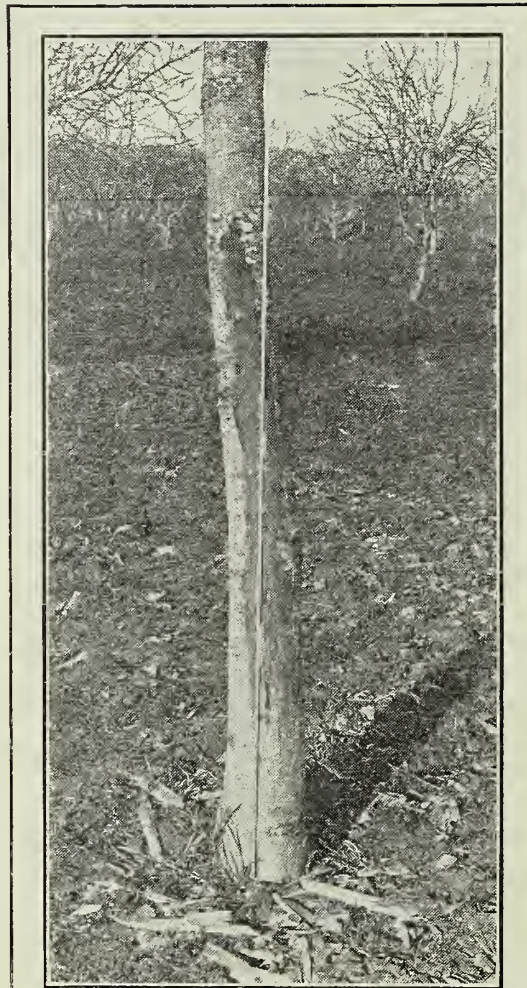
1. A ring of wood next to the pith.
2. The pith. (These two are mostly found on twigs and small branches).
3. The youngest layer of wood next the cambium.
4. The woody cylinder. (Injury to the wood can be definitely detected by the discoloration produced even by slight injury that does not affect the vitality of the tree. The degree of this discoloration can, in most cases, be taken as an index of the severity of the injury).
5. The fleshy bark. (This is often merely flecked or streaked, but in severe cases the entire bark finally dies and turns brown).
6. The cambium.

The degree of killing of fruit and leaf buds depends upon the hardiness of the buds and the species and variety of tree. Fruit buds of most species, when fully dormant, are about as hardy as the woody cylinder and generally die only when the trees are quite badly blackened in the wood. But in the case of the plum, for instance, the fruit-buds may be killed by winter cold while the wood shows no injury. With the apple, on the other hand, the wood is severely injured before the buds are affected or the twigs are killed back.

THE cambium is one of the last structures to die in severe freezing weather, provided it is thoroughly dormant. But just under the cambium is the newest formed part of the wood, a ring of varying width. This is much more easily killed, and, showing as a black line in cross section, it is frequently mistaken for the cambium. However, when the least bit of growth has taken place on the cambium, or if it is not thoroughly dormant, it is likely to be the first thing killed. Likewise, in the case of fruit-buds, if they are the least bit swelled they are most susceptible to cold and very easily killed. Fruit-buds are most sensitive when swelled, but the cambium may be killed or lifted from the wood either from the fact that it has not ripened (in event of fall freezing), or that it has swollen from mild winter weather, or spring growth. If the bark is lifted from the wood this does not necessarily mean that the cambium has been killed in all cases, though this may be true. There is always a chance for the cambium to be alive if the bark is alive. After a few mild days this can readily be determined by examination. But in your examination make perpendicular cuts through the bark, not at right angles to the direction of growth. A narrow strip of bark with underlying wood attached, cut in the direction of growth of the part examined affords ample opportunity for diagnosis and

leaves a wound that does not impair the recovery of the tree if it has the least chance. In case of lifted bark the cambium frequently splits, part remaining attached to the wood and part to the bark. In such cases where the bark remains alive, wrapping or bandaging the trees or nailing the bark to the wood will be of considerable benefit by holding it in place and allowing it to become attached again.

The daily minimum preceding the coldest spell of two years ago varied from 32 degrees to 10 degrees above zero in those sections west of the Cascades, but east of the mountains zero temperatures were



This seedling Franquette walnut tree at McMinnville was saved by stump grafting after being killed to snow-line.

experienced before December 1, and up to the time of the extreme drop. The drop to this minimum was therefore more sudden and generally greater in the west side districts than in Eastern Washington. The suddenness of the drop in itself probably was of some moment in the production of injury, since trees in a particular condition of dormancy require particular temperature to adversely affect them.

It is quite easy to see why the trees in the milder Coast climate were much more severely affected than those growing east of the mountains. In the latter case they had become inured to greater extreme of temperature since they were planted and they were subjected to a gradually increasing degree of cold and had a chance to develop a gradually increasing degree of dormancy, whereas, in the case of trees growing on

low bottom lands in the milder climate, with its fall rains, the fact of their incomplete dormancy is hardly open to question.

Growers stated that the trees dropped their foliage much earlier than usual and that, at the time of the freeze, were as dormant as they ever get. But that the trees were really dormant does not appear probable, in view of the character of the injury developed. The soil for the district is quite uniform, a sandy loam, sandy subsoil. In general clean intensive cultivation was practised. The topography of the land is very level, hence the air drainage is poor.

LET us consider some individual orchards as I examined them in 1920 to illustrate the effects of the freeze and factors influencing the treatment and recovery of the trees:

Italian prunes, 30 years old—When visited in February no injury was found below a point 10 inches from the ground, but from this distance upward the bark was discolored and rather dry and spongy, the injury extending outward on the main branches. The sapwood was not affected, but the cambium was discolored and appeared to be dead. The bark was frequently loosening from the wood. One-year-old wood was not affected and only about 25 per cent of the fruit-buds were killed. Old devitalized fruit spurs, so common in the average mature Italian prune tree of this region, the long slender spurs that hang pendant, were frequently killed, being frozen through at the base. In July, when this orchard was again visited, many dead and dying branches were found. A part of it had been pruned during the latter part of June, removing all branches that looked "sick" at the time, but inside of ten days other branches on these same trees had reached the same condition. Considerable barnyard manure had been used on this orchard in recent years and the injury was worse in the section that received manure containing sawdust and shavings as litter. This material would tend toward an acid soil condition and it may be that trees growing on such soil are less hardy, but further study is needed to verify this point.

Cherries, 9-year-old Lamberts, Bings, and Royal Anns—In February most of the trees showed the bark loosening on the south side above snow line and the cambium region was discolored. Lambert fruit-buds were dead, likewise most of the Bings, but the Royal Anns appeared to be more hardy and only about 50 per cent of the buds were dead. By July the bark on the south side of the bodies had burst and peeled back from the wood. On the under side of this loose bark, however, had formed a most remarkable callous growth, often fully an inch thick. Had this bark been nailed back in place it would soon have become attached again and the

(Continued on page 18)

Suggestions for Pruning Apple Trees

By O. B. WHIPPLE

Formerly Horticulturist, Montana Agricultural Experiment Station

IN THIS discussion on pruning I propose to confine myself almost entirely to problems relating to the pruning of the apple. I believe that some fruit growers are poor pruners because they lack faith in their pruning ability. Many a tree goes unpruned because the owner feels that there are mysteries in the art of pruning of which he knows nothing and that the tree is better off unpruned than wrongly pruned. Too often the same grower will turn his trees over to some itinerant pruning expert, so-called, who, barring his nerve, is no better qualified to do the work than the owner himself. To be a good pruner one must understand the principles; he need be a good observer and experience is of course helpful, but after all there are not many mysteries involved.

Inconsistency in pruning is another fault of many pruners. I do not refer to those cases where through miscalculation or lack of experience the tree is allowed to become too thick and must finally be severely pruned to be properly thinned out. There are many who just don't get around to prune every year. Such spasmodic pruning tends to keep the balance between growth and fruitfulness more or less upset and it certainly does not lessen the labor involved. Moderate annual prunings will give much more satisfactory results than those of the spasmodic nature. Too frequently severe prunings may come at the wrong time. For instance, how many times have you heard the fruit grower say, "Well, I don't expect a heavy crop this year as I had a big one last, so I will take this opportunity to give my orchard a good thinning out."

There is no poorer time to prune the orchard heavily than the spring just preceding the off-year. A great majority of the fruit spurs bear only branch buds and the severe pruning may force many of these into twig growth reaching the proportions of water sprouts. If the heavy pruning is followed by favorable growing conditions the orchards may have another off-year the following season, the trees expending their energy in wood growth at the expense of fruit-bud formation. It is well to remember that fruit-buds for the season's crop are formed in July and August of the previous season. The one important condition favoring fruit-bud formation is an abundance of reserve food material. This does not mean that liberal applications of fertilizer will make the tree produce fruit-buds and fruit. This is not reserve food material and when combined with ample water supply may throw the tree into such rapid growth as to retard fruit-bud development. This does not mean that heavy pruning will increase the reserve food supply of the parts remaining and in-

duce fruiting; it is more likely to have the opposite effect.

By reserve food material we have reference to the elaborated food stored up in the tissues of the tree, food not used immediately in the processes of twig growth and fruit development. Conditions favoring the accumulation of this reserve food are good vigorous twig leaf development early in the season with conditions favoring only moderate growth during the season of fruit-bud formation in July and August. We must have leaves for the leaves elaborate this food and we must have new shoots for these bear leaves, but any system of pruning which prolongs the period of rapid growth beyond the latter part of July is opposed to fruitfulness. There can be no accumulation of reserve food material so long as the tree is actively engaged in leaf and twig development.

IF A HEAVY pruning becomes necessary the proper time to administer it is at the opening of the season when the orchard promises to bear a heavy crop. But here again we may blunder for promises are not always fulfilled and an untimely frost may remove the crop which would have acted more or less as a stabilizer and we are again confronted with conditions which favor the production of water sprouts rather than fruit-buds. We can well be more consistent in our pruning. Adopt a plan, follow rather a middle course, modify the plan as experience dictates, but don't swing from one extreme to the other.

But we can be too consistent in our pruning as well as inconsistent. Most fruit growers now appreciate that to develop a good framework we must prune the young tree severely. As we train the young orchard we unconsciously become devotees of severe pruning. As the orchard reaches the bearing age we hope for fruit, we even pray for fruit, but we forget the principles of fruit-bud formation. The only reason a young tree does not bear fruit is that it is expending its energies in twig growth and has no reserve for fruit-bud development. It grows early and late and so long as we continue the practice of severe pruning we are opposing fruitfulness. There comes a time in the life of every orchard when moderation must be practiced in pruning. Many of our younger Montana orchards are now in this stage. Once the framework is well developed we should do just as little pruning as possible until the tree shows signs of over-bearing.

Of course some pruning will be necessary to remove branches that interfere with others. But the plan should be to increase rather than decrease the number of growing points. We can do this by heading in

the small growth in the center of the tree rather than by removing it entirely. This small growth may be developed into the first fruiting wood of the tree. True, it may be necessary to remove this wood later, but it serves a purpose in aiding to bring about a balance between growth and fruitfulness which is long delayed if we continue the practice of severe pruning as outlined for the orchard during its formative period. There is really much to be gained in early fruit production if we properly preserve this small wood in the center of the tree. And let us not forget that the first three or four years should see the season of formative pruning past and the inauguration of another pruning program which will tend to reduce rather than encourage the growth of wood.

This period of moderate pruning may extend through the next four, five, six or seven years or even longer. It will depend upon how well the orchard is cared for in the way of irrigation, cultivation and fertilization. It may even depend upon the varieties planted. The passing of this period of moderate pruning will be plainly indicated by a tendency for the tree to bear heavy and light crops alternately, by an undesirable decrease in the size of the fruit especially during heavy fruiting seasons, and by a lack of twig growth. But when these signs indicate that the tree has entered into this period of fruitfulness we must not get over-anxious about pruning for here is where thinning may be practical with profit. It is well to maintain an ample supply of fruiting wood. In the first place trees so pruned will often go through periods of late spring frost and still bear a profitable crop, when trees stripped down to the minimum of fruiting wood will be thinned down seriously. We have all seen instances of where the orchard neglected as to pruning will bear a better crop such seasons than the orchard which has received more ideal treatment in this respect.

AGAIN if we are to secure annual crops we must maintain a greater number of fruiting spurs than required to produce a maximum crop. The fruit spurs of the apple and pear and even those of the plum and apricot are inclined to bear only alternate years. Theoretically then we must maintain twice the amount of fruiting wood required to produce a good crop. We must then see that not more than one-half of this wood matures a crop in any one season. I do not mean by this that such a tree properly thinned will always bear a crop of fruit. There are certain varieties in which alternate bearing can hardly

(Continued on page 21)

Northwest Fruit Exposition

THOSE who sponsored the Pacific Northwest Fruit Exposition, held in Seattle, November 21-30, were well pleased with successful results of the show. Attendance and interest proved so good that the exposition was continued three days longer than originally planned, up to and including November 30.

The Grandview district of Washington captured the coveted grand sweepstakes prize of \$1,000 cash and gold banner, for the best district display. Out of a possible 1,000 points this district scored 857.

Second in the sweepstakes competition was the Cashmere district, which scored 785 points and received \$500 in cash and a silver banner. Other district exhibits were scored as follows: Third, Lake Chelan, 761; fourth, Yakima, 751; fifth, Benton, 750; sixth, Walla Walla, 738; seventh, Methow, 723; eighth, Okanogan, 716; ninth, Clarke, 644; tenth, Wenatchee, 637.

The 1,000-point basis of scoring was made of 600 points for fruit, 200 for artistic merits, and 200 for commercial attractiveness and "selling power." The list of judges included talent from Washington, California and Oregon.

Grandview's exhibit was one showing

great banks of apples surrounding a map of the district. The serving of apple pie to each visitor admittedly added a number of points to the district's score, under the "selling power" of the booth.

The American Fruit Growers of Wenatchee carried away the grand prize of \$500 in merchandise for best individual display by a fruit grower. Peter Erickson of Vashon was second and H. W. Roberts of White Swan, in the Yakima district, was third.

Attractive daily programs of lectures, demonstrations and music were presented in connection with the exposition and there were two or three important banquets. Thirty "Prunarians" from Clarke county attracted attention when they attended in natty uniforms and distributed samples of Clarke county prunes to everyone.

Neither attendance nor number of exhibits from Oregon were up to expectations, but this was partially the result of storm conditions which prevailed during much of the time the exposition was in progress.

THE price of Pacific Coast cranberries was advanced 50 cents a box the first week in November, to \$5.50 per box, for the berries remaining in hands of the growers' exchange.

