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HORTICULTURAL SOCIETY

—AND—

FRUIT GROWERS' ASSOCIATION

OF BRITISH COLUMBIA.



# Pest and Remedy Supplement

As Adopted by a Committee appointed at the  
Annual Meeting.

1895-6

NEW WESTMINSTER  
COMMERCIAL PRINTING COMPANY, LIMITED.  
1895.

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# SUPPLEMENT.

## PREPARATION, PLANTING AND PRUNING OF ORCHARDS.

BY ERNEST HUTCHERSON, OF LADNER.

Of all rural occupations it is questionable if there is another which possesses the degree of fascination or yields the depths of genuine enjoyment that tree planting does. Crops of annual production and brief existence may afford a passing gratification, but a few months sweep away all trace of our arduous service and the round must again and again be repeated. In some sort one's life acquires a posthumous lease in the planting of trees, which, whether for ornament or profit, may thrive, continue, and wax great through succeeding generations, affording pleasure to the sight and ministering to material necessities.

In the early development of a new country, orchard planting, naturally, receives the most prominent attention, and to this department the considerations of this article are directed.

Before entering upon the practical part of the work let me say a word on the question, can the growing of fruit be made profitable in British Columbia? I would say, most emphatically, yes, if you grow good fruit. Our fruit growers who set one thousand trees and think the work is accomplished, and look upon a 20-acre orchard as the acme of human enterprise, can hardly conceive of the scale on which capital is invested, and the magnitude of the business done in some of the immense orchards in California. There they employ from 50 to 75 hands the year round, with double that number during the picking season. Competing railroads throw branch lines through the orchards, and packing houses are built so that cars can be loaded from the door. In British Columbia we can grow better apples, pears, plums, prunes, and cherries than can be grown in California. Then why should it not pay?

A commercial orchard, handled on commercial principles, is still a thing of the future in this Province. They are being set but have not yet come to bearing. Those few orchards which are to-day such a source of wealth to their owners are the results of a little time now and then snatched by the proprietor from work often deemed more important. While looking upon the hundreds of thousands of dollars invested and being constantly expended in California, I often thought what would be the result to this country if some of our capitalists would invest a few thousand dollars in scientific orcharding here. In all our cities you will find factories with valuable machinery standing

idle, and in the interior of the Province thousands of dollars and valuable time are being given to prospecting which pays but little interest on the capital invested. Will anyone contradict me when I say that one-tenth of this money invested in fruit growing in this Province, handled by skilled labor, under educated management, would yield larger returns than the industries referred to, and would develop our fruit growing to such an extent that in 20 years our Province would be made the summer resort of wondering thousands, and it would tax our railways to handle the fruit.

Having carefully considered the matter and chosen a location, it is well to plant only such varieties as are adapted to the soil. Plums and prunes do well in most soils and locations; pears are natural to clay land, while early apples, cherries, and peaches thrive on light sandy land. The mode of preparation should depend a great deal on the location and nature of the land. I have seen orchards doing well where no ploughing had been done, but this system necessitates a great deal of hand labor. Sub-soiling is not so necessary as in the hotter and drier climates. Good drainage is paramount to success. In purchasing trees three things are indispensable: (1), Varieties true to name; (2), Healthy, vigorous, well-matured trees; (3), Careful and judicious packing, without which all may be lost. The laying out of the ground is important. An orchard is an object of public notice, and the neatness and precision of its plan and planting, or the reverse, will generally be taken as an index to the character of the planter. A well laid-out and well tended orchard commands almost universal admiration, while nowhere is slovenliness more conspicuous. In planting there are three methods in most common use known by various names, but probably best distinguished by the geometrical forms in which trees thus planted are grouped, viz.:

*Triangular.*



*Square.*



*Quincunx.*



Of these the simplest and most frequently adopted is the square. In this the orchard is laid off in lines crossing each other at right angles, with equal intervals of space, and a tree planted at each crossing of the lines. As the roots of a tree are generally presumed to radiate from the trunk and extend an equal distance in all directions, they may be said to occupy a circle of ground. In such a case it is obvious that a disadvantage attends the square system by leaving an unoccupied space midway between each four trees, unless their roots overlap each other at the nearest point of juncture, which in theory should not occur. This can be easily illustrated by laying out four coins in

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a regular position. Now take three of them and place them in the form of a triangle, with their edges touching. Observe the comparative reduction of this waste space and an idea is given of the superiority of the triangular system. This, of all others is unquestionably the most nearly perfect. Without crowding the trees any closer, it secures 15 per cent. more than the square to any given extent of ground. The larger number of persons who plant orchards do not fully appreciate this advantage. Let it be further illustrated: By the square system, at 20 feet apart, 109 trees are planted on each acre. Assuming their yield at mature age to be 200 lbs. of fruit to the tree, the crop would aggregate 21,800 lbs. per acre. Planted by the triangular system this same acre will support equally well 126 trees, which at the same estimated yield, would afford a crop of 25,200 lbs., or an increase of 3,400. Conceding that the fruit is only worth the moderate value of two cents per lb. on the tree, the gain by the adoption of the triangular system is shown to be \$68 per acre. This is essentially clear profit, as the cost of land, expense of cultivation, and the amount of taxes are the same in either case, the only difference being in the cost of the increased number of trees and the cost of planting. Apply this computation to a ten-acre orchard for a term of ten years and \$6,800 is shown to be the not unlikely sum which a fruit grower may sacrifice, rather than incur a little bother at the beginning. This system is of equal advantage in small fruit plantations and it affords superior facilities in all operations of cultivation. It is sometimes called the sextuple system, from the character of a larger group which it forms, in which six equidistant trees stand in a circle about, and also equidistant from, a seventh occupying its centre. A gross error has occurred in the frequent application of the name quincunx to this method. The true quincunx is described by four trees planted at the angle of a square, with a fifth placed midway between them. It is chiefly used in planting with reference to a future thinning out of the trees of an orchard, when those designed to remain permanently shall have attained a considerable size. In such a case the centre tree in each group of five is ultimately removed, having served a profitable season of production, until the growth of its neighbors demands its room. Sometimes a dwarf or small growing sort is thus permanently planted and in occupying the otherwise vacant space partially secures the advantage of the triangular mode. If extensive planting is to be done, the distance between the trees is regulated by the habits of its kind. For illustration, I would plant Yellow Transparent and Keswic Codlin apples ten feet apart; Northern Spies, R. I. Greenings, Baldwins, and Golden Russets, 25 feet apart. This rule holds good with all the fruits according to the habits of the tree.