Nailing Apple Boxes

GOVERNMENT investigators have found that the right use of a few more nails in the apple box would prevent losses to the shipper running into thousands of dollars annually. Tests with standard packed boxes, ready for shipment, were conducted by means of revolving drums in which they were placed. Before they had gone a "journey" of average length in the machine most of the boxes had broken open and the drum was dripping cider.

On investigation it was found that usually the parts of the box to loosen and give way first were where the four nails were holding an edge. Two more nails were therefore driven into each nailing edge of the remaining boxes. With this simple change the boxes stood just about twice as much rough handling.

The Idaho State Seed show will be held at Idaho Falls January 10-13. Premiums amounting to approximately \$1500 will be distributed to competitors from the United States and Canada. Last year 34 Idaho counties were represented and it is believed the number will be greater this year.

You will want to send copies of the Homeseekers' number of *Better Fruit* to some of your friends. Order them now while you have it in mind.



Photo taken at planting of first tree in large orchard of Coates "1418" prunes, started at Orenco, Oregon, by the Oregon Nursery Company. In the foreground, left to right, are these participants: A. C. Coupe, mayor of Orenco; J. W. Shute, Hillsboro banker; M. McDonald, president Oregon Nursery Company.—(By courtesy Morning Oregonian).

Bud Selection and Frequency of Mutations

By E. B. BARCOCK

University of California, Berkeley

THE efficacy of bud selection as a means of improving the type is dependent upon the occurrence of bud mutations; its practicability, upon their frequency. If the above statement holds as a general principle, and it probably does, it is obvious that he who would change existing varieties through bud selection must first discover bud variations, or plants that grew from bud variants, of a relatively permanent nature, *i. e.*, the bud variant must maintain its distinctive characteristics when multiplied by vegetative propagation.

Such a permanent bud variation, resulting from a mutation in some vegetative cell, is commonly called a bud sport, and the general occurrence of bud sports in plants is well known. Concerning the frequency of their occurrence, however, very little is definitely known, yet it is a subject of the greatest importance to horticulturists, who propose to improve our commercial varieties of tree fruits through bud selection.

Nurserymen, especially, should be keenly alive to the practical aspects of this question. Because of the successful demonstration of the value of bud selection in the citrus fruits, there is an increasing tendency among nurserymen to propagate standard varieties of all tree fruits from selected trees which are known, either from mere observation or actual performance records, to be consistent high producers. Of course, such selection of high-yielding stock trees is commendable, provided proper precautions are taken to insure trueness of type for the variety in regard to characters other than yield.

Date Prune Planting

APPROPRIATE ceremonies attended the planting of the first Coates "1418" prune tree by the Oregon Nursery Company, in the big commercial orchard of this particular prune it has started at Orenco, Oregon. The tree was planted on October 29. The ceremony was witnessed by many interested fruit men including Henry E. Dosch, representing the State Board of Horticulture.

It had been hoped that Leonard E. Coates, originator of this commercial prune with the date flavor that now bears his name, would make the trip from his home in California to be present, but he was unable to do so.

The Oregon Nursery Company has obtained exclusive propagating rights for the Coates prune and, according to M. McDonald, president, intends to develop large orchards of this variety at different localities of the Northwest adapted to its culture.

Such nursery stock can then be offered as first-class stock of the variety, but nothing more until it has been proved by performance tests of the budded progeny that the character of high yield is actually transmitted. This is what too many nurserymen fail to appreciate and they are rushing pell-mell into an expensive campaign of searching for high producers, with the avowed intention of representing the budded progeny as of superior merit because of the high yield of the selected parents!

A general warning as to the importance of using proper methods when attempting to carry out in deciduous fruits what has already been accomplished with the citrus fruits was given by Shamel in his paper before the American Society of Horticultural Science last year. It is the purpose of this paper to emphasize the existing uncertainty as to what can be accomplished through performance records and the propagation of selected high producers among the deciduous fruits. The motive of the paper is not to discourage extensive experimentation in this field.

The more well-planned and carefully executed experiments the better, especially if they are fully reported, with adequate data on the performance of the budded progeny in comparison with the parent trees. But the whole question of the practicability of increasing the yield of deciduous varieties through bud selection is still unanswered, and it is this aspect of the subject which it is the duty of horticulturists to keep before the nurserymen and the fruit growers. Following are some of the reasons for maintaining an attitude of suspended judgment on this question.

BOTH species and varieties differ as to the frequency with which bud mutations occur. We are greatly in need of actual data, but presumably there is no horticulturist who would venture to assert that bud sports are as frequent in any deciduous fruit as they appear to be in several of the citrus fruits. Thus far, only two varieties of orange, two varieties of lemon and one variety of pomelo have been intensively studied, and we do not know that bud mutations are as frequent or of as great practical importance in other citrus varieties as they appear to be in the five California varieties with which Shamel has worked. But even though all citrus varieties are found to be inherently prone to mutate frequently in their vegetative tissues, it would not necessarily follow that any varieties of apples are equally apt to do so.

Furthermore, even if one variety of apple were to produce many bud sports it would be unsafe to infer that all other

varieties were equally variable. Of course it is well known that in apples, plums and other deciduous fruits new varieties have arisen as bud sports. But the number of varieties arising in this way is relatively small and it is therefore fair to infer that vegetative mutations which favor or cause high productivity are also relatively rare. The point I am making is simply that as yet we lack sufficient data to justify any conclusion regarding the practicability of increasing the yield of deciduous fruits through bud selection.

The danger in assuming close similarity between deciduous and citrus fruits as regards the practicability of isolating high-yielding strains through bud selection is further emphasized by the few experiments that have been made with deciduous fruits. The outstanding work of Whitten in Missouri, Gardner in Oregon and Crandall in Illinois, all gave negative results in the apple, and in the strawberry only one positive case was reported and that resulted in deterioration of vigor and lowering of yield. While these experiments were of limited scope, only a few varieties being represented, and similar experiments with other varieties may give very different results, still it must be admitted that thus far experimentation has tended only to increase our doubt as to the practicability of increasing the yield of standard varieties of deciduous fruits through bud selection.

THE question of the frequency of mutations has received some attention from geneticists. Without going into details we may consider the general bearing of the *Drosophila* investigations on this subject. The students of heredity in the po-

Land Show Awards

THE number of fruit exhibits at the Land Products Show, held in Portland in connection with the Pacific International Livestock Exposition, was not so large as it would have been but for the threatened railroad strike. Despite intervention of the strike talk the show was a success, exhibits of fine quality filling all but a few feet of the available space.

Sweepstakes prize, for the best 25-box entry of apples, went to the Hood River Apple Growers' Association. T. A. Sammis of The Dalles was a close second. In the five-box display, Dewey Gasson of The Dalles won first.

The Medford district showed up well in the one-box displays of various varieties. The Medford Orchards won first on Hoover Reds; the Monitor Orchards, first on Ganos, and C. Y. Tengerwald, first on Bellflowers.

mace fly have reported about 300 different mutations in the one species studied extensively, and during the period of investigation they have counted approximately 30,000,000 flies. This gives a frequency of one mutant in 10,000 flies. But many mutations appear more than once and some are of such an insignificant character that they are not reported, so that they claim a frequency of one mutation in every four or five thousand flies.

If we assume for the sake of argument that the same frequency of mutations obtains in the apple, how many trees would have to be tested in order to discover one high producer which is in a true, hereditary sense superior to other trees and hence capable of transmitting its character of high yield to its budded progeny? Obviously we could not expect to find one among 4000 tested trees, because many factor mutations affect only some morphological character or characters and do not affect yield and that every other one of these tends to increase yield, we have already increased the number from 4000 to 16,000 trees which must be tested in order to discover one truly superior tree.

WE might pursue this line of hypothetical reasoning much farther, comparing the number of chromosomes in the apple or the plum with the number in the pomace fly with reference to the known rate of mutations per chromosome in the latter and the number of bearing trees of the former now in existence. But it all points to the same general conclusion, to wit, that the geneticist can not hold out much encouragement to those who propose to locate genetically superior deciduous fruit trees by means of performance records and progeny tests.

The present tendency of nurserymen to advertise stock grown from known high producers as capable of furnishing orchards that will yield more than orchards grown from first-class stock from healthy trees that are typical of the variety, should be discouraged. Such inferences are at present unwarranted. There should first be some well-planned experiments on typical orchards of all the principal deciduous fruits. Then, if the results of these experiments are such as to indicate that performance records and progeny tests are worth having in deciduous fruits, it should not be difficult to interest the growers.

However, the keeping of performance records of orchard trees may be well worth doing by every orchardist if only for the purpose of eliminating drone trees. After performance records had been kept for several years by many growers, it should be possible to locate a large number of outstanding trees which could then be propagated for testing. It is desirable that some of our experiment stations undertake investigations in this field in the near future, and because of the wide range of materials

to be covered and the length of time involved, it is a very suitable field for cooperative investigations.

None of the foregoing statements should be interpreted as antagonistic to the idea that bud selection is an important phase of modern fruit growing. The regular practice of bud selection should be encouraged because it will assist in holding varieties true to type and it will increase the chances of discovering new and possibly valuable bud-sports. But the mere fact that bud selection is practiced is not sufficient to warrant any claims to special or unusual merit in nursery stock. The super-yielding tree of apple, peach or plum, which will beget a super-yielding orchard, has yet to be discovered.

Shippers Win Point

A PRELIMINARY victory of some consequence to fruit shippers of the Yakima valley was won recently in the suit of the Earl Fruit Company of the Northwest vs. the Northern Pacific Railway. The case was tried in the circuit court of Multnomah county, Oregon, and the shippers' victory has significance for fruit men of the Northwest in being one of few decisions given against a railroad in such actions.

The court and jury granted a judgment of \$1,900 to the plaintiff on claims involving three carloads of boxed apples shipped out of the Yakima valley in November, 1917. The fruit was shipped in box cars, under shippers' risk option No. 1. The railway company insisted that the shippers assumed all risk from freezing. The fruit company alleged that the railroad company was responsible, since the freezing occurred after an unexplained delay to the shipment. The jury was convinced that, had there been no delay, there would have been no injury to the apples.

The case revives recollections of numerous similar losses experienced by shippers of the Yakima valley in 1917, when the carriers refused to grant privileges of carriers' risk, under option No. 2, and hundreds of carloads of fruit were lost in box-car shipments. Extension granted by the 1920 transportation act gives any such shippers about two months yet in which to file suits on those shipments.

A test case in the state of Washington, brought by the Pacific Fruit and Produce Company, resulted in a victory for the Northern Pacific in the state supreme court. The Northern Pacific has made a motion for a new trial in the present suit and this has not been ruled upon. Arthur M. Geary, of Portland, presented the shippers' case and J. W. Quick, of Tacoma, represented the railroad company.

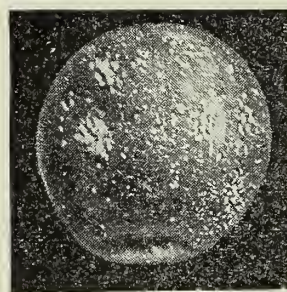
BEFORE using a disinfecting spray in a hen house or coop be sure to remove every particle of filth or rubbish, otherwise the spraying will do little if any good.



ALBATROSS BRANDS

How to prevent the "blotch" or "burn" of the spray on fruit

Observe this study in contrasts. The apple at the left was sprayed with Arsenate of Lead—a wonderfully good spray. But the user neglected to mix "Spray Spread" with it. Below is a similar apple—sprayed with the same kind of spray—but Albatross Spray Spread was mixed with the spray. Note the difference—the "lead" dried on the FIRST apple in



Note the "blotch" or "burn" of the lead on this apple

spots—or blotches. The second apple received an equal amount of protective spray—but it spread over the apple in a thin film. Appearance and marketing appeal of the apple is thus retained. The pictures tell why Government experts are so enthused over "Spray Spread"—why experienced horticulturists say it has NO equal for spreading an "arsenate of lead" spray.

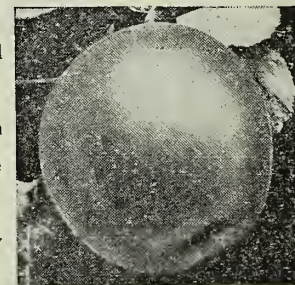
ALBATROSS "SPRAY SPREAD"

(Calcium Caseinate Compound)

Quality Features:

1. Very finely ground—always uniform.
2. Quickly Soluble.
3. No lost time.
4. Protects fruit with uniform coating.
5. Does not injure foliage.
6. Recommended by experts.
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Directions sent with each order



Note the uniform, adhering film on this apple

PACKAGES AND PRICES

200 lb. Bbl.	Boxes	2 lb. Pkgs.
22¢ lb.	24¢ lb.	25¢ lb.

Freight prepaid to Northwest points.

NOTE: If you use Casein, Albatross Superfine, is the brand to buy. Very finely ground—quickly soluble when mixed with alkali.



—for storage plants, packing sheds, etc.

During the last six years a very large proportion of the major industrial plants, warehouses, lumber mills and canneries (list on application) have been made "spick and span" with Albatross Cold Water Paint. This paint is very economical to use—drys snow white—will NOT peel or rub off—retards fire—easy to apply—and when properly applied, reduces insurance rates. Has remarkable spreading and covering qualities—will work over wood, rock, plaster or other material. For almost any kind of commercial interior, Albatross Cold Water Paint is unequalled. Extensively used in the fruit world for storage plants, packing sheds, etc. Tell us your requirements—we can meet them to your complete satisfaction. * * * General Basic Products Co., Sole Manufacturers, 2926 16th Ave. S.W., Seattle, U.S.A. Dealers: Address us for attractive sales proposition.

Elemental Treatise on Pruning the Apple

Prepared by STAFF WRITER

Here and there a man who starts to read this detailed discussion of the subject of pruning the apple tree is likely to say: "Nothing in this for me—I know all this already." Granting that he spoke the truth, this magazine is amply justified in running the article for its value to the many new subscribers it is always gathering—many of them perhaps new in the apple-growing game. However, some of the things here presented are fundamental and, as such, cannot too often be reiterated and borne in upon even the experienced apple grower. The article deals quite fully with pruning in all its relations to production of a maximum of sound fruit. It has also the merit of being written in plain, understandable language.

UNTIL recent years, in fact until the advent of commercial orcharding about the middle of the nineteenth century, popular opinion was adverse to pruning on the ground that it was unnatural and caused the plant to suffer from shock and loss of vitality. Pruning cannot cause shock as the plant has no nerves; and the practise is natural for nature prunes most relentlessly. Look at the forest tree. What became of the thousands of buds and small growth which once existed along its naked trunk and branches during the early stages of development? There was a constant struggle for existence, each individual twig or branch striving for light, space and nourishment. As the competition became keener one after another was forced to succumb. There is a survival of the fittest. This is nature's way of pruning.