By skilful pruning nearly all kinds can be confined to a reduced space and this is advocated by some, but demands more than average qualifications. For example, apples planted ten feet apart after about



five years' growth are pruned like grape vines, cutting back last year's wood to one bud. The greatest pains will scarcely prevent some roots becoming bruised or broken in the taking up and handling of the trees. Before planting, cut all these away to fresh sound wood, using a sharp knife. With branched trees shorten the limbs to the third or fourth bud from the trunk. Allow the tree to stand the same depth that it grew in the nursery. Do not put anything whatever but clean earth under or in contact with the roots. Manure, if used, should be on the surface where the rains will carry its properties to the roots in the form of a liquid, which is the only form in which they can take it up.

So many theories have been entertained respecting the objects to be sought in pruning orchard trees and the practice to be adopted, that I almost hesitate to express an opinion. Several eastern writers on this subject condemn all pruning except to remove dead or crossing branches. No less an authority than A. J. Downing says and puts the lines in italics: "Every fruit tree grown in the open orchard or garden should be allowed to take its natural form, the whole effort of the pruner going no further than to take out all weak and crooked branches." On the other hand, both Thomas and Barry advocate the free use of the saw and knife, even upon bearing trees. "When doctors disagree, who shall decide?" I remark that the subject of pruning trees is one of much importance. Whatever may be the practice on the other side of the continent, where orchard trees are much slower in growth than here, it is essential in the management of orchard trees in this country that they be carefully pruned and trimmed, during several years at least, after being planted in the orchard. The future usefulness, to say nothing of the beauty and symmetry of the trees, depends much upon the judgment with which they are treated when young. For just as the twig is bent the tree is inclined. In British Columbia fruit trees are commonly transplanted into the orchard at the age of two years from graft, with such I have had the best success. They are generally from four to six feet high and without side branches, or, if any, a few near the top. These trees should be cut back, before beginning to grow, to a point from which the owner wishes to start the foundation of the superstructure, so to speak. This point may be at a height of from 16 to 18, or 24 to 30, inches, according to taste or judgment of the proprietor. It is desirable on several accounts to start the head of the tree as low as practicable. The point at which the young tree is cut back should be carefully chosen so as to leave a good bud. A very little below the cut, and on the windward side of the tree, several branches may be expected to start out near the top of the stump. About five of these ought to be selected to remain and so chosen to balance the growth on all sides of the tree and all other sprouts may be rubbed off. The chosen branches may be allowed to grow until the next winter when they all should be cut back to, say, from 12 to 16 inches from the main stem. As before, this cutting should

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be made just above a good strong bud. But another principle now comes into notice. If the tree to be pruned is of a variety whose natural habit is to make a broad and spreading head, as the Rhode Island Greening Apple, the branch should be cut so as to leave the upper bud on the inner side of it. But if the tree be one whose nature is to form a close, upright head, the cut should be immediately above an outside bud. As in the previous year, so now, several branches may be expected to start out upon each one of the stems so cut back. Two of these branches should be selected to remain, but the others early destroyed. From year to year the same general system should be pursued, until the trees come into bearing, and as much longer as they continue to throw out branches of several feet in length. The foregoing rules on pruning are not intended to be dogmatical, but only suggestive. No doubt some may prefer to leave a larger number of branches at the first and second pruning, and to cut back more or less than is above suggested, but probably it will generally be agreed that the main idea is correct, viz. : that all young trees should be so pruned and trimmed that when grown they shall have low, open, and spreading heads.

Map the orchard immediately after planting, for if delayed, labels will become lost and confusion result. Do not allow any wire or string attaching a label to remain about the trunk or a large branch as it is frequently overlooked until the ruin or serious injury of a tree calls attention to its presence. Bind up any bruises accidentally made on the trunk in cultivating, or otherwise, with a mixture of clay and fresh cow dung. Post yourself regarding noxious insects that you may detect their first appearance and stamp them out before they overpower you.

Finally, study your business and seek information from all sources, especially your orchard, and be assured that nothing can supply the want of personal vigilance and industry.

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#### WHAT TO PLANT.

At a meeting of the Fruit Growers' Association a special committee was appointed to gather what information they could and report upon what varieties of fruit they thought were best to grow for profit in British Columbia. After considerable investigation by this committee it was decided to recommend the following varieties :

Apples—Early summer : Yellow Transparent, Red Astrachan. Late summer : Oldenburg, Gravenstein, Keswick Codlin. Fall : Wealthy, King, Maiden's Blush, Blenheim Orange. Winter : Northern Spy, Baldwin, Ribston Pippin, Grime's Golden, Ontario, Golden

Russet, Stark, Ben Davis, Canada Red, Canadian Rienette. Sweet Apples—Summer: Golden Sweet. Fall: Bailey's Sweet: Winter: Talman's Sweet.

Crabs—Hyslop, Montreal Beauty.

Pears—Summer: Marguerite, Clapp's Favorite, Bartlett. Fall: Beurre Clairgeau, Beurre d'Angou. Winter: Lawrence, Beurre Easter, Howell, Sheldon, Bosc.

Plums—Peach Plums, Bradshaw, Imperial Gage, Red Egg, Yellow Egg, Victoria, Gueii, Pond's Seedling, Grand Duke.

Prunes—Bulgarian, Italian, Pond's Seedling, Hungarian, Coe's Golden Drop, Silver.

Cherries—Sweet: Early Purple, Guigne, Governor Wood, Black Tartarian, Napoleon Bigarreau, (Royal Ann), Yellow Spanish, Windsor. Sour: May Duke, Large Montmorenci, Belle de Choisy.

NOT	}	Peaches—Alexander, Waterloo, Early Rivers, Hale's Early, Early Crawford and Wager.
RECOMMENDED		Apricots—Not sufficiently tested to recommend any certain varieties.
FOR		Quince—Orange.
GENERAL		Grapes—Moore's Early, Worden, Delaware, Brighton, Niagara, Concord, Diamond, Wilder, Martha.
PLANTING.		

Strawberries—For Home Market: Crescent, Bubach, Sharpless, Improved Jucunda. For Shipping: Clark's Seedling, Lovett's Early, Warfield No. 2, Wilson.

Raspberries—Cuthbert, Marlboro, Golden Queen.

Black Caps—Gregg, Tyler, Souhegan, Thomson, Lovett's best.

Blackberries—Snider, Kittatiny, Erie, Taylor, Lawton, Evergreen.

Gooseberries—English, Industry, liable to mildew in some localities. American: Champion, Downing, Smith's Improved.

Currants—Red: Fay's Prolific, Moore's Ruby, Cherry Currant.

Currants—White: White Grape.

Currants—Black: Lee's Prolific, Black Champion, Black Naples.

The following is a list of varieties not thoroughly tested but worthy of trial.

Apples—Summer: Alexander. Fall: Haas, Red Beitigheimer, Colvert. Winter, Hubbardson's Nonesuch, Seek-no-further, Rhode Island Greening, Stark, Newton Pippin, Yellow Bellflower.

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Pears—Summer; Madeline, Marguerite, Brockworth Park. Fall: Buerre Bossock, Duchess d'Angouleme, Howell, Sheldon. Winter: Josephine de Malines, Dr. Reeder.

Plums—McLaughlan, Moore's Arctic, Jefferson, Shipper's Pride, Smith's Orleans.

Cherries—Rockport Bigarreau, Olivet, Mezel, Black Republican.

Strawberries—Haverland, No. 2, Triomphe de Gand.

Apricots—Moorpark, Early Golden, St. Catherine, St. Ambrose, Early Montgamet, and Russian varieties.

Quince—Rhea's Mammoth.

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#### POTASH FOR FRUIT TREES.

EDS. COUNTRY GENTLEMAN—Would the use of hardwood ashes applied to strawberries be likely to produce the same results as kainit? In what quantity should it be applied, and at what time?

I have some Bartlett pear trees which produce very knotty, inferior fruit, though liberally supplied with stable manure. Would an application of kainit be likely to benefit them, and what quantity should be applied per tree, say four inches in diameter? D. W. S.

*Answer by Mr. T. G. Yoemans*—The inquirer will be entirely safe in using liberally unleached ashes—a hundred bushels, or two hundred, to the acre would be safe, if he has them.

In my experience, the cheapest form of procuring potash is in muriate of potash, which will analyze at least 50 per cent. pure potash. This can be applied at much less expense than can the same quantity of potash in the form of wood ashes. The muriate of potash gives what is most desired for berries more economically than kainit. I have never used kainit very extensively; have used unleached ashes quite liberally, and have decided to use only the muriate in all applications of potash.

For pear trees nothing better than potash and ground bone can be used as a fertilizer (five to eight pounds to a tree).

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#### PRUNING.

BY A. OHLSON.

So much has been written on this subject, that of the numerous works, periodicals, and reports published on Horticulture, it would be difficult to find any that do not contain advice on pruning—very



often excellent advice too—yet the beginner may read these and still be at a loss to know just what to do because climatic and local conditions and the habits of varieties vary to such an extent that a method of pruning found to be a success in one locality may prove a failure in another.

There are certain facts, however, that hold good everywhere and while I do not propose to give advice on the hard-and-fast-line principle I will point out these—draw the outlines as it were—and leave it to the experience and good judgment of the reader to work out the details.

The question is often asked, "why do you prune?" Are you not interfering too much with nature in pruning, and why not leave it to her to do the work?

Well, the fact is that the cultivation of fruits is an interference with, or rather improvement on, nature. The natural apple, for instance, is the crab-apple of the woods or some species of it. This in course of time, probably longer than is generally supposed, has been improved by cultivation, and selection of the best sports and varieties as well as by proper pruning. For it has no doubt been known to man since a very remote period that the thinning of a heavy crop improves the size and quality of that which is left, and the cutting out of old and weak wood improves the remainder by the admission of light and air.

Most of our choicest varieties of fruits have been produced by improved methods of cultivation, from time to time bestowed on their parents by man, and we have abundance of evidence that unless a high state of cultivation is continued these varieties will deteriorate, while on the other hand, if continued, they may still further improve.

Pruning is, therefore, of very great importance in fruit culture, for, by intelligent pruning, we are able to shape a tree in the most desirable form, increase or diminish the crop, and improve its quality, and in no small degree maintain the vitality of the tree.

In order to get strong, well shaped, and well developed trees in the orchard the pruning should begin in the nursery with that object in view. To produce such, the sideshoots, or laterals, should be cut off about two or three inches from the main stem during the summer months, this will cause the stems, being well covered with leaves, to increase in size much faster than if the side shoots were left their full length until the winter pruning be done.

Many nurserymen make the mistake of stripping the young trees of their side-shoots too soon, the result is that the trees become top-heavy, the diameter of the stem often greater at the top than at the collar.

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It is waste of time and labor to try to improve such deformities by staking, tying, etc. The better way is to cut them down when planting to about six inches from the ground and train a stem as indicated above, but often the best way is "to burn them" there and then.

The criterion of a "headed tree" is that it should be strong enough to stand without staking.