Effect of Pruning on Vitality—There is an exact balance between the feeding capacity of the plant and the superficial growth. The larger the food supply the larger the top. If part of the top is removed there is an endeavor to supply the deficiency by a very rapid growth. The loss of tissue is of no consequence and does not

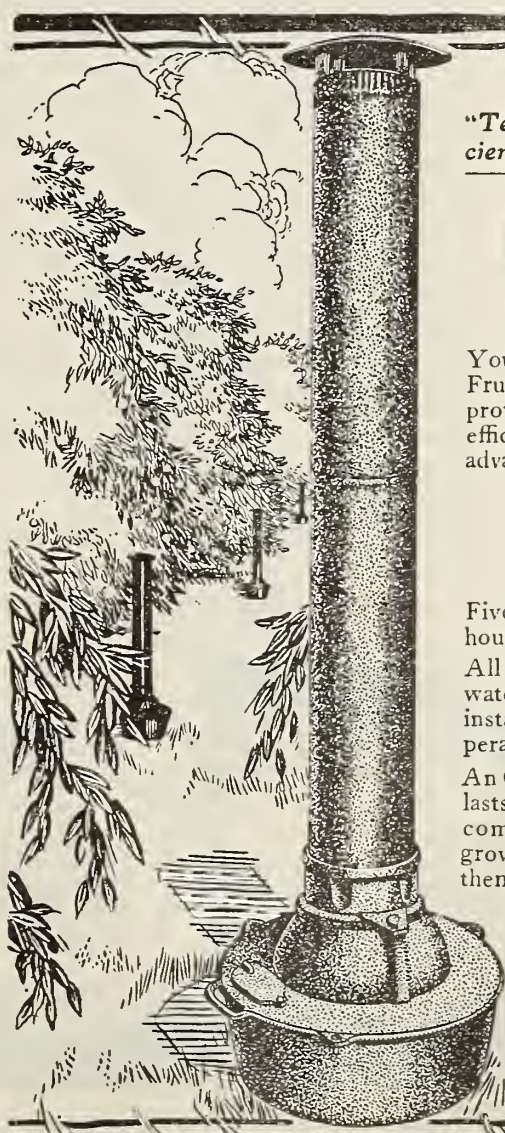
reduce the vitality, unless the nutrition of the tree is injured; but greatly increases the vigor by concentrating the almost constant food supply into the fewer remaining branches. The nutrition of the tree may be injured by such severe pruning as to remove an excessive amount of leaf surface. The leaves serve to combine the soil solutions and the carbon of air into sugars and starches which form the plant's food. The removal therefore of the greater part of the leaf surface will interfere to some extent with the vitality of the plant by preventing a sufficient amount of elaborated food from being formed and distributed over the plant.

Reasons for Pruning—The purposes of pruning should be thoroughly understood before one can hope to prune intelligently or attain the best results. It is better to understand the reasons and purposes than to know the rules of pruning. In fact, no set rules can be made, because the purposes of pruning and the conditions under which to prune are so varied that each tree becomes a

special problem. Get the interests of the tree thoroughly in mind, study the reasons and effects of pruning; and have an ideal toward which to work.

Prof. Wickson of California gives the practical purposes to be served in pruning as follows: "(A) Convenience of the grower, (B) Health and strength of the tree, (C) Regulation of heat and light, (D) Attainment of size in fruit, (E) Attainment of strong bearing wood, (F) Promotion of regular bearing."

Convenience—Low headed trees where most of the work is done from the ground, are most quickly, cheaply, and efficiently handled in all the orchard operations of pruning, spraying, fruit thinning and picking. The lower the fruit can be grown, yet not interfering with cultivation, the more profitable it is. One often hears it said, "There is no profit in fruit which cannot be reached from a ten foot ladder." This profit line is apt to be quite low in times of close competition and every effort



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You insure your house, why not your crop? Fruit growers everywhere can have assured crop protection through the use of this improved and efficient heater which has a number of notable advantages over any other kind.

Oldsmar Frost Protector Costs Less To Operate

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All cast iron (stack excepted), the Oldsmar is waterproof and cannot get out of order. Lighted instantly, it requires little attention and temperature regulation is positive.

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should be made to keep the fruiting wood low.

Strength—Make the tree strong and stocky so it will hold up a maximum load of fruit with as little artificial propping as possible. Most varieties will bear more fruit than they can hold up. Strong stiff obliquely rising growth sustains weight much better than horizontal branches but is more apt to split at the crotch. A combination of the two is desired. Start the branch out more horizontally and turn it upward gradually as it becomes smaller and weaker. This will give the strongest effect. Avoid starting two or more of the main branches near the same point on the trunk in forming the head as a weak crotch is apt to result. They should issue in a whorl at least six or seven inches apart.

Crooks in the limbs are slightly conducive to strength and fruitfulness, as the downward flow of the sap in them is more restricted.

A tree will hold up a heavier load if part is distributed throughout the central portion of the tree.

LIGHT and Heat—Usually the fruit of the highest color, size and quality is in the top of the tree where the light conditions are best. Prune to keep the form open enough to admit sufficient light into the more profitable lower and interior parts of the tree. Light is not only essential in properly coloring the fruit but is most necessary in the digestion of the plant food in the leaves.

In California and climates of high summer heat, it is necessary to prune less open, growing a denser top to shade and protect the trunk and branches from sun scald. In most localities of the Pacific Northwest where there is little damage from heat, one should strive to give as much light as possible to the fruit and foliage.

Health and Vigor—Trees have a tendency as they grow older, to become less

thrifty and vigorous and to produce smaller fruit. Such trees make very little wood growth and usually receive very little pruning. The pruning should always be sufficiently heavy to stimulate a healthy, vigorous growth. This is particularly important with small varieties as the Wine-sap which becomes almost unmarketable on old weak trees.

Vigorous trees are less susceptible to the ravages of borers and some fungus diseases.

Size of Fruit—Pruning affects the size of fruit in two ways: First, by keeping the tree vigorous and healthy; second, by thinning the fruit. Fruit thinning is in reality pruning, but will not be discussed in this article.

Thinning may be more or less minimized by antecedent pruning. Shortening or thinning out bearing branches or removing fruit spurs when clearly seen to be in excess, keeping only sufficient bearing wood to correspond with the size, vigor and bearing habit of the tree is advisable.

Bearing Wood—The fruiting habits of trees may be corrected by regulating the amount of bearing wood. On heavy bearing, early fruiting or weak growing varieties practice heavy winter pruning to discourage the formation of fruiting wood. On shy or tardy bearers, which are usually strong rampant growers, fruiting can be stimulated by practicing light summer pruning and no winter pruning. Tipping back or pinching off the growing tips is conducive to lateral growth which may result in fruit spurs. By repeatedly pinching back water sprouts may develop into good fruiting wood.

Regular Bearing—A tree producing an excess of fruit is seldom able to perfect good fruit buds for the following year. Hence a heavy crop is usually followed by a light one. Any of the numerous causes, including irregular pruning, lack of thinning, and various cultural methods and climatic conditions which produce either a

heavy or a light crop will tend to start the irregular fruiting habit.

To break the alternate year bearing habit, summer prune and thin during the season of heavy bearing, and winter prune after the short crop. The habit is most easily overcome by annual thinning. Moderate annual pruning is conducive to regular bearing.

SYSTEMS of Pruning—There are but two main systems of pruning, the central leader and the open head, although there are several modifications of both. Either system will give good, strong, heavy bearing trees if properly pruned.

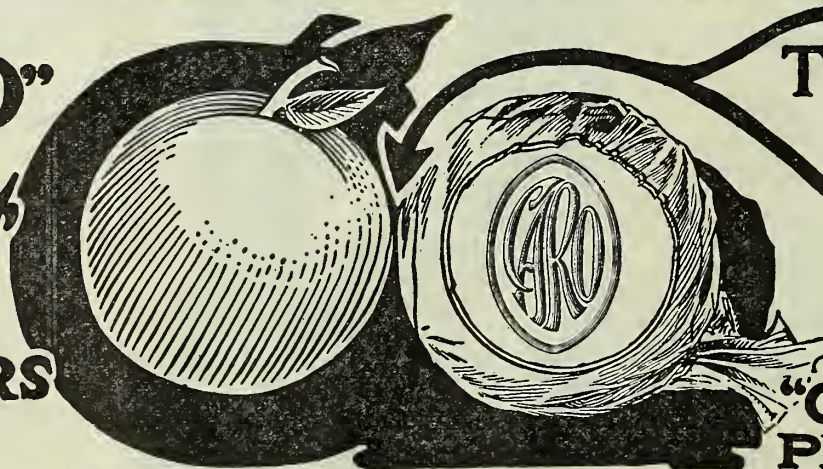
Central Leader System—The leader or pyramidal type forms the tree into an approximate pyramid, with branches along a central stem. In comparing this system with the open head, it has the advantage in that a stronger tree can be formed. The load of fruit is distributed over a larger number of branches issuing at intervals, thus reducing splitting at the crotch.

The objections to this system are: First, the lower branches are apt to grow more horizontal and when loaded, droop and interfere with operations; second, the top where the best fruit is eventually produced is higher; third, the fruit is poorly distributed, there being very little and poorly colored fruit in the lower interior portions where it is most profitably grown and easily held up by the tree, and an abundance at the top and out on the weaker ends of the branches; fourth, the light conditions are not as good, for the drooping of the loaded branches more or less cover and shade the fruit beneath.

Open Head System—The open head is the opposite of the central leader type. The central stem is done away with and the head is formed on three to five, preferably four, main branches which issue near the ground and rise obliquely, forming a more or less inverted pyramid or vase shaped tree. The

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"Caro" Protects—"Caro" Prolongs the Life of Fruit—Why?

CHEMICALLY TREATED, "Caro" from DessiCARE (to dry up)

FRUIT MATURITY is retarded by cold or refrigeration and hastened by heat or atmospheric exposure.

The soft fibrous silk-like texture of "Caro" provides just sufficient ventilation to retard the ripening process.

FRUIT DECOMPOSITION starts from a bruise which opens tiny holes and permits juice to escape and BACTERIA to enter. "Caro" clings closely and dries up the escaping juice. "Caro" ingredients harden the spot, kill the BACTERIA, arrest the decomposition.

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center which is more or less open is filled with fruiting wood. This is by far the better system and is used almost entirely in commercial plantings. It brings the head with the fruiting wood nearer the ground which greatly facilitates pruning, spraying, thinning, and picking. The branches rise obliquely and are less liable to break when loaded or droop to interfere with operations. The head is more open, giving a better distribution of light to the interior portion of the tree. As the fruit matures, the heavily loaded scaffold branches tend to spread, admitting more sunlight to color the interior fruit. Thus the open head system gives better light and air conditions to a larger leaf and fruiting surface, producing more first class, highly colored fruit.

If attacked by blight the open-head tree would be preferred, as most of the fruit spurs and growing tips through which the blight generally enters are lower where the disease could be more easily detected and controlled. Should the leader of a pyramidal tree be attacked seriously enough to necessitate its removal the tree would be ruined. But the other type having several scaffold branches or trunks, one might be spared without seriously crippling the tree. Where blight is prevalent the lower parts of the scaffold branches should be kept free of fruit spurs and small growth, keeping the fruiting wood of the lower interior on sub-branches.

Artificial Support—Under some conditions, with weak growing, heavy bearing varieties or varieties which tend to form weak crotches as the Winesap or King, it may be necessary to give artificial support to the open center tree. Propping with poles is not practical as it is expensive, unwieldy, temporary, and inhibits orchard operations in general.

There are advocates of a system of wiring, the wires remaining permanently in the tree. A twelve-gauge galvanized wire is fastened from a central ring to each main branch by means of screweyes. The wires should be placed as high as possible to give strength and yet not be fastened to branches under one and one-half or two inches in diameter. The wiring costs about twenty cents per tree and will last a lifetime. The wires do no damage and are a handy means of support to stand upon while pruning, thinning, and picking. Some trouble is experienced, however, in the limbs breaking at the point where the screweye enters.

For heavy or early bearing varieties or in districts subject to sleet and heavy snows in winter it will be necessary to add temporary support to the trees too small to receive the permanent wire supports. Tying soft spun two-ply hemp or manila twine between opposite branches is satisfactory and cheaper than props. It lasts three years and costs about five cents per tree.

Another method of support is to bolt opposite branches together immediately above the crotch.

(Continued on page 20)



What You Lose in using cheap paint—do you know?

GOOD paints require much thought and time in their preparation. That is why you should insist upon purchasing paints that have a reputation.

We make good paints like this—to save you money; and we call them Fuller's Specification Farm Paints because we have made them especially for farm use.

We use pure PIONEER WHITE LEAD, pure linseed oil, zinc and color in scientifically exact proportions, arrived at through 72 years' experience.

The lead is made so fine that it will pass through a silk screen of 40,000 meshes to the square inch. That means covering capacity and ease of spread.

A special device super-purifies the lead, making it "whiter" so Fuller colors are exceptionally clear-toned. All ingredients are thoroughly mixed in specially designed machines, so the paint is always uniform.

The result on the house or barn is an elastic, tough, protective coat that stays five or

more years, keeping the wood like new.

Some figure paint economy as "cost per gallon." That is wrong. For "cheap" paint doesn't cover so much surface—you buy more gallons. "Cheap" paint spreads less quickly and you have more labor cost. So "cheap" paint applied is no less expensive than the best.

"Cheap" paint on the average starts cracking in twelve months

while the best paint stays intact five or more times longer, if properly applied. Figure then the cost per year of service and decide how much you lose when you use cheap paint. Don't allow surfaces to rot. It costs less to paint them.

All "Fuller" Specification Paints are made the costlier way for your economy. Be sure you get them when you paint.



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Slipshod Practices in Marketing Fruit

By W. B. ARMSTRONG

President Washington State Farm Bureau, Yakima, Washington

FULLY to describe the lack of order in the distribution of the perishable food stuffs grown in this country would be impossible and to attempt such full description would result in a tiresome impeachment of our civilization which has permitted the greatest disorder to remain in the distribution of the food of the people.

A few statements will illustrate the disorder, and while they are drawn from experience with apples, please remember that exactly similar happenings occur to all raw food stuffs, whether they be apples or onions, turnips, squash or potatoes, poultry or eggs.

The national apple crop of 1920 will be remembered as the largest for almost 20 years, and as our Northwest crop moved to market we found that a number of centers of distribution were becoming badly glutted.