Cut back at the time of planting to four or five buds, if the trees are headed, if not headed cut back according to strength and variety. No definite rule can be given. A one year old tree of Red Egg Plum, seven or eight feet high, may be cut back to two feet, about the right height for this upright growing variety; a yearling Reine Hortense Cherry, two or three feet high, should be cut back to six inches, or close to the ground and have a stem grown, to be headed down when sufficiently strong to about five feet, about the right height for such a drooping variety. It will thus be seen that some knowledge of the habits of varieties must be had, and this can only be gained by experience and observation. Low stems, however, are much to be preferred, three feet or three feet and a half being ample for varieties of ordinary habits of growth.

The reason for cutting back at the time of planting is to give the tree a chance to make roots the first year. As it cannot do this and at the same time support the whole top, it must either die or get into that stunted condition from which it will seldom recover.

There are individuals who advocate leaving the trees unpruned the first year after planting and cutting back the second year, but actual experience will show which is the better way.

Cut to a bud pointing outward on an upright growing variety and to a bud pointing inward on a spreading or drooping variety. For instance, if a drooping variety like the Yellow Bellflower were pruned to buds pointing outwards, the head of the tree would soon reach the ground like a weeping willow, while an upright growing variety like the Northern Spy if pruned to buds pointing inwards would become too tall in the head, like a poplar; both forms should be avoided as much as possible.

Of the buds that have started select the best three or four, as the case may be, and pinch or cut back the rest to an inch or two from their base during the summer months. This is better than rubbing them off, because by pinching or cutting the fork of the tree can be well covered with leaves which will draw the sap to that place and make the tree increase in size and strength where it is most needed.

The first year after planting, the young shoots of apples, pears, and plums (cherries need only be thinned out) should be cut back to

about eight or twelve inches. Cut a weak shoot more severely than a strong one and cut to buds that are well developed and point in the right direction. Pinch or cut off any shoots during the summer that cross, crowd, or do not take the proper direction, but do not cut off the fruit spurs unless the tree is a very weak one.

The second and third year after planting cut back as during the first year, adding from a foot to a foot and a half of young wood each year. Cut off any stumps left by summer pruning the previous year and lay the foundation for that open, rounded head so desirable in the orchard. To do this the centres of upright growing kinds should be well cut out in time.

We have now arrived at a stage where the motto of the orchardist should be "to maintain vigor without producing an undue amount of wood and to maintain fruitfulness without overbearing." Some varieties are apt to produce too many fruit spurs and these should be thinned out to prevent overbearing; others not so prolific should have their heads well thinned out and any branches that are taken out should be cut off at their base.

The idea of cutting back severely every year and then pinching the young shoots back during the summer in order to produce fruit spurs is absurd. The more severely a tree is cut back the more wood it will produce and *vice versa*. A shoot left its full length will develop spurs and bear fruit if other conditions are favorable, but if shortened will produce wood.

To become an expert pruner requires some knowledge of plant life as well as a habit of close observation, but a person in possession of these should be able to master the art, especially if he gives his mind to the work. Get the best books on the subject and read these carefully. Get the best tools to be had and keep them sharp and in perfect order. Always cut off a large branch close to the stem or to some other branch, and cut a smaller one close to a bud. Do not use a cutter on a ten-foot pole, a man cannot do proper work with such a tool. Do not climb a tree that can not bear your weight, nor have on a pair of hob-nailed boots that will bruise the bark. Never cut a large branch from above in such a way that when it falls a portion of bark and wood will be torn away with it; cut first from underneath, then from above, and splitting will be avoided. Do not cut off the roots when planting, "cut only the ends smooth" of such roots as have been broken. Do not cut the life out of your trees and then blame the climate because they do not bear—the climate is all right.

#### PRUNING

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PRUNING.—Experience has taught me that it would be very unwise to leave a stub in cutting a branch from a tree. If it were left on in pruning, it would eventually have to be cut off at the base, unless left to rot off. Anyone who has cut and split cordwood, or handled knotty lumber, knows how these dead stubs injure the tree. If a branch must be removed, let it be done as soon as possible, and like any other surgical operation, with neatness and despatch. Just at the junction of the branch with the main stem, is the spot to make the cut. Then paint the wound, if larger than will be grown over the first year. In the illustration the cut at 1 is too close to the body, and the wound too large; at 2 it is too far from it, but at 3 it is just right.

—H. E. VanDeman, in *R. N. Y.*



#### SUMMER PRUNING.

*Summer Pruning Shrubs and Trees*—When it becomes better known how easily good shaped trees may be produced by summer pruning, there will be more of it done than there is to-day. Somehow, the idea prevails that pruning of trees should be done in winter. Fruit trees, which farmers are more interested in than any others, are left to grow as they will in the summer, trusting to the saw and hatchet for the regulation of matters when the winter comes. This is where the great mistake is made. The time to prune any tree to the best advantage is when it is growing freely in summer. Some few years ago I had under my care some peach trees. I had the planting of them as well as the care of them afterwards. From the first year these trees were summer pruned almost entirely. About June, when the growth was fresh, the trees were inspected and were kept in good shape by pinching off of all the shoots that were out of place or growing too rapidly. This was done by finger and thumb. When topped in this way the side shoots push out, and a dozen shoots take the place of the one. The tendency of the peach tree is to make long shoots, and a tree left to itself will soon become unsightly. But when topped as described, beautiful specimens are obtained, as these trees were which I speak of. Instead of there being trees with long branches, bearing fruit only on the ends where the young twigs were, these trees were bushy from bottom to top, being well supplied throughout with young twigs, which are the ones that bear the fruit. These young shoots are the result of summer pruning, and they can be produced on all trees as well as on the peach.—*Practical Farmer.*

## BUDDING.

For budding you need no tools but a sharp, thin-bladed knife. You can get a budding knife, such as is shown at 1, at any store where horticultural implements are kept. The illustration shows everything plainly; 2, shows how the bud is cut off; 3, under side of the chip after it is cut out; 4, how the incisions are made, and 5, the bud inserted and the whole securely wrapped. The cut is usually made about half an inch above the bud to be removed and the cut is made down to three-quarters of an inch below the bud, though it may be made shorter. A small portion of the wood is removed with the bark, so not to injure the root of the bud. Make smooth cuts; fit the bud to the incision as closely as possible, and wrap securely, so as to exclude air and water.—*Cultivator*.



## GRAFTING.

There are many apple and pear orchards throughout British Columbia unprofitable on account of the varieties planted. Many kinds also, once profitable, are so no longer on account of the apple scab, as, for instance, the Fameuse, the Early Harvest, and the Fall Pippin.

Now any man, who has a little skill in the use of tools, can easily transform such trees to kinds that are valuable, by grafting; an art by many looked upon as difficult, and invested with many secrets.

The first thing to do is to secure scions of the kind wanted, for these must be cut while the buds are yet dormant, and be laid away packed in earth, or in fresh saw-dust until needed. If near a city market it will pay to grow a few such fancy apples as Red Astrachan, Duchess and Wealthy, and scions may be secured at a very small cost, from almost any nurseryman.

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Apples and pears may be grafted much later in the season than stone fruits, for while the latter may be done as early as possible in the spring, the former need not be done until the last of May, or even the early part of June.

Cleft grafting is the usual method, and for small limbs is the best. For this, the tools required are a sharp saw for cutting off the limbs where the graft is to be inserted, a sharp knife to sharpen the scion, a grafting chisel, such as is shown in Fig. A (c), to open the cleft where it is to be inserted, a mallet to drive the chisel, and a small kettle, with a lamp so fixed in it as to warm the water in which the wax is placed till needed.

Our illustrations will represent the process. The scion, Fig. A (b), is bevelled equally on both sides, with the outer edge if anything a trifle thicker than the other to ensure firm contact between the cambium layer of the scion, and the stock. It is an advantage to have a bud on this edge as shown if the stock is small, one scion may do, as in the engraving; but if large, it is better to have one on each side, and thus if one fails the other may succeed.

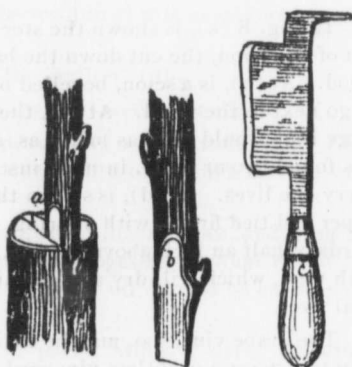


Fig. A.

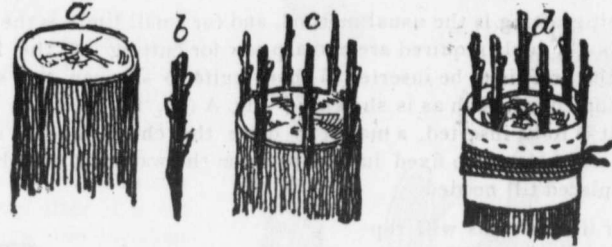
The stock should be smoothly cut across with the saw, and then split with the grafting chisel, the narrow projection on the back of which is used to open the cleft for the insertion of the graft. All the cuts are then covered with grafting wax and the work is complete.

Grafting wax may be made in a variety of ways, but in all the ingredients are resin, tallow or linseed oil or beeswax, and it is more or less expensive according to the amount of beeswax used. A very good recipe is one pint of linseed oil, one pound of beeswax and four pounds of resin. The resin and the beeswax should first be melted together, and the tallow or oil be added, when the whole should be well stirred up. The mixture should then be poured into cold water, and when it has cooled, worked by hand until ready for use.

A very simple method of grafting has been most successfully practised by the writer, at Maplehurst, during the past few years, which requires very little skill, few tools and no wax. An illustration showing it appeared in the *Rural New Yorker*, under the name of Crown Grafting, which engraving we have copied, because it shows



the process so well that very little is needed in the way of description. One advantage of this method is that it may be used on limbs as large as six inches in diameter, and on trees of considerable age, for as the wood is not split, the wound is the easier healed.



In Fig. B (a), is shown the stock cut, and prepared for the insertion of the scion, the cut down the bark simply reaching through the wood. At (b), is a scion, bevelled on one side only, which is the side to go next to the wood. At (c), the scions are set, but only a very large limb would need as many as are here represented; the writer has found two or three, in most instances quite enough, since nearly every one lives. At (d), is shown the same, wound with stiff manilla paper and tied firmly with a string. The paper is made to project upwards of half an inch above the cut, the basin thus formed is filled with mud, which will dry and remain until the wound has begun to heal over.

The grape vine, too, may be easily grafted, and knowledge of this may transform a profitless vineyard into one of great value. This work must be done early in the season before the buds begin to swell. The scion should be about six inches long, and is inserted very much in the same way as described in cleft-grafting the apple, except that the old vine is cut some three or four inches below the surface of the ground, and that no grafting wax is used. Instead, the cleft stock is tied with a string (Fig. D), and the earth is carefully heaped about the scion so as to leave but one bud above the surface.



Fig. C.



Fig. D.

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In case the old vine is too knotty for cleft grafting, the work may be accomplished by splice-grafting a smaller branch, as shown in Fig. C. This is done at a distance of two or three feet from the stump, at (g), and the grafted branch is then laid down and fastened in place with a peg. The earth is pressed about the scion leaving a bud above the surface, which is the only one that should be allowed to grow.

### WAXES FOR GRAFTING AND FOR WOUNDS.

#### COMMON RESIN AND BEESWAX WAXES.

1. Reliable Wax—Resin, 4 parts by weight; beeswax, 2 parts; tallow, 1 part. Melt together and pour into a pail of cold water. Then grease the hands and pull the wax until it is nearly white. One of the best waxes.

2. Resin, 4 lbs.; beeswax, 1 lb.; tallow, 1 lb.

3. Resin, 6 lbs.; beeswax, 2 lbs.; linseed oil, 1 pint.

4. Six lbs. resin; 1 lb. beeswax; and 1 pt. linseed oil. Use a brush and apply the mixture hot one-eighth of an inch thick over all the joints.

5. For Warm Weather—4lbs. resin, 1lb. beeswax, and from half pint to a pint of raw linseed oil; melt all together gradually, and pour into water and pull the wax. The linseed oil should be entirely free from cotton-seed oil.