By the first of this year losses, due to lack of what I will call pre-vision in shipping, must have aggregated fully \$1,000,000 to growers and shippers of Washington alone.

The storage facilities of Fort Worth, Texas, were piled up with excess shipments of Northwest Jonathan apples, while, to my knowledge, there were still unfilled orders for that variety in the hands of shippers.

It is impossible, of course, to trace back the ultimate loss, but when it is understood that 95 cars of Jonathans were in storage in Fort Worth late in December, it will be realized that tremendous loss was experienced from that point alone. The presence of so many Jonathans there closed the markets of that region to later varieties, causing further loss—indirect loss, of course, but nevertheless very important.

Kansas City was another center where the glut exceeded that at Fort Worth, and conditions at Pittsburg, Chicago and other places only repeated with little variation, the same tale.

My own observation and that of many others show that in the middle and eastern states in the spring of this year apples were being retailed at exorbitant prices and it is undoubtedly true that nearly all of our apples of that 1920 crop were consumed at tremendous prices. Some said "over-production" caused the disasters to our 1920 crop. I assert that, in view of the facts I have related, such description is unwarranted, and to make my position stronger, if need be, will say that I have knowledge of large areas of Illinois, Iowa and other middle states, which were almost entirely without a supply of either eastern or western apples.

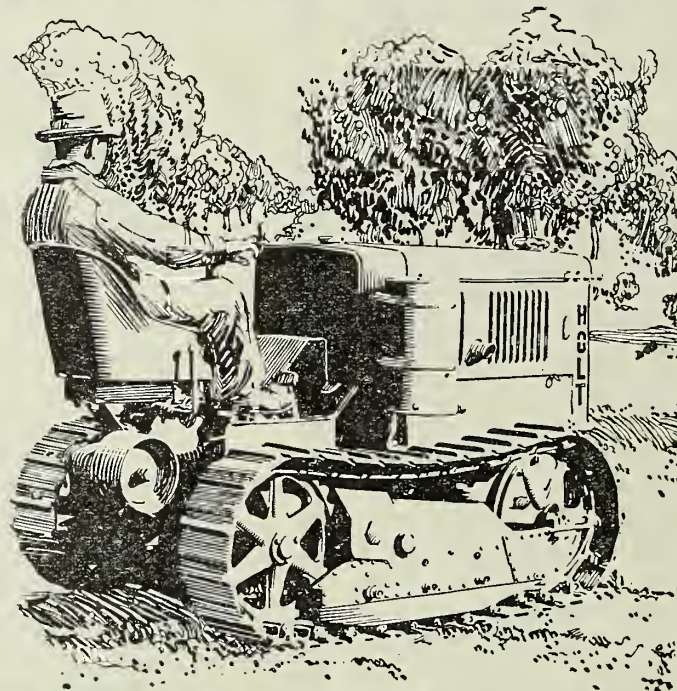
The easy-going minds that said "over-production" last spring, looked forward to a certainty of better distribution with the present crop which is the smallest the coun-

try has had in years. What do we see but the same disorder—shipments made without any knowledge of the conditions of demand and supply at their destinations, cars arriving in large numbers at centers of distribution already flooded, and retail prices kept sky high and proving a barrier against consumption.

YOU well know that a very short run of such disorderly marketing would mean the swift ruin of any manufacturing con-

cern. A parallel to such unbusinesslike practices cannot be found in any other industry because in all other industries those whose money and time are tied in them feel a responsibility for the successful merchandising of their product. Indeed the industries of which I speak are built right around a selling plan.

Suppose you were in the commission business in Pittsburg and that you had put your money or your credit into a purchase of five cars of Jonathans only to learn soon after that a large number of cars loaded with the same apples were rolling toward you unsold. Suppose that each morning a bright and breezy broker called with a list of unsold cars, any or all of



The New Leader Among Small Tractors

Now at last you can secure in a small tractor all those qualities of long life, low upkeep cost, economical operating expense that have for years featured the larger models in the "Caterpillar" line. Only the extensiveness of Holt experience and the thoroughness of Holt experimental work, together with the development of new qualities of steel and better methods of heat treatment, made possible a small tractor that would live up to Holt standards. Size has been limited without sacrifice of power—weight has been reduced without imperiling strength.

The new "Caterpillar" T-35 Tractor is only 48 inches wide and 52 inches high, weighs but 4000 pounds, yet develops a liberal surplus of power over its 14 drawbar-horsepower rating.

It has been tried, tested and proven—meeting the exacting Holt standards of economy, durability and dependability. Send at once for complete information. Be ready for winter work with a new and better way to get it done.

THE HOLT MANUFACTURING COMPANY

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T-35 Tractor

which you or your competitor are asked to bid upon. You would draw no comfort from the fact that this same list is a duplicate of the ones that other brokers are peddling all over the country, but you would settle down in gloom—say to yourself, "Never again will I buy a stock," and from that time to the end of the season order with the utmost conservatism.

If you were dishonest you might attempt to recover your loss on the first purchase by ordering and then turning down cars for any old cause in the hope of making some illegitimate gain.

Any who have been wondering why I have not said more about the retailer must realize that it is almost entirely up to the consuming public to regulate that branch of the trade. Some practical suggestions have been made and it is probable that much can be done by the grower to assist in regulating the great spread between the jobber and the consumer, but I repeat that the solution of the difficulty is mainly in the hands of the public.

Last April there was assembled in Chicago representatives of the various fruit growing districts in the United States. It was decided to place this matter of distribution before President Howard of the National Farm Bureau. He was asked to appoint a committee of 21 persons, thereby giving representation to the various fruit growing districts of the country. This task he has accomplished.

Meetings of Interest

PROGRAMS of two meetings, which would readily have been given space in these columns last month, were not completed until mid-November. Sessions of the Oregon State Horticultural Society at Forest Grove will be ending as this issue reaches the hands of most subscribers. The dates of this, the thirty-eighth annual meeting of the society, were December 1, 2 and 3. An array of able speakers and practical topics were listed on the program.

On November 29 and 30 the Western Walnut Association, which includes in its membership walnut and filbert growers of the Northwest, held meetings at the Chamber of Commerce in Portland. C. A. Reed, nut specialist with the United States Department of Agriculture, returned here, following his recent investigations of the nut industry of this region, to be the principal speaker.

The British Columbia Berry Growers' Association, recently organized, this year has handled about 500 acres of fruit. The total tonnage estimated for the year is 2,500 tons. The new association is composed of 13 berry marketing organizations that were already in existence and will act as the central sales selling agency. H. A. McNaughton of Gordon Head, Vancouver Island, has been appointed sales manager of the new organization.

Australian Tests

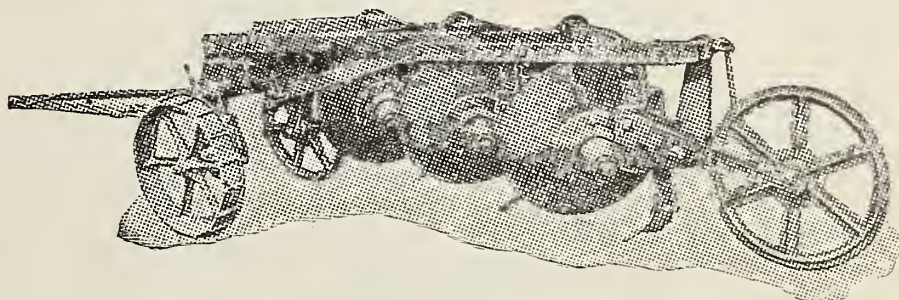
THE South Australian government is doing valuable work in the interests of primary producers through the tests and experiments being carried out in its experimental orchards at Blackwood, where fifty acres are incultivation. A total of more than twenty different kinds of fruit are grown there in 4829 different varieties.

The following trees are grown for testing purposes (the figures in brackets indicate the number of varieties cultivated): Peaches (525), nectarines (83), apricots (125), plums (401), cherries (294), olives (35), almonds (50), persimmons (44), figs (205) loquats (18), apples (1826), pears (1014), quinces (42), nuts (50), oranges and mandarines (75), lemons and limes (17), other citrus fruits, including pomelo, shaddock, kumquots, etc. (25).

Foolish Competition

CITRUS LEAVES realizes that ships alone will not solve the question of our trade relations with the Orient. The securing of a balance between imports and exports is first necessary. Foreign trade can not be developed over night. It must come about through a gradual and slow process. The narrow-minded competition between the ports of the Pacific Coast must be eradicated.

Cities on the western coast interested in developing foreign trade must co-operate. From Puget Sound to San Diego, the spirit must be one of mutual assistance. Through this close co-operation our goods will be fostered in foreign markets, gradually absorbed and return cargoes disposed of here. Immense possibilities are open to us on the Pacific Coast. Are we going to meet this task.—Citrus Leaves.



The New McKay Disc Orchard Plow

Here is the latest and most improved development of the disc plow and subsoiler combined. It has been designed and built to embody every improvement. Its ease of handling and its greater adaptability to every condition of orchard, grove, vineyard or open field tillage are outstanding points that insure its increased utility.

THE ORCHARD PLOW AND SUBSOILER OF GREATEST UTILITY AND PROFIT

The McKay disc plow has been thoroughly tested under most difficult conditions.

The patented hitch permits plowing close to trees, throwing soil either direction. Front and rear discs cut outside of wheels, thus allowing closest plowing to and from trees and vines. Greatest offset without side draft on tractor. Built low and sturdy, the plow will work under trees without injury to branches or fruit. No projections of any kind above the beams.

The new McKay pulls straight on centers with no side thrust.

It is simple in construction, has but few parts—most of which are steel—and is noted for its unusual strength and endurance. There are no chains, sprockets, levers or gears. The patented power lift is sure and simple.

Attached subsoilers behind each disc break up the hard pan, but may be adjusted out of the way when desired. Greater clearance above and between discs permits turning of heavy cover crops. Full Timken bearings in all wheels and discs. Pivotal front truck allows tractor and plow to turn on narrowest headlands without straining beams.

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Seasonable Hints

Those readers who unfailingly keep things in spick-and-span shape about their orchards or ranches and who do the necessary task at the exact time it should be done may just as well pass this by. This is just a bunch of timely hints and, as such, can be of no value to any such paragons of efficiency.

It is a poor workman who finds fault with his tools, but it is a worse one who goes on a job with poor equipment.

If you do not use the best pruning tools obtainable you are missing much of the possible satisfaction of this oftentimes irksome job. Aside from the fact that the best tools make the work of pruning easier, a good pruner, whether saw or shear, is the one that makes the clean cut, while the poorly built tool almost always damages the limb stub.

Figuring an average of only 20 cuts to a tree, you would make between 10,000 and 12,000 cuts in a 10-acre orchard. If your pruners are worn or dull, or not properly constructed or adjusted to insure a clean cut all around, then you are sure to leave thousands of ragged,

disease-receptive spots to mar and cripple your orchard.

Use of an old, worn-out spray machine is another bit of false economy that practically assures trouble and loss. Not alone is it expensive in amount of time consumed, but also because of the inferior work that must result in loss of clean fruit.

If you did not clean up and repair your spray equipment and put it away in the best of shape when through with it you would be repaid even yet for the trouble of putting it in proper trim now, or at least well in advance of the time you must use it again. Time for the dormant spray, as you will recall, is not so many months distant.

Have you looked into the matter of fertilization with an open mind? Perhaps you have not realized that the day has gone when horticulturists took it for granted that these wonderful Northwestern soils would go right on producing bountiful crops without man's assistance. Hundreds of tons of fertilizers are now applied annually to orchards of the Northwest and their use is steadily increasing.

Thousands upon thousands of acres of land in Southern states was drained in days gone by of every vestige of fertility through continued cropping to tobacco or cotton without thought to replacement of the elements necessary to crop life. This condition is now being remedied, but the loss in the meantime has been appalling. Through the use of cover crops and commercial fertilizers lands of the South are once more being brought back to a state of fertility.

The lesson is too obvious to need elucidation. You will surely grant that there must be no repetition of any such stupidity in the Northwest.

Mythical "Ring"

It appears, after all, that the Chicago investigators of food costs thought they found something wrong with the Northwestern growers. One member of the committee which visited Coast cities made the allegation that the grow-

ers will sell their apples only to a "ring" of commission men.

The charge, were it proven true, would reflect more or less of discredit upon the growers and would possibly account for a part of any undue costs to the consumer.

Before those who know marketing methods and conditions in Coast fruit sections the charge fell as a "dud." The explanation of why nearly all the fruit produced here is sold to a comparatively few commission dealers is simple. They know the business and, more important in this phase of the matter, they have the funds necessary to handle carloads of fruit under conditions as they exist.

Individual would-be purchasers of fruit in car lots, the growers have found, almost invariably drop their plans when they find, for instance, that a car of apples at its eastern destination represents an outlay of approximately \$2,000. This money requirement is what keeps the individual from buying, and not an agreement among growers to sell only to a "ring" of buyers.

National Apple Day

It is a fact hardly to be disputed that National Apple Day was given little recognition in Western fruit-growing states this year. There were any number of communities where not the slightest observance of the day could be noted.

Several explanations may be advanced. Chief among them are the fact that most apple growers were too busy with their crops and a sort of impression that the observance is intended anyhow mainly as a reminder for consumers in the East. As to the first excuse, excellent reasons can be advanced in favor of a later date for apple day.

The fact remains, however, that if the nation is to be told that a certain day of the year is set aside in recognition to the apple and its value to mankind, those who are most vitally concerned should not slight and ignore the occasion. The impression thus given the consumer-public is anything but beneficial.

Send in a Letter

AS A REMINDER and incentive to influence many readers to send in "experience letters" to be run in the Homeseekers' number, coming out January 1, the prize awards offered are here listed again:

Ten dollars cash, first prize, for best and most informative letter.

Five dollars cash, second prize, for next best letter.

Two-year subscriptions and extra copies of the issue to all others writing acceptable letters.

The letters should deal with personal experiences in growing fruits, berries or nuts, or any combination of these. Location, dates, size of tracts, yields and figures on returns are needed to make the letters convincing. Read the article on filbert growing by Nat M. Norelius in the October number and you have an excellent illustration of how to detail your experiences.

Letters should not be over 800 to 1000 words long and should reach the editor not later than December 22. Have the wife or daughter pen the letter if you happen to be pretty busy. It will be a favor if you write on but one side of your paper.

Delay will make you too late, so sit right down and pen a letter that will give the eastern homeseeker first-hand information about what you have accomplished.

Any who do not send us an experience message, but who want extra copies of the number, can make sure of getting them only by ordering them in advance—right now.