6. Resin, 6 parts; beeswax, 1 part; tallow, 1 part. Should be used warm for inside work.

7. Resin, 4 or 5 parts; beeswax,  $1\frac{1}{2}$  to 2 parts; linseed oil, 1 to  $1\frac{1}{2}$  parts. For outdoor work.

#### WAXED STRING AND BANDAGE.

8. Waxed String for Root Grafting—Into a kettle of melted wax place balls of No. 18 knitting cotton. Turn the balls frequently, and in five minutes they will be thoroughly saturated; when they are dried put away for future use. This material is strong enough, and at the same time breaks so easily that it does not injure the hands. Any of the resin and beeswax formulas may be used. When the string is used it should be warm enough to stick without tying.

9. Waxed Cloth—Roll old calico or thin muslin on a stick and place it in melted wax. When thoroughly saturated unroll the cloth and place it on a bench to cool. Then cut it into strips to suit.

#### WAXES FOR WOUNDS.

10. Any of the more adhesive grafting waxes are excellent for dressing wounds although most of them cleave off after the first year. Stiff and ochreous paints are also good.

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II. COAL-TAR—Apply a coating of coal-tar to the wound, which has first been pared and smoothed. If the wound contain a hole, plug it with seasoned wood.

### THE SUCCESSFUL RAISING OF PEARS.

PEARS are a delicate fruit, liked by nearly everyone. The trees are early bearers, of easy culture, and take up very little space. When once well established they bear neglect better than most other kinds of fruit. The tree has no insect enemies, if we except the fall web-worm, which occasionally locates on it, or perhaps, once in a lifetime, the tree may be visited by a small colony of slugs. Pears delight in dry and sunny locations, yet will grow and thrive almost anywhere if properly cared for. If the soil be wet it should be underdrained, and for this purpose a ditch filled with the small stones that can be raked from the surface will answer admirably. For standard varieties 20 ft. apart each way is sufficient, and for dwarfs or pears worked on quince stock, 10 ft. will usually do, though some varieties, if planted deeply, will root on the pear stock and become standards, requiring more room. For market there is little profit in dwarfs, but for family use they come into bearing so early, and with some varieties they bear fruit of so much better quality that they are well worthy of cultivation.

A fertile soil is good, but not absolutely necessary. Until the tree is well grown the ground should be carefully worked through the early part of the season, letting the work cease as early as the first of September. Dwarfs should be worked every season, as the quince stock on which they are budded has fine fibrous roots that feed near the surface, and turf left about them for any length of time is fatal to any good results. All summer varieties should be picked at least ten days before ripening, and ripened in boxes excluded from light, and as far as possible from air. Of course they will ripen otherwise, but to secure the best possible flavor, there is no better plan. Fall varieties should be gathered two weeks before ripening, and handled in the same way. Winter varieties may remain on the trees until the leaves fall, taking care not to let them get severely frozen. Pack them away in a similar manner as recommended for the earlier varieties, and keep them as near the freezing point as you can until you wish to use them. A few days in a warm room will then ripen them rapidly.—*Farm and Home.*

### CURRENTS.

The propagation of the currant is so exceedingly simple that we would not advise any of our readers, who wish to enter into the culti-

vation of this fruit from nurseryman varieties wanted quantity of cut worthless to him no such opportunity from nurseryman which is a little failures. These ing into the current Five feet apart because the cult it will be no more than it would be be in two directions

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Select a sandy stable manure at the well, so that it ma

vation of this fruit, to go to the expense of buying a quantity of plants from nurserymen. If any neighbor has a plantation of currants of the varieties wanted, he will only be too willing to part with a large quantity of cuttings, at the time of the yearly pruning; for these are worthless to him, unless he intends to use them for propagating. If no such opportunity as this offers itself, cuttings can be purchased from nurserymen at a very small cost. If planted in a sandy loam which is a little moist and not too shady, there will scarcely be any failures. These, after one year's growth, will be ready for transplanting into the currant plantation, and in two years will begin bearing. Five feet apart each way is a very good distance for planting them, because the cultivation will thereby, be rendered very simple; indeed, it will be no more trouble to care for such a plantation of currants than it would be for an ordinary corn field, for horse cultivation can be in two directions, and there will be very little work left for the hoe.

The pruning of the currant is very important, and should be carefully attended to every year, both for the purpose of producing a constant supply of young growth, and also to remove all stalks which are affected by the borer; these latter should be carefully removed and burned, for this is the only way of routing this insidious foe. *The Garden* (English) gives the following very sensible directions for pruning the currant: "The requirements of the Red Currant are very different from those of the Black, as the latter bears best on the young wood, while the Red answers best if the young wood be cut off almost close to the main stem at pruning time in the autumn, leaving an inch in length, unless it be desirable to increase the number of branches, or the size of the tree. Young trees should be encouraged to form six or seven main branches, keeping the centre of the bush open all the time, like a basin, until the trees reach their full height, about four feet. The leading shoots should have only about one-third of their length cut off, and when the tree gets to its full height, they may be cut off at the points as in the other parts, thus keeping the old main stems, which by this time will be full of buds throughout their whole length, and will bear very freely; it is well to encourage a young branch to grow up if any of the others show signs of weakness from old age, and thus gradually replace them. Summer pruning is also very beneficial to Red Currants, cutting all young wood back to about three inches, as soon as the fruit is gathered (if it be not required for extending the tree), and, at the winter pruning, reducing the pieces left to one inch in length."

#### TO GROW THE FINEST TOMATOES.

Select a sandy loam with a southern exposure. Put on well-rotted stable manure at the rate of 10 to 15 loads per acre. Plow and harrow well, so that it may be thoroughly incorporated with the soil, or in



place of this, 2 or 3 shovelfuls of rich compost may be added to each hill. Sow the seed, and sow only that purchased from reliable dealers, or saved from the finest, earliest specimens, in the hot-bed, the first of March. When 2 inches high transplant into cold frames, 3 or 4 inches apart. Be sure to shade and water the plants until well rooted. Transplant again, when 4 inches high, 8 inches apart. This will make fine, stocky plants, with strong roots. Of course, protect the cold frames from frosts or storms by covering when necessary, but manage to give light and air as soon as possible after the danger is over.

By all means be careful not to set the plants in the open air until all danger from late frosts is over. The risk is too great and you gain nothing, as the plants are growing faster. If properly transplanted, the earth made "firm" around the stalks, they will be retarded very little. It is better, if possible, to set just before a rain, or if this cannot be done, late in the afternoon, so that they may have the coolness of the night to revive in, but if strong plants, and well set, they will wilt but little, and in a day or two will look as thrifty as ever.

Set the plants 4x4 feet each way, with the exception of the dwarf Champion, which will bear 3x3 feet. Cultivate both ways with a horse cultivator. Should an unexpected frost occur after setting in the open ground, the plants may be saved, unless very badly frozen, by a thorough sprinkling with cold water. We once saved half an acre by this means; but it must be done before sunrise. In the North, where frost comes early in the fall, pull the vines before frost; throw them in a large pile or piles and cover with hay or straw. Green tomatoes, matured enough, will ripen and repay you for the trouble.—*Farm and Home.*

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## RASPBERRIES.

### SOIL.

All varieties of *red raspberries* do not succeed equally well on the same kind of soil. For instance, varieties of foreign extraction (*Rubus idoeus*), such as "Clark," "Hornet," and "Brinckle's Orange," do not flourish on sandy or light soils, but are more at home on a deep, rich, moist soil that is rather compact. On light soils their leaves are apt to burn in summer, which prevents the canes from maturing perfectly, and consequently renders them liable to injury by winter. For most varieties of raspberries a cool, loamy soil, moist, but not sodden, will usually give the best results.

The *black raspberry*, on the other hand, seems equally at home on sand or loam, and on well drained clayey soils; but on heavy compact soils which are cold, it does not thrive. Anyone who has attempted

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to grow black caps in cold and sodden soil will readily appreciate the truth of this statement. In ground of this kind the canes are subject to disease, are easily winter killed and prove generally unprofitable.

#### PLANTING, CULTIVATING AND PRUNING.

In field culture, suckering varieties, red, purple and yellow, should be planted in rows six to seven feet apart, and three feet apart in the row. The rows should be accurately measured and indicated by stakes previous to planting. The work of planting is much facilitated by carefully opening with a plough a furrow 4 or 5 inches deep in the line of the row for the reception of the plants. Two plants may be set in a hill, using a hoe to fill in the soil, which should be carefully compacted. Setting out two shoots to begin with, ensures a much better and even growth in the whole field, than if a single cane is used in each case, and fewer failures will result if this plan is adopted. The cultivator, which should be started as soon as the planting is done, will effectually complete the filling of the furrow.

Black caps may be planted in rows in the same way. They are also successfully grown by planting in hills four or five feet apart each way. This method allows of very thorough cultivation by horse power, thus greatly lessening the amount of hand labor.

The bearing wood should be removed as soon as the fruiting season is over. Experiments carried on here during the past two years, and still in progress, have not indicated any striking advantage from leaving the removal of the old wood till spring. There is generally more time to attend to this work in early autumn, than during the hurry of spring work.

Clean culture with all fruit crops always pays best. In the case of the raspberry, this is particularly true. Frequent shallow cultivation will keep down weeds, and preserve the moisture of the soil, often lacking during the season of fruit harvesting. A superfluous growth of suckers in the case of red raspberries, may be kept under by the cultivator and the vigor of the canes in the row thereby increased. Satisfactory results are also obtained, by some growers, by mulching with straw or coarse manure instead of cultivating.

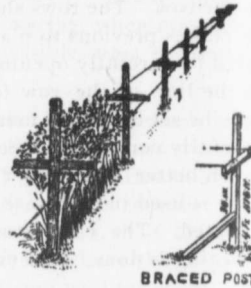
A cheap trellis can be constructed with little trouble by using posts 5 feet long, made of 2x6 inch planks, and driving them edgewise across the rows, at distances of 3 to 4 rods apart. A single wire stapled to the outside of these posts will be sufficient to hold the canes in place, and prevent them from being borne to the ground by the weight of the fruit, or by rain or wind. Another plan is to use posts made of 2x4 inch scantling. Cross pieces 15 to 18 inches in length are nailed on the posts about three feet from the ground. The ends of the cross pieces are notched. The wire is nailed to the end posts of each row, and is held in place by the notches in the cross

pieces into which it is laid. This method allows of the easy removal of the wire when desired.

In garden culture, it always pays to grow the canes in hills. Each hill should be supplied with a stake to which the canes may be tied.  
—*Central Experimental Farm Bulletin.*

#### TRAINING THE RED RASPBERRY.

My way is to firmly drive four-foot stakes one rod apart and nail to each, 30 inches above the ground, a short piece of plank two feet in length and saw a notch close to each end of the upper edge. In these notches firmly stretch No. 16 wires and brace back the end posts. The accompanying illustration makes perfectly clear this simple and effective way of doing the work. The advantages of keeping raspberry and blackberry vines from sprawling all over the lot will be best appreciated by those who have tried this method.—*W. M. King.*



#### "TOUCHY CROPS" ON THE PACIFIC.

A correspondent from Washington to the *Rural New Yorker* gives some good advice about touchy crops, that is, crops difficult to raise, and for that reason, generally neglected.

"On my little farm, I have grown several such crops, and find them almost the only profitable ones these dull times. One such crop is tomatoes. The nights in this Puget Sound region are so cool that tomato culture is successful only in the hands of the thoughtful, painstaking gardener. I have been raising tomatoes in increasing quantities for three years. In 1892 I began with a little experiment plot, 24x60 feet; from this I sold \$16.94 worth of tomatoes, besides what the family used. In 1893, the area having been increased to one-eighth of an acre, the sales amounted to \$57.96. The crop of 1894 has just been finished, and though this has been by far the driest and most unfavorable of the three years, the crop was sold for upwards of \$80. A good rain in July would easily have increased the crop 25 to 30 per cent. Having but little competition in the home market, the prices ruled fair, while the surplus was disposed of at a good figure in the Seattle and Olympia markets. Those shipped were well packed and carefully graded, sold well, and created a demand which will tax my ability to supply.