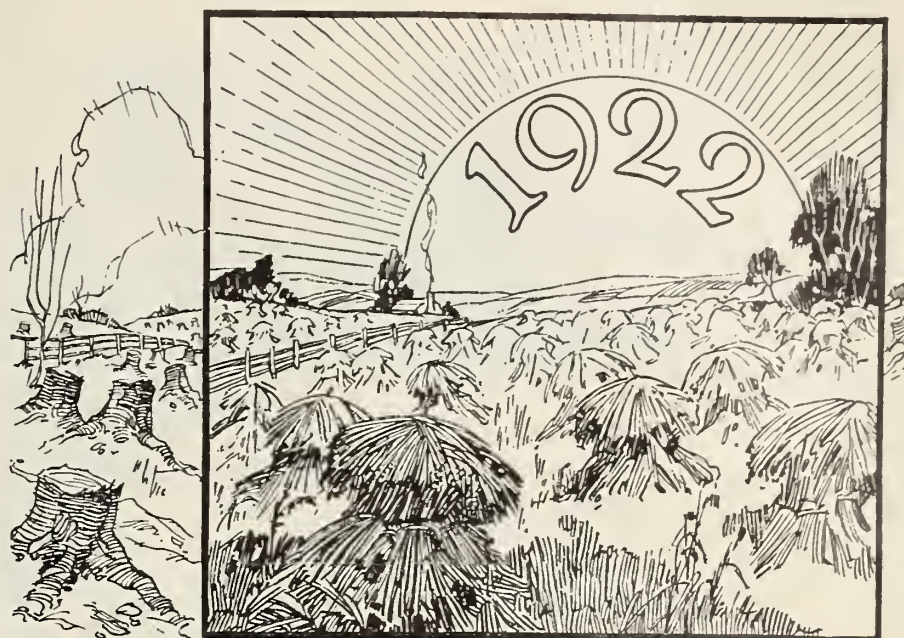
College Holds Show

AROUND a mammoth pyramid built from 6000 rosy-cheeked apples, displays of fruits, flowers and vegetables transformed the men's gymnasium into an Egyptian garden at the sixth annual Oregon Agricultural College horticultural show, November 4 and 5.

The sides of the "gym" were allotted to the four main divisions of horticulture: pomology, vegetable gardening, floriculture and horticultural by-products.

Sixty kinds of apples, produced chiefly at the college experiment station, 20 varieties of grapes, district displays of apples, a large exhibit of pears from the southern Oregon experiment station, 20 entries of walnuts, an odd lot of such nuts as the Kola, the Pili, and Paradise, and subtropical fruit comprised the exhibits prepared by the department of pomology.

An exhibit from British Columbia, sent in by William de Macedo, a student, won first blue ribbon in the district displays. A collection of Medford fruits, sent by Willette B. Murray, won second place. Professor W. S. Brown, head of the department of horticulture, judged the exhibit.



1922 Will Be the Northwest's Greatest Land Clearing Year

Hundreds of thousands of acres of waste stump land were cleared and farmed in the Northwest during 1921. But the stump enemy must be beaten still further. Most farmers are planning to increase their incomes in 1922 by clearing even more land than last year.



STUMPING POWDERS

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Make your plans now. Take an inventory of your land. Resolve to put just as many idle, waste acres to work for you in 1922 as you can clear.

More land has been cleared in the Northwest with Du Pont Stumping Powders than by any other explosive merely because their uniformity makes them the most reliable and their strength makes them the cheapest.

You can buy Du Pont Stumping Powders from your hardware dealer or general store. For complete instructions for using explosives for land-clearing, drainage and tree-planting, write for free copy of Development of Logged-off Lands.

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SPOKANE—SEATTLE—PORTLAND

Nursery Stock Quarantine

A QUARANTINE has been established against the importation into Washington of nursery stock from the counties of San Benito, Santa Clara, San Mateo, Alameda, San Joaquin, Sacramento, Yolo, Solano, Contra Costa, Napa, San Francisco, Marin and Sonoma in California and Linn, Marion and Polk counties in Oregon. The quarantine was issued because of prevalence of pear thrips which is not prevalent in the state of Washington.

Every shipment of nursery stock or any other host of pear thrips from the counties

and territories mentioned must have all foreign particles thoroughly removed from the roots, and during the period of activity of the pear thrips, namely March, April and May, all parts of nursery stock except roots must be dipped in a solution of miscible oil No. 2 (five gallons), and black leaf 40, (one pint to 200 gallons of water). All shipments of nursery stock from these sections into Washington must be accompanied by an official certificate from a local horticultural inspector or quarantine officer showing that these regulations have been complied with.

Winter Injury

(Continued from page 6)

trees would not be crippled as they are now bound to be when heart-rot fungi enter the unprotected wood. Frozen wood is very susceptible to attack by these wood rotting organisms. Living bark is the best protection against such invasion, but failing that, exposed wood should be coated with a good protective tree paint, such as that made by warming together a mixture of 1/3 creosote and 2/3 coal tar, or a good Bordeaux paste may be used. Both should be frequently renewed until the wound is completely healed over.

Apples, 30-year-old Baldwins, Spitzenbergs, Romes, Ganos, Astrachans, and Yellow Transparents—The Baldwin, Spitz, and in some case the Romes also were girdled above the snow line when examined in February, the bark being discolored all the way through and the sapwood likewise browned. In such cases the trees were recognized as hopeless and by July nothing remained of them but a collection of dead trees. Except for a few green shoots that had "suckered" from below the snow line they presented the same appearance as in February. An occasional tree, more vigorous than its neighbors, or those that had been fertilized, appeared to be in better shape and with careful nursing might pull through, but these trees were few. It was a striking demonstration of hardiness, however, to see Astrachans, Yellow Transparents, and Ganos in full leaf and bearing a good crop, standing out green and vigorous in the midst of the dead trees, sole survivors of a once beautiful orchard.

Filberts, 9-year-old Barcelona and DuChilly—The catkins were killed above the snow line, but were not injured below. Pistillate flowers were uninjured. Occasional cambium injury was observed on the south side and where the trees had been heavily forced this was more severe. The greatest damage, however, resulted from the loss of the next year's crop.

Walnuts, 9-year-old seedling Franquettes and Mayettes—The one-year-old wood was dead also the buds and catkins when examined in February. The bodies were injured through the bark, cambium and sapwood, especially on the south side, but on the north there was, in many cases, a strip of good cambium that offered some hope of saving the trees, although as cripples. In July we found occasional shoots from adventitious buds below the one-year-old wood and usually many from below the snow line.

IT MIGHT be of interest to go a little farther with these special reports on conditions in nut orchards. For instance, the influence of elevation and good air drainage was shown in the freedom from injury of the extensive plantation known as the Eola Tracts near Amity, Ore. One or two trees only on the entire planting of over 1300 acres, showed any injury at all, very slight discoloration in the outer

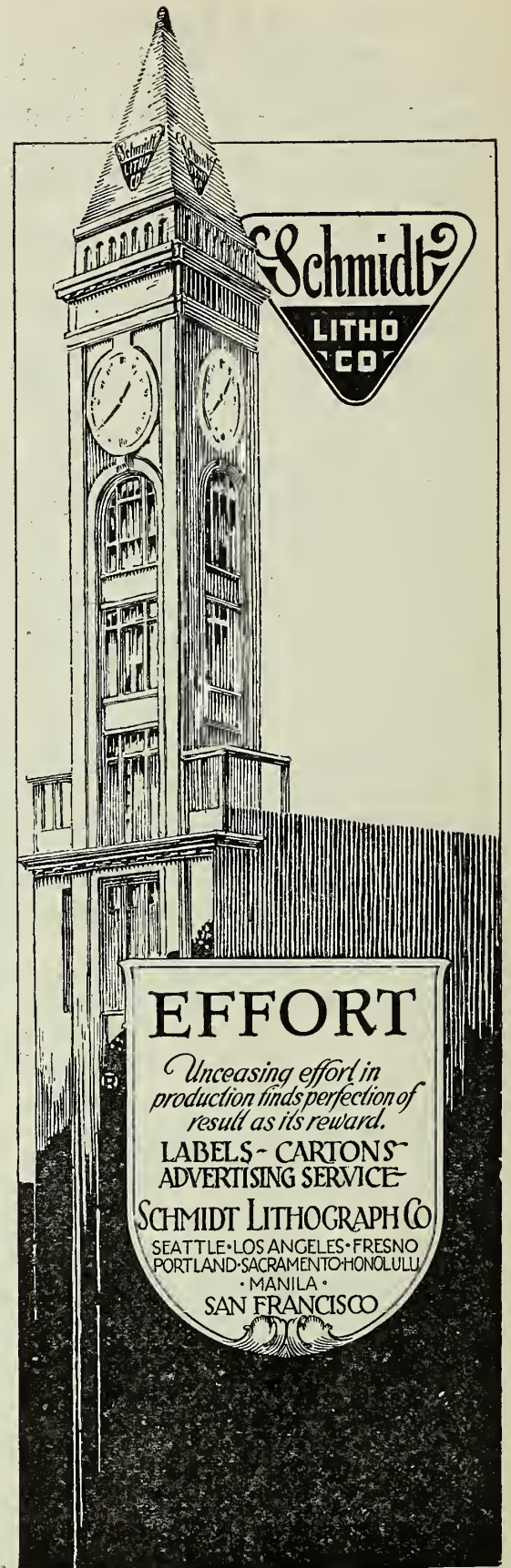
bark. These trees were in a little pocket shut off by some woods. The planting is located at an elevation of 700-800 feet above the main valley floor, where severe loss occurred. The land is very rolling and this provides good air and soil drainage. Due to its elevation it escaped the severe freezing temperature since the minimum reached only six degrees above zero. Again, in the Liberty District, south of Salem, there is a walnut orchard extending from a small flat on poorly drained land over a hill. The trees on the flat were observed to be badly damaged in February and I suspect some of them have since died, but on top of the hill no damage could be found. These observations doubtless could be multiplied many times if we could collect the experiences of all the growers.

What is the lesson—Choose a safe location for your plantation, do not disregard such fundamental consideration when establishing a business that should last a lifetime or more, but which can be wiped out in a single night. A perfect climate exists only in the prospectus of the real estate man; don't gamble with the weather.

Besides choosing good location, what more can we do for protection? We can influence the degree of dormancy with which our trees enter winter by the manner of cultivation and the system of cover cropping employed. Take as an instance in point the orchards of Charles Trunk, at Dundee. His plantation is on deep clay loam soil, very retentive of moisture and it extends from low bottom land over the lower slopes of the hills. He recognizes that the different sections require different treatment in the way of cultivation, and that he succeeds in inducing proper dormancy was indicated by the condition of his trees and their comparatively light damage when I visited the orchards in February. He has good drainage conditions except on the low bottom land, but here he discontinues cultivation in June to allow the trees to harden up for winter. On higher land he cultivates until August, depending upon the soil. He grows a cover crop of clover between the trees and this also aids in better ripening of the wood as well as furnishing fertility. Such conditions call for good judgment in balancing moisture conservation for crop production and timely checking of growth in preparation for winter. The wood of his trees appeared uninjured in February, but occasional bark injury was noted as well as killing of buds and catkins, the critical temperature for which was passed with cold registered at ten degrees below at his place.

The question is frequently asked as to the possibility of reducing loss from winter killing by topworking tender sorts to hardier varieties. For obvious reasons complete success by this plan can only come if the operation is carried out below the usual snow line.

When injury has already occurred above the snow line and the trees are likely to die



as a result, which was the case in so many instances two years ago, resort may be had to stump grafting, as has been successfully demonstrated by W. W. Reburn in his ten-year-old walnut orchard at McMinnville, and by Mr. Cox, also at McMinnville, in the case of his old apple orchard. If, however, you are going to stump-graft, the quicker you cut away the dead top the better chance you will have for success of the operation. Mr. Cox's experience will bear out this statement, for where he delayed his grafting operations until the trees came into leaf he had rather a poor success in getting his cions to take, while in cases where the work was done early he had complete success.

THE importance of vitality and vigor in a tree in withstanding frost damage was strikingly illustrated in several orchards. In February we were inclined to think that the old neglected trees, those that had not been making a vigorous growth, were injured the least, but this good showing did not extend through until July. The weak trees may have been more completely dormant at the time of the freeze and may have been injured less, but if so they did not have the ability to recover while the more vigorous trees did. In February we visited the orchard of Frank Hrubetz, south of Salem and found striking differences in the amount of injury in different parts of the orchard. The orchard consists of 20 to 25-year-old Italian prunes and a number of old pear and other trees. Part of it had never been fertilized, and this section showed much injury in the tops of the trees, branches frozen through and dead in the crotches, especially at the base of the old pendant fruit spurs on the prunes. Another part was treated with two pounds of nitrate of soda per tree in the spring of 1918. The injury was markedly less in this section.

Still another section had been treated for two years with nitrate of soda and here there was no injury at all in the tops. The prune orchard of L. T. Reynolds, north of Salem showed the same thing, much less injury on trees that had received nitrogenous fertilizer, while many trees that had not been fertilized failed to survive. We carried on some spraying experiments in the latter orchard in 1919 and during the course of this work a number of the trees lost a considerable amount of their foliage as a result of spray injury. The winter injury on these trees located in the unfertilized section of the orchard was most severe and many of them have died. In the fertilized section these trees showed damage, but survived.

This freeze demonstrated some valuable lessons, one of the chief of which is the remarkable recuperative power of frost injured trees, and in this connection we probably shall have to concede the honors to the Italian prune. But among all fruits and nuts we saw demonstrated their comparative hardiness, and so we may therefore choose for our future plantings such varieties as are most likely to withstand the next "test winter."

I want strongly to urge that growers of the Northwest coast country study each other's experiences growing out of the freeze, so that they will be better prepared for the next test winter. We use Nature ill if we do not use her to best advantage. So for further plantings let us choose the site intelligently with a view of all possibilities; let us grow varieties of proved hardiness as well as of proved worth otherwise; and then let us care for the trees, not as a crop of potatoes to be dug in the fall, but as a trust that we may leave when we are gone.



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Potash Hunger
the opportunity has come to buy
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POTASH PAYS

Rodent Warning

By LUKE POWELL.

Yakima, Washington

UNLESS the fruit grower who has had alfalfa in his orchard takes some drastic steps to control the mice the loss from girdling will be severe, especially if we have a hard winter.

There is no question but that alfalfa is a fine soil builder for the orchard, but it is also an excellent breeding place for mice. Never but once before have I seen the mice as bad as they are in some of the orchards in the Valley this fall. I have seen orchards where 60 per cent of the trees were girdled during the winter. This will be duplicated in some orchards in the Yakima Valley and elsewhere if the owners do not wake up to the situation before it is too late.

The owner of a good orchard cannot take too many precautions. Disc the alfalfa in this fall. Clean away all trash for two feet from around the trees. Drop poison grain in the burrows or holes of the mice and under V shaped troughs, turned upside down, and in or under other things where the mice can get to it, but birds and fowls cannot. Later if there is a heavy snow and you do not feel any too safe clean the snow away from the base of the trees. However, do not fail to destroy as many mice as possible before real cold weather arrives.

I have known the mice, when they were hungry and other food hard to get, to girdle the roots of large trees from three to four feet from the trunk. Trees are never safe as long as there are mice in the orchard. The saving of one tree will pay for a number of pounds of poison and hours of labor.

The owls destroy a great many mice. Do not kill them.

Elemental Treatise on Pruning the Apple

(Continued from page 13)

Perhaps the most efficient method is to twist together lateral shoots from opposite scaffold branches allowing them to grow together, forming a support. This is best done during the third to fifth years of the tree's growth. It will increase with the tree in size and strength, giving a strong permanent support.

FORMING the Head—In forming the head keep in mind a mental picture of the ideal tree. The four or five scaffold branches should issue in a whorl evenly distributed between the heights of fifteen and thirty-five inches on the stem, extending outward obliquely and turning upward gradually as the branches become smaller and weaker, giving strength to the limbs and making a wide expansive wine-glass form with a rather open center admitting sunlight and air and affording the greatest possible leaf and fruiting surface

as low down as possible, yet no branch drooping to interfere with cultivation.

We will now consider the steps taken to secure this ideal form.

Pruning at Planting—This first pruning consists in cutting back the top and pruning the roots. The roots are usually cut back quite severely in removing them from the nursery row, and should be pruned as lightly as possible at planting time, removing only broken, badly bruised, diseased, or dried out roots, and cutting the healthy ones back to live tissue. This allows the wound to granulate, heal, and throw out feeders. A knife or hand pruning shears is used. The knife makes a smoother cut, but the latter is generally preferred on account of greater ease and rapidity.

Head at Thirty-Five Inches—The proper height to head the tree is a question of pop-

ular dispute among horticulturists. Various heights from eighteen to thirty-six inches being advocated.

The idea is to head as low as possible yet allow sufficient room for scaffold branches. The lowest branch should issue at about fifteen inches from the ground to permit proper cultivation beneath. The four main branches should be at least six or seven inches apart on the stem. If closer, when they become large they would appear almost together, crowding badly, at the point of emergence and forming weak crotches. This would bring the upper branch at about thirty-five inches. Some may think this is too high, reasoning that to head lower would bring the fruiting wood lower. Yet as a matter of fact there is practically no difference.

(To be continued)

MYERS SPRAY PUMPS

The inestimable value of spraying has again been demonstrated this year. While some localities report smaller crops of fruits and vegetables than usual, the quality has invariably been far above the average thus balancing the shortage in production.

This indicates that whether the yield be an abundant or small one there is always a ready sale for choice fruits—and choice fruits can no longer be grown without resorting to the protection afforded through spraying.

MYERS SPRAY PUMPS, NOZZLES and ACCESSORIES have long been assisting fruit growers, farmers, gardeners and others in their fight against plant and tree enemies. Economical, practical, reliable and fully proven, with styles to meet all spraying requirements, no matter how large or small your orchard or vineyard, there is a guaranteed Myers Spray Pump that will exactly fit your needs, and the price will be as low or lower than many of the light weight, poorly constructed and cheaply equipped outfits now on the market.

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Pruning Suggestions

(Continued from page 7)

be avoided. I do mean, however, that in general a fruit spur which bears fruit one year will not bear fruit the next. The reason is obvious if we appreciate the theory of fruit-bud development. The spur which bears fruit expends all its energies and uses all available food supply to develop the fruit. There is no reserve food supply available for fruit-bud development. This spur must then take another year for recuperation and fruit-bud formation. On the other hand the spur from which the fruit has been removed will elaborate in its own leaves a supply of reserve food material and will develop fruit-buds for the next year's crop. This then is one of the prime objects of thinning. To be sure, we thin for size, but after all we may thin for size and not secure annual bearing. That is we may get a crop of fair sized apples and still have alternate bearing.

There is a limit to the amount of fruit that may be developed and still develop fruit-buds. One must gain judgment on this point by actual experience. We are quite apt to lack courage in thinning. I believe we should decide about how many boxes of fruit a tree will develop and then thin for that amount. This means that we may actually need to count the fruits remaining on the tree. Suppose we decide a certain tree should bear ten boxes of apples and that a desirable size of fruit is say 135 to 150 apples to the box. Then thin the trees to 1350 to 1500 apples. If you don't make some such estimate you are pretty sure to leave more fruits than the tree will properly develop. If it produces this crop and fails to bear flowers the next year you have over-estimated the capacity of the tree at least in most varieties. If the fruits develop over-size or the tree matures its fruit well and makes too much growth you have under-estimated the tree's capacity.

Every grower must for his own conditions, work out his own standard. It will not be necessary to make counts in all trees for you will in time develop a good thinning judgment. If this thinning is to be effective it must be done early, at least before the season of fruit-bud development is well advanced. In our standard apples like Wealthy and McIntosh I am quite sure that the annual crops may be secured by proper pruning thinning, but not by pruning alone.

IT IS ALSO well to remember that in some varieties at least there is a choice to be made in the fruits to be left. For instance, a normal cluster of apple flowers is six. In the McIntosh the center or sixth blossom does not develop a good fruit. The stem is short and fleshy and the fruit is angular and of poor shape. This is the flower that too often sets and the fruit develops at the expense of the others which

drop or are crowded off. The next two blossoms below this are the ones that develop into the best fruit.

I want to mention briefly, that there is another stage in the development, which we should watch out for, and that is the stage when the fruit begins to develop out on the tips of the branches, at the expense of those in the center of the tree. Such a growth indicates that the tree requires more pruning, and then we begin what we might call a system of pruning for the heading in of the branches, to encourage more growth in the center of the tree. I don't think much of allowing the tree to develop its fruit away out on the tips of the branches.

Then, one other point, and that is, pruning tools. I don't believe many of us appreciate the convenience of proper pruning tools in orchard pruning, and I think we should put more emphasis on proper tools. I wonder how many orchardists have used a pole pruning saw, which, in my estimation, is one of the most convenient pruning tools about the orchard; we have all used pruning clips, probably, but by a pole pruning saw, we will eliminate one-half of the climbing and one-half of the work on stepladders; a good type of pruning saw is one with a curved blade on the end of the pole; they cut both ways, but particularly when pulling, which is the safest way to cut, when pruning.

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Prevents wire worms, eel-worms or nematodes, smutty grain, ants and potato scab.

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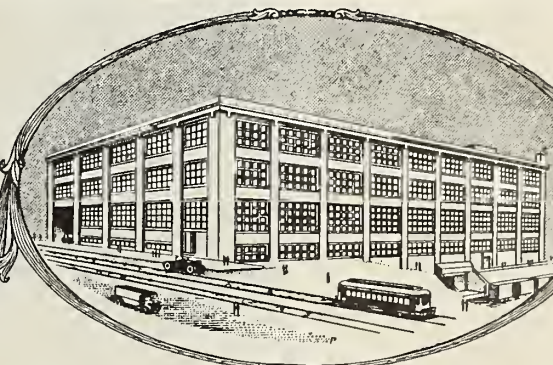
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Eastern Growers

MID-WEST and eastern orchardists are planning to follow the Pacific Coast practices in growing and marketing their fruits in an attempt to recapture their own home markets now largely held by the far-west trade. They are telling themselves that if they prune to get better size and color in their fruit, spray to keep down insects and diseases, pick the fruit tenderly to keep it free of bruises, and then put it up in attractive box packs which are held in cold storage "with enough moisture to prevent shriveling," they can oust the western product because of the advantage they have in transportation charges.

This does not mean that the coast growers are bound to lose the markets, comments W. S. Brown, chief of horticulture at Oregon Agricultural College Experiment station. Superior climatic conditions make for a certainty of crop much above that of the eastern conditions, and also lend a high color and fine quality that are truly distinctive. The industry is a business in itself here, while in the more eastern districts it is only a side-line that will not get the study and attention it receives here.

Western men have a big advantage in the cost of containers, Professor Brown points out. Nearness to box lumber mills enables the western grower to buy good boxes at 12 and 16 cents, whereas, the eastern growers paid as high as \$1.50 per barrel of three bushels capacity last year.

With a further reduction in freight rates by rail to eastern points, and increasing shipments through the canal to European markets the Pacific Coast growers may expect to find outlets for their surplus high grade fruits.

Profits of Thinning

APPLE thinning tests conducted in the orchard of O. W. Melton in the Fruitvale district, Yakima valley, this season by E. G. Wood, extension horticulturist of the Washington State College, in co-operation with the farm bureau, indicated that the thinning increased the value of the fruit \$3.20 per tree. Increase in the value of the crop at that rate in this particular orchard, where the trees are 100 to the acre, would be \$320 per acre.

In view of the fact that the thinning was said to have been done later than it might have been and in view of comparatively small size of the fruit, the benefit from the thinning is not as pronounced as might be expected and the estimate of its value in the crop, \$320 per acre, is quite conservative, it is stated. Mr. Wood put on 12 thinning demonstrations in Yakima county this year and it is the general belief that the instruction given will bear fruit in more care in thinning and larger size of fruit.

In this particular test the value of the fruit on the thinned trees amounted to \$24 as against a value of \$20.50 for the fruit

on the unthinned tree. The cost of thinning was estimated at 50c per tree. The two trees were the same size, in the same condition and as near alike in set of fruit and general thriftiness as it was possible to select. The unthinned tree had slightly more apples on it than the thinned tree, but both trees packed out about the same number of boxes. The thinned tree, however, had the advantage in size of fruit and in color, making the crop on it worth \$3.20 more than that of the unthinned tree.

Codling Moth Bulletin

BASED upon spraying experiments conducted in several orchards during the seasons of 1915, 1916, 1917, and 1918, on representative apple varieties, the Department of Agriculture has issued Department Bulletin 959, a professional paper entitled, "Experiments and Suggestions for the Control of the Codling Moth in the Grand Valley of Colorado." by E. H. Siegler and H. K. Plank.

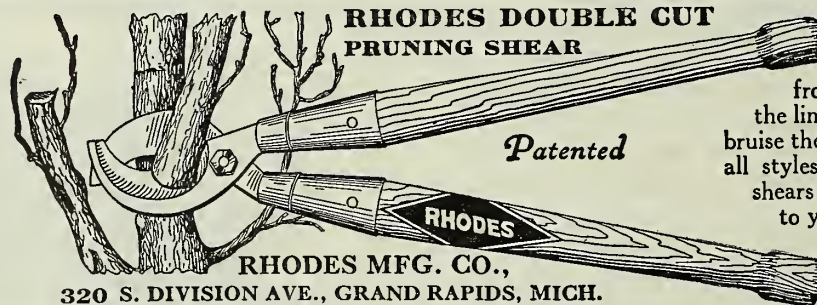
Spraying schedules for three applications are also given. Best results, it was found, were obtained from arsenate of lead at the rate of 1 pound of the powder or 2 pounds of the paste to 50 gallons of water. The matter of spraying equipment, together with supplemental control measures, is also discussed in the bulletin.

Enemies of Grapes

PERHAPS no horticultural crop so well illustrates the serious loss which may result from native species of insects and fungi attacking cultivated varieties of their natural wild food plants as does the grape. In a new Farmers' Bulletin of the United States Department of Agriculture, No. 1220, Insect and Fungous Enemies of the Grape, 64 out of 75 pages are devoted to description, history, and control measures for those of principal importance.

Several of these species in certain sections rank as first-class pests, such as the grape rootworm, grape-berry moth, grape curculio, grape leaf-hopper, grape leaf-folder, grapevine flea-beetle, rose-chafer, grape phylloxera, and the like. The bulletin, which may be had upon application, also deals with species which ordinarily are not important except during occasional seasons, or more or less locally, but are nevertheless the subject of many inquiries to the department every year.

Insect and fungus enemies of grapes are not less amenable to treatment than pests of other fruit crops, and the bulletin outlines methods of prevention and control which have been demonstrated by the investigators of the department to be successful.



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WASHINGTON

FROM White Salmon more than 200 cars of apples had been loaded out by the middle of November, and warehouses were reported as still packed to capacity.

AMONG heavy yields of apples in the Yakima Valley was that of J. F. Douglas, near Wapato, who obtained 12,000 boxes from 14½ acres, or an average of 870 boxes per acre.

CARL R. PIERSON, 28 years old, is credited with having made the highest record as a box ligger in the Yakima district this season. His record was the lidding of 2,260 boxes of pears in one day.

IN THE Prosser district the better returns on grapes were these: Two acres owned by O. S. Larson, gross return, \$2,400; four acres Concorde owned by Mrs. George Finn, gross return, \$4,000.

APPROXIMATELY 600 cars of apples were produced this season in Walla Walla county. More than half were shipped East as fast as packed, but a big surplus piled up at the time the rail strike threatened.

SIX carloads of "gift apples" were shipped some little time ago from Wenatchee to Chicago in solid cars. From Chicago the shipment is being distributed to all parts of the country by express and parcel post, under special labels affixed to the boxes.

A TOTAL of 150,000 gallons of cider and 200,000 gallons of vinegar will be produced by the Inland Products Company, at Spokane, according to Manager Charles Theis. Reports show seven cider mills at work in Spokane, with promise of record production because of an unusual quantity of windfalls following the early windstorm.

WHAT doubtless is to stand as the record day's shipment of apples from the Wenatchee district was made on October 30, when 300 refrigerator cars were dispatched.

FRED WREN, orchardist of the Lake Chelan district, was given credit for having displayed the biggest Delicious and Rome Beauty apples seen in Spokane this season. Twenty-eight of the Rome Beauties filled a box, as they averaged 1½ pounds apiece and measured 16 inches in circumference. The Delicious averaged 1¼ pounds apiece.

ACCORDING to report from Springdale, 100 cars of apples were loaded there for shipment to England.

THE Harmony ranch, on Crescent Bar, near Trinidad, with 54 acres planted to apples and pears, was recently purchased by R. A. Tedford & Co. The apple crop this season was 15,000 boxes, the trees being eight years old.

ACCORDING to officials of the Skookum Packers' Association, the Peshastin Fruit Growers' Association recently packed out 10,808 boxes of apples in one day. They believe this set a new record for a day's work in any packing house of the Northwest. This output of more than 14 cars was sent over nine Cutler grading machines, one of which handled 1,341 boxes.

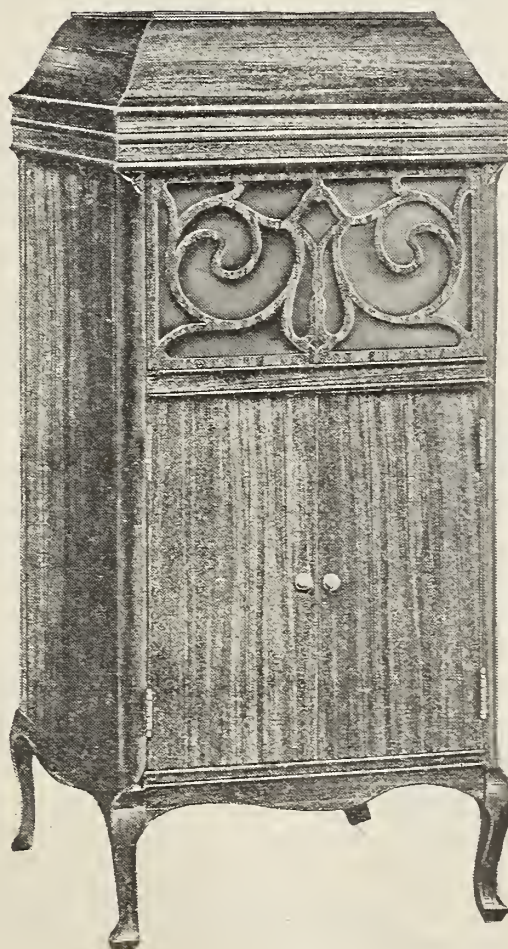
AT VANCOUVER recently Chat Knight sacrificed a 40-year-old cherry tree of the Bedrock Democrat variety which stood in the parking before his home. He cut down and destroyed the tree principally because it dropped its fruit too profusely on the sidewalks. This cherry has the unfortunate quality of deeply staining anything with which it comes in contact, and hence is not readily marketable.

THE Yakima Fruit Growers' Association at Sunnyside, Wash., report having packed out 2207 boxes of Rome Beauties in one day. They used one of the Cutler special warehouse model graders. This is something over three carloads of fruit made ready for market in a day. Rather different from the hand sorting and sizing of the old days.

A Christmas Special

\$200 Phonograph for \$95

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Here is the reason we can make this extremely low price. We have taken over the complete stock of Phonographs from one of the largest wholesale houses in the northwest at a tremendous discount, they having discontinued this department, and we are passing the saving on to the readers of Better Fruit.

A sweet toned Phonograph in a beautiful cabinet, (Mahogany or Golden Oak). One of the Standard makes and you can buy it at wholesale price while they last. 10 days Free Trial. Compare it with any machine selling at \$200, and if you do not find it their equal, return it and we will refund your money.

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You will have to order at once to get in on this special offer as our stock is limited. Write today for full information.

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Golden Winesap

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It has the juicy tartness of the Jonathan, the meatiness of the old Winesap, the beauty of the Winter Banana, the deep gold color of the Grimes and the keeping qualities of the good old Ben Davis. Strong grower, healthy and vigorous. Originated in Utah and should be hardy everywhere. Bears young and very profusely.

True Delicious Apple

This is the ideal farm apple. Large fruit, beautiful dark red, quality unsurpassed. Flavor sweet, slightly touched with acid, comes out of storage in perfect condition.

Campbell's Early Grape

A new variety, vigorous growth, very hardy, very early and an abundant bearer. Good shipper; keeps for weeks after ripening.

Perfection Currant

In our entire experience this is the best bearer, the largest, sweetest and easiest to pick. Rich, mild flavor, less acid and few seeds.

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All kinds of Fruit Trees, Plants and Shrubs, Vegetable, Flower and Field Seeds, etc., of the best quality, at very low prices. Get our Big Free Illustrated Catalog and prices before you buy.

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Seeds and Trees That Grow

APPLE shipments from Selah will be heavier than anticipated, the estimate having been raised from 1,000 to 1,200 cars. In mid-November warehouses were jammed with packed and loose fruit, and at one time one of the packing houses was obliged to suspend accepting apples temporarily.

E. S. BARNES was elected president and D. A. Chellieu was chosen secretary of the Jefferson County Berry Growers' Association, at the annual meeting held in Port Townsend. J. M. Kincaide was elected to fill a vacancy on the board of directors.

FOR the Wapato district the claim of producing more than 1,000 boxes of apples per acre is put forth by Harry Jones. On 11.5 acres, carrying 800 trees, Mr. Jones harvested 12,000 boxes, principally Winesaps. The trees are 11 and 14 years old. Mr. Jones attributes his record to successful fertilization, which consisted in leaving alfalfa uncut in the orchard, supplemented last year with nitrate placed about the trees. He expects to use five pounds of nitrate per tree for next season.

SUCCESS of a "fruit handling" machine invented and built by the Spokane Valley Growers' Union, and the only one of its kind in the world, is reported by Edward Peirce, manager of the growers' union. The machine has been in operation since the shipping season opened and is reported by Mr. Peirce to have increased the handling of fruit by about 50 per cent. At the time Mr. Peirce gave the report the union had shipped 110 carloads of fruit as compared with 50 carloads at the corresponding time last year. The increase was attributed chiefly to the new machine.

OREGON

FOR the prunes produced on his 12-acre orchard at Scio this season, Mat Doubek received \$1,700. This is to be compared, however, with a return of \$4,000 for the 1918 crop.

IT IS expected that the Hood River Canning company will pack 500 tons of lower grade apples in gallon cans this year. The plant has been working on Spitzenbergs and Newtowns principally to date. It employs about 35 persons and will be in operation until March 1.

AN APPLE show was held by the Milton-Freewater district November 11, at the new Lamb packing plant at Milton. This district is reported to have had an apple crop fully equal to the record crop of 1919. Prune shipments amounted to 600 cars.

NEARLY 80 tons of prunes were processed from the 40-acre orchard of C. R. Widmer of North Benton. The prunes were processed and graded at the Dallas plant of the Oregon Growers' Co-operative association and 10 tons graded as 20-30s.

APRUNING school will be held in the Hood River valley December 5 to 8, inclusive. One school will be held December 5 and 6, at Parkdale, and the remaining two days will be spent at Hood River. The work will be in charge of Clayton L. Long, extension specialist of Oregon Agricultural College.

THE acreage of cranberries along Coos Bay is steadily increasing as the crop is proving a profitable one. On a tract on North slough production this year was reported as between 100 and 150 bushels per acre.

THE largest trainload of fruit ever shipped from the southern Oregon district was composed of 51 cars, dispatched from Ashland over the Southern Pacific on November 1. The shipment, which went south was composed of fruit from the Willamette, Umpqua and Rogue River valleys.

GROWERS at Freewater will receive \$2,000,000 for this year's apple crop, according to a recent estimate. Cost of production was placed at 50 cents a box and net return at \$1 a box. The community's prune crop was more than 250 cars. The price for prunes averaged about \$40 a ton, with \$52.50 as the top record.

THE mild weather which prevailed over the state until the third week of November developed second crops of berries in many sections. Second crop raspberries were grown in numerous sections. Strawberries were in the home markets at Medford, Marshfield and other towns at late as November 10 and 12.

SO DIFFICULT was the matter of judging between exhibits at the highly successful Rogue River Valley Apple exposition at Medford that the judges resorted to microscopes in looking for blemishes. In the three-box entries contest the judges thus examined every apple in the competing exhibits of Upton Brothers of Central Point and the Bear Creek orchard of Medford. The award was finally given to Upton Brothers. They also won first in one-box entries of Jonathans, Newtons and Spitzenbergs.

IDAHO

THREE weeks ago it was reported that there were 100 carloads of apples in storage in the modern new plant at Eagle Heights, near Nampa. It was estimated that it would take the packers three months to handle these apples.

AT EMMETT the Hartley prune orchard of 8½ acres, now owned by W. Stone, yielded 164 tons of green prunes, or almost 20 tons per acre. The prunes were sold in special cases at 70 cents a case, which brought a return just short of \$50 a ton.

THE McBirney Fruit Company, with large prune orchards at Meridian and Beatty, produced and shipped approximately 200 cars of prunes. The shipment of about 100 cars from Beatty was "suitcase" packed.

M. C. HINSHAW has a 15-acre apple orchard near Greenleaf, in Canyon county, from which he is said to have netted \$1,000 an acre in the past three years. This year he sold his crop at \$51 per ton. His gross return was \$1,400 an acre, and \$400 of this was clear profit.

ON THE upper slopes of the Central Cove district, California grapes are grown with entire success. Jacob Mussell, who has a vineyard there, had a fine grape exhibit at the Idaho state fair, including Flaming Tokays, Thompson's seedless, Malagas, Muscats and Blue Damascus varieties.

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APPLE, PEAR, CHERRY
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IN 24 HOURS.

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—are the men who choose their banking connection with the same discrimination they use in pruning. The First National Bank, because of its size and comprehensiveness of its departments, is particularly equipped to offer the horticulturist the most in banking service.

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ROBERT HYSLOP has a peach orchard of four acres in the Deer Flat district, south of Nampa, which netted him big returns, both this year and last. The crop of 1920, sold on the trees at 4 cents a pound, returned him \$1,786. This year's crop, which was about 50 per cent greater, was sold for 5 cents a pound. The trees are but six years old.

IN IDAHO the prune growers and shippers this season quite extensively used what they call the "suit case" pack for their fruit. This means use of nothing other than the ordinary peach or tomato box which holds about 19 pounds net. An advantage is said to be much greater speed in handling the fruit. The price per "suit-case" this year ranged around 60 and 70 cents.

ATRACT of the famous Stephens apple orchards at Nampa, planted 96 trees to the acre in 1908, this season averaged 13 1/5 boxes per tree, or 1,267 boxes per acre. Yield per tree ranged from 10 to 19 boxes. E. F. Stephens, widely-known orchardist and principal owner, attributes this record to frequent cultivation in the earlier stages and the supplying of lots of plant food, particularly alfalfa, as the orchards get older.

CALIFORNIA

UNDER sponsorship of the California Pear Growers' Association the First Annual Pear Industry convention was held in Berkeley, November 21 and 22. Everybody connected with the industry, including buyers, canners, shippers, driers and transportation agents, was invited. In calling the convention President Frank T. Swett of the association said the industry annually brings \$12,000,000 to the state.

ABIG fight for lower freight rates for 1922 on deciduous fruits is being outlined by the California Fruit Growers' and Shippers' Protective League, recently organized at San Francisco. Frank T. Swett has been made manager of the organization, which has opened offices in San Francisco.

RASPBERRIES from the Shady Oaks farm in Saratoga were a part of numerous Thanksgiving menus in Chicago. The berries, reported to have been of exceptional quality, were assembled at San Jose and sent forward from the model pre-cooling plant there in time to go on the Chicago market just before Thanksgiving time. There was a carload of them.

WHAT is considered a record price of the year for peaches was recently reported by J. L. Nagle, general manager of the California Fruit Exchange. A shipment of Levi clings from Newcastle sold at a New York auction on November 1, for \$5.25 a box. The net price was calculated as \$4.36. The boxes contained an average of 45 peaches, or 18 pounds of fruit.

IRRIGATION and methods and practice of graftage are given prominence in the deciduous fruits short course being held at the University of California farm, at Davis. The course opened November 28 and is to continue until December 12.

ALONG-TERM pruning test on a large scale has been mapped out by the University Extension Service for a plot of peaches and apricots a mile long, on the California Packing Company property near Tuttle. The trees were planted in 1919.

IN OCTOBER, the Watsonville district shipped 800 cars of apples, 241 to eastern points and 639 to California points. In the same month last year the district shipped 680 cars.

CALIFORNIA authorities are insistent on enforcing the apple standardization law to insure a more perfect pack. A Watsonville grower was recently fined \$100 for violation of the law.

IT IS reported that the 5-cent package of raisins put out over the country by the Associated Raisin Company has proven so popular the company can not get cartons fast enough to take care of the demand. Now the California Prune and Apricot Growers, Inc., have followed out the same idea by putting out a 5-cent carton of prunes.

REPORTS from San Francisco on the shipment of Concord grapes from Washington were to the effect that they did not sell well, drawing an offer of 5 cents per pound. The shipment carried poorly, it was said.

INVESTIGATIONS by the California College of Agriculture have disclosed that peaches are the most popular deciduous fruit of the state. There are 9,000,000 bearing trees in the state that produce an annual crop valued at more than \$30,000,000.

CHARLES W. PUGSLEY, for many years professor of animal husbandry at the University of Nebraska and editor of a farm publication there, has been named as Assistant Secretary of Agriculture by Secretary Henry C. Wallace of the Department of Agriculture.

AMARKET for the peels, cores and other apple waste in the Northwest has been opened up by the establishment of a factory for the manufacture of powdered pectin at Topeka, Kan. The discovery is said to revolutionize the jelly making industry. The discoverer is Albert Leo, a chemist who formerly operated a by-products plant at Moscow, Idaho.

Most of the apples raised in New Jersey this year were sold to mincemeat factories at \$100 a ton, according to A. Freeman Mason, formerly of Hood River, but now in charge of the New Jersey Experiment Station. Many orchardists merely loaded their apples loose in box-cars, taking them direct from the trees without regard to possible grading, and shipped them to the mincemeat makers.

A freak apple that attracted considerable attention was grown this year in the orchard of George Gallaway, east side fruit grower at Hood River. The apple grew on a Spitzenberg tree, but had four equal segments, quite distinctly representing Spitzenberg, Arkansas Black, Gravenstein and Delicious varieties. Cross pollenization was the cause of this freak of nature.

TREES AND SHRUBS



Fruit trees budded from bearing orchards. Apple, Pear, Cherry, Peach, Plum, Prune, Apricot, Quince, Grape Vines, Shrubbery, Plants, Raspberries, Blackberries, Logans, Dewberries, Asparagus, Rhubarb, Flowering Shrubs, Roses, Vines, Hedge, Nut and Shade Trees. Carriage paid. Satisfaction guaranteed.

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CALIFORNIA CENTRAL CREAMERIES

425 BATTERY STREET
SAN FRANCISCO

740 TERMINAL STREET
LOS ANGELES

Marketing News of Interest

WHILE shipments of apples over the United States at large have decreased by about one-half, as compared with those of a month ago, they are keeping up well in the Pacific Northwest. A check made a week ago showed that Idaho was sending out an average of about 25 cars a day; Oregon around 85 cars a day, and Washington about 175 cars a day.

Indicative of how heavy have been early shipments from the "boxed apple" states was the government's report compiled to November 1. By that date shipments of boxed apples aggregated 28,593 carloads, as compared with only 15,702 carloads by the same date in 1920.

ACCORDING to late figures compiled in the Spokane office of the bureau of crop estimates, the apple crop of the state of Washington was increased by about 3,000,000 bushels, to 28,325,000 bushels. Early estimates had placed the

crop at 25,474,000 bushels. The 1920 crop was 17,000,000 bushels. The state's pear crop is placed at 1,760,000 bushels.

Latest estimates for Oregon place the apple crop at 3,900,000 bushels. Idaho this year had an estimated production of 3,132,000 bushels. This breaks all previous records for the Gem state.

DURING recent days slow demand and dull market for Northwestern boxed apples have been reported from many of the big eastern cities. Where apples have moved, however, it has been at fairly good prices.

CLOSING of first apple pools is now being effected in many districts. One of the first to report was the Hanford local of the Spokane Fruit Growers' Company. Prices for the Hanford pool Jonathans ranged from \$1.35 for the smaller fancies to \$2.25 for the larger extra fancies. On Delicious, for the same grades, there was a range from \$2.73 to \$3.48.

FINAL payments on cherries were made early in November by the Wasco branch of the Oregon association at The Dalles. Net average prices

to growers were announced as follows: Bings, 8.52 cents, Lamberts, 9.74 cents; Royal Anns, 6.65 cents; Black Republicans, 5.63 cents; Oregon Blacks, 9.72 cents.

THE pool of 112,000 pounds of this year's raspberry crop handled by the Eugene Fruit Growers' Association was closed two weeks ago, Manager J. O. Holt announced. The price received for red raspberries was 8½ cents and for blackcaps, 10½ cents.

CANADA'S apple crop is estimated at 3,377,200 barrels in official report of the fruit commissioner. His estimate of production by provinces, expressed in barrels, is this: Nova Scotia, 1,300,000; British Columbia, 1,009,000; Ontario, 960,000; Quebec, 35,300; New Brunswick, 33,000.

IN THE 12 months ending October 31, California shipped 48,350 cars of oranges and grapefruit and 11,797 cars of lemons, 72½ per cent of which, aggregating 43,592 cars, were handled by the California Fruit Growers' Exchange. The average operating cost of the exchange's marketing service was 7.03 cents per box.

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Two Years for the Price of One!

This is YOUR Opportunity:

IF you are NOW a subscriber, to get Two Full Years ahead from the date your present subscription expires for \$1.00.

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IF you are NOW a subscriber and want to give some friend a Christmas present of BETTER FRUIT, send \$1.00 and we will extend your subscription one year, also send your friend BETTER FRUIT for one year, thus giving two subscriptions for the regular price of one, or we will send BETTER FRUIT to your friend for two full years.

In other words, you may have as many Full Years' subscriptions as you want at 50 cents each, either all for yourself, or some for your friends.

Whereas this year you fruit men will make some money, we realize that you were all hard hit last year, and so to help just a little we are making you this reduced price. The price of \$1.00 applies to subscriptions within the United States; foreign subscriptions may be figured at one-half the foreign price, or \$2.00 for two years.

We need your support, and perhaps we can help you through the coming year. We are working for the very things which will help you most in the fruit game, but in order to put them through we must have subscribers. Use the coupons below NOW while you think of it, and save half the cost of your fruit paper.

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B

With the Poultry

PROTEIN FOODS NECESSARY

ONE thing that accounts often for a falling off in egg production during winter months is a deficiency of animal feeds, or feeds rich in protein. Poultry growers must guard against such deficiency and can usually do so without great trouble. On most farms it is easily possible to supply the protein needs of the flock through skim milk or buttermilk. The voracious way in which hens eat these dairy products is excellent indication of their value to the birds. Meat scrap is another protein food that is, of course, standard in poultry rations. The poultry grower who expects to gather high-priced eggs in quantity will see to it that his flock gets this food element in plentiful supply.

CLOVER and alfalfa leaves provide a most excellent combination of protein feed and green succulence. On farms where hay is handled it is often possible to sweep up enough of these leaves to supply a flock of good size. See that they are gathered from the barn floor or from around the haystacks. A good way to prepare the leaves is to pour boiling water over them, then cover the container and let them steam for a time, when they will be ready to feed either alone or in a mash.

DUST BATH IMPORTANT

A DUST bath is an important aid to the hens in keeping them free from lice and helps forestall the spread of mites in the chicken house. Usually there is a place about the yard or hen-house where the flock may dust itself at will. If there is not one should be provided that is dry and accessible at all times. All that is needed is to provide a box about two feet square containing ordinary road dust or fine dry dirt. The box should be placed inside the house, far enough from any openings so rain may not drive in upon its contents.

IT IS quite essential to induce exercise on the part of laying hens. The best way of doing this is to feed all grain in dry clean straw litter, six to eight inches deep. The common straws, in order of their desirability are: wheat, oats, barley, rye, buckwheat. Shredded or finely cut corn-stalks, leaves or shavings may be substituted where straw is not available.

Every flock, to the careful observer will include individual birds that are outstanding in their appearance, that possess the desirable type for the breed as well as the characteristic color of plumage. These more likely appearing birds are caught and carefully examined in detail for color, defects and desirable points. In this way the most perfect fowls are chosen to be segregated and conditioned for exhibition.

SUNNY windows on the south side of the hen-house are almost a necessity to the health and comfort of a properly raised poultry flock.

AS an egg producer and liver regulator sour milk or buttermilk is one of the best foods for poultry.

WITH a clean and healthy poultry house, a good litter of straw may be scattered over the floor and become one of the best of scratching pens.

AS a green food for hens one of the best is cabbage. Being succulent and containing a larger amount of ash and protein than most of the vegetables fed poultry, it is not only excellent for this purpose, but is one of the easiest to obtain. To obtain the best results from cabbage fed to poultry it should be hung up at such a height so that the poultry can just pick them clean to the stump.

A FINE feed on the farm where oats is being grown and easily obtainable is oats tied in bundles and stored in a house where it cannot be cleaned of its heads. Tied in bundles and thrown into scratching sheds it makes an ideal scratching litter in which to throw cracked corn and seeds. Fed in this way it makes a fine feed to compel the exercise necessary to egg production.

Our Inquiry Department

WILL you please tell me what time of year is best for whitewashing trees.—J. M., Oregon.

Trees may be whitewashed either in the fall or spring, but it has been determined that fall whitewashing does the most good. The winter killing of trees that have put forth a late growth, particularly where there may have been too much late irrigation, is appreciably warded off by fall whitewashing. It is well even to give the trees another coat if much of the whitewash is washed off by winter rains.

I HAVE recently rented a place in the Willamette Valley on which there is a small vineyard. Will you please tell when is the proper time to prune grape vines.—A. E. R., Oregon.

You should prune the grapes during the dormant period, the months of December and January being perhaps the best in this section. If you have varieties needing winter protection the pruning should be done at once, but it is hardly probable that your grapes need protection here.

TREES INJURED BY RABBITS

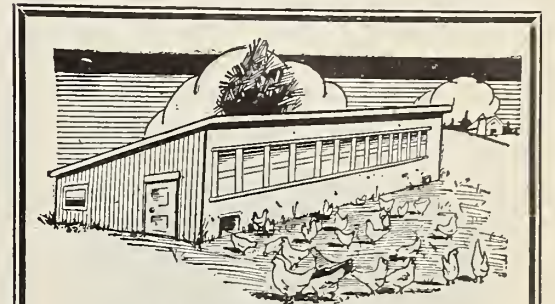
Is there anything that I can put on trees that have been injured by rabbits to heal the wounds?—F. H. T., Idaho.

If the wounds are not too extensive, grafting wax applied to them shortly after they are made will prove effective. Another treatment that has saved trees that were injured by rabbits but were not girdled and had not become too dry was to place against the tree, a mound of earth which was kept irrigated until the surface granulated and new bark was formed. If the tree has been completely girdled and the wound allowed to dry, the only way of saving it is to use the bridge graft. This consists of putting scions taken from healthy trees underneath the bark above and below the wound. These maintain the flow of sap until new bark can be formed.

BUNCHES ON PEACH TREES

I have a number of young peach trees that are developing bunches near the roots that look like crown gall. What can I do with them?—D. C., Oregon.

If these bunches are small the diseased growth can be cut away leaving the healthy wood smooth. The wound made by the cutting process should be painted over with Bordeaux paste.



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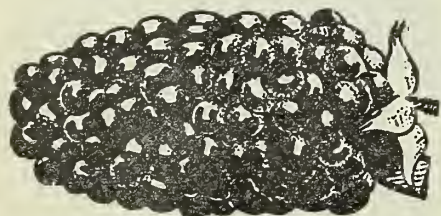
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COMPLIMENTS FROM INDIANA

▲ ▲ ▲

Franklin, Ind., October 25, 1921

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Yours truly,

R. R. 7

A. L. MAGILL

Bees and Beekeeping

Edited by AMOS BURHANS

THE last 10 years have seen more large hives adopted in the bee yards of American apiarists than the previous 50. The advantages of the large hive are so many it is a wonder they have not been used in great numbers earlier than this. Where they are once tried they are always used.

One of the reasons large hives have not been adopted with more speed is the tendency of the beekeeper to have one standard hive for his work and to stay by it after he is started, owing to the expense of making the change. For many years the 8-frame hive was standard all over the United States and Canada. Then along came the 10-frame hive and found many who liked it until today it is the standard hive in use everywhere. The 10-frame Jumbo hive came in sight next, but did not get very far. Only a few are in use compared to the standard 10-frame hive. The Jumbo offered nothing more than the 10-frame standard except two inches more depth to the frames. It was soon seen that there was something lacking.

Then came the modified Dadant hive, based upon the record for honey production made by the original Dadant hive. The latter contained a frame two inches longer than the standard Langstroth frame used in the 8 and 10 frame hives, as well as two inches more in depth. So the Dadants in order to have their new hive conform more with the standard dimensions that have preceded it, shortened the length of the frames to that of the standard hives in use, but added another frame and spaced their frames one and one-half inches from center to center in order to give the hive better circulation.

The depth of the modified Dadant hive is two inches plus deeper than the standard 8 to 10-frame. It contains 40 per cent more room for the queen to lay in. It gives nearly 200 square inches more capacity for the bees to breathe in and provides great deal better conditions for bees to work in during summer. The danger of combs melting down is reduced to practically nothing. This is a fault and a serious one of the smaller hives, especially where they are used in the hot climates.

AND it is this lack of ventilation or capacity to hold heat that makes the small hives great swarmers. Beekeepers who know that strong colonies in small hives have a greater tendency to swarm than the colonies of big hives are always working to prevent swarming. These manipulations are the bane of the beekeeper. A divided force right in the honey flow—and this is when the majority of swarms issue—means no surplus honey from either the old hive or the new swarm in many cases. If the swarm can be returned to the hive from which it issues, there will be great returns from that colony. This fact demonstrated, then came the search for a method to prevent swarming which has ended in the yards of modern beekeepers with the use of the big hive.

Swarming is caused primarily because the bees have no room for their surplus, the queen has no room to lay or finds poor ventilation. The big hive, with the properly spaced and properly sized frames, practically prevents swarming. I saw 800 big-hive colonies from which only three swarms had issued up to the middle of July. Bees were swarming in other yards from the 8 and 10-frame hives. In my own yard, where I was working for extracted honey, I had two swarms in August from builtup modified Dadant hives. I am using standard 10-frame bodies for extracting supers on my big hives. They work fine.

For farm conditions of beekeeping, where the owner does not want a lot of manipulating or swarming to tend to, I can heartily recommend the big modified Dadant hive. Keep them in the shade to make conditions ideal; see that good queens are at the head of each colony; get on

the supers in time to get the honey and the bees will do the rest without swarming. Bees winter better in big hives because they have a greater amount of honey above the brood nest in the deep frames and greater room to store surplus on which to build up in the spring as well as enlarged clustering space. If you are just starting at beekeeping or want an easier method of handling them, try the big hives.

Statement of Ownership

STATEMENT of the ownership, management, circulation, etc., required by the Act of Congress of August 24, 1912, of the Better Fruit, published monthly at Portland, Oregon, for October 1, 1921.

State of Oregon, County of Multnomah—Before me, a notary public in and for the state and county aforesaid, personally appeared C. J. Owen, who, having been duly sworn according to law, deposes and says that he is the business manager of Better Fruit, and that the following is, to the best of his knowledge and belief, a true statement of the ownership, management (and if a daily paper, the circulation), etc., of the aforesaid publication for the date shown in the above caption, required by the Act of August 24, 1912, embodied in section 443, postal laws and regulations, printed on the reverse of this form, to-wit:

1. That the names and addresses of the publisher, editor, managing editor and business managers are:

Publisher, Better Fruit Publishing Company, Inc., 281 12th St., Portland, Oregon. Editor, Ernest C. Potts, 1569 East Everett St., Portland, Oregon. Managing Editor, Jerrold Owen, 281 12th St., Portland, Oregon. Business Manager, C. J. Owen, 281 12th St., Portland, Oregon.

2. That the owners are: (Give names and addresses of individual owners, or, if a corporation, give its name and the names and addresses of stockholders owning or holding 1 per cent or more of the total amount of stock).

Owner, Better Fruit Publishing Company, Inc., Portland, Oregon. Stockholders, Jerrold Owen, 281 12th St., Portland, Oregon; D. L. Carpenter, 800 Oregonian Bldg., Portland, Oregon; E. E. Faville, 800 Oregonian Bldg., Portland, Oregon; A. W. Stypes, 800 Oregonian Bldg., Portland, Oregon.

3. That the known bondholders, mortgagees and other security holders owning or holding 1 per cent or more of the total amount of bonds, mortgages or other securities are: (If there are none, so state). None.

4. That the two paragraphs next above, giving the names of the owners, stockholders and security holders, if any, contain not only the list of stockholders and security holders as they appear

upon the books of the company, but also in cases where the stockholders or security holder appears upon the books of the company as trustee or in any other fiduciary relation, the name of the person or corporation for whom such trustee is acting is given; also that the said two paragraphs contain statements embracing affiant's full knowledge and belief as to the circumstances and conditions under which stockholders and security holders who do not appear upon the books of the company as trustees, hold stock and securities in a capacity other than that of a bona fide owner, and this affiant has no reason to believe that any other person, association or corporation has any interest, direct or indirect, in the said stock, bonds or other securities than as so stated by him.

5. That the average number of copies of each issue of this publication sold or distributed, through the mails or otherwise, to paid subscribers during the six months preceding the date shown above is: (The information is required from daily publications only).

C. J. OWEN,
Business Manager.

Sworn to and subscribed before me this first day of October, 1921.

(SEAL) GEORGE H. CARR,
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