As to varieties, I have tested E. Ruby, Dwarf Champion, Perfection, Ponderosa, etc., and have been forced to the conclusion that

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for me, my own selection of E. Ruby is *the* tomato. It is the earliest I have tested, fairly smooth and of fair quality. I go over the tomato patch as soon as the fruits begin to ripen, and pick out and mark a few of the plants bearing the most, the earliest and best shaped tomatoes. All my seed is taken from these plants. I plant my seed March 1st, in flats two inches deep, filled with a mixture of two-thirds alluvial, sandy loam and one-third leaf mold. For want of a better place, these flats are kept in the kitchen window till the plants are transplanted to the cold frame. Transplanting is usually begun about April 1st, and finished, doing the work at odd times, about April 20th. The transplanting is done partly into old cans, partly into flats or boxes containing 3 or 4 inches of the same sandy, alluvial soil, with the addition of a little bone dust or complete fertilizer, and part directly into the soil of the cold frame where the cans and boxes are placed at once after transplanting. Here they remain, watered, ventilated, and covered from frost till May 20th, when planting in the open ground begins, and is finished by June 1st. The plants are usually about 6 inches high by this time, well hardened, and continue growing, after being set out, with scarcely a check.

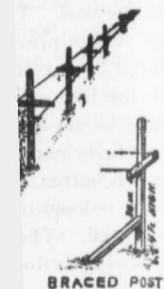
No attempt is made to get large, soft plants, as experience shows that such plants are much inferior to those of slower growth and sterner stuff. No fertilizer is used except in the hill, and no stable manure is used at all, as I have but little of it and find it more useful for other purposes. Besides using a good handful of fertilizer in the hill, a small handful is sprinkled over the plant and around it just after planting, to keep away the troublesome flea beetle. This plan never fails with me. The plants stand two and a half feet apart in the row, which are three feet apart. When the plants get so tall as to begin to fall over, a stake three feet long is pushed down beside each one, and the plant is tied to it, using one or two strings as required.

From the time plants are set out in the open ground, all side shoots are pinched off as they appear, and after two clusters of blossoms appear, all growth above them is checked also. Neglect of this one point will make a difference of two to four weeks in ripening, with me. Cultivation once a week is kept up till the crop is well grown. Part of my patch this year was on ground that had grown three consecutive crops of tomatoes, and I was troubled less with rot this year than ever before, though some of my neighbors' plants suffered severely. I attribute this immunity from disease to the use of commercial fertilizers and thorough and long-continued cultivation among the plants. A crop of lettuce, radishes or green bunching onions from sets is usually grown on the land before planting tomatoes.

Staking and training to a single vine are very important if one wishes an extra early crop. This year the first tomatoes sold netted

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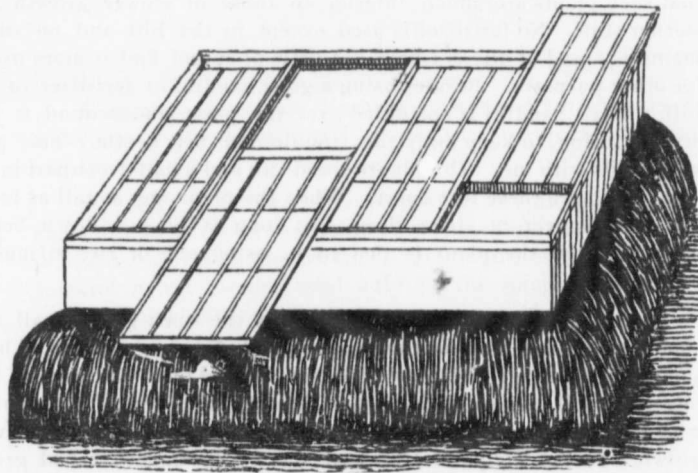
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the six cents per pound, and four weeks later my first competitor got his crop into the market, when tomatoes were selling for two or two and a half cents per pound. I am now so situated that I can make a paying specialty of this important crop without any fear of glutted markets or too much competition."

#### HOW TO MAKE A HOTBED.

A hotbed may be constructed for permanence, of brick or stone, but for temporary use, of plank or common inch boards, as in the illustration: the back about twenty inches high, one-half greater in height than the front, which should be from twelve to fourteen inches—the whole made to support one sash or several of any dimensions, the best of about three by seven feet. The back being higher than the front gives a declivity to the sash, thus casting off the rain, which it would not do if flat. The box at the proper season should be placed upon a bed of fermenting material, which, making a gentle and continuous heat, warms up a layer of soil resting upon it, and thus germinates seed and forces plants into rapid growth.



The value of the bed depends principally upon the character of the fermenting material. This should be rich stable manure (no cow dung) forked over two or three times at intervals of a week and kept in a deep and compact pile till it begins to smoke or steam, indicating that the process of fermentation has set in. If the dung be very rich in grain an addition of forest leaves is desirable, as they serve to prolong the period of fermentation, which might otherwise be too rapid.

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Place five or six inches of earth on the manure, levelling and finishing with an iron-toothed rake; then put on the sash and leave the bed alone for a few days before planting the seeds. If the seeds are put in at once the manure may become so hot that the tender germs will be destroyed. About the third or fourth day, the heat will usually subside to about 80 degrees, then it will be safe to sow. Mark off in rows about four inches apart, scatter the seed thinly in the drills, cover with half an inch of soil, and pat the bed down with a board or the back of a hoe.

Radishes and onions do not need transplanting, but transplant tomatoes and cabbages once or twice before setting in the open ground, giving them more room each time. Also transplant lettuce when it gets its second or third pair of leaves. Set three inches apart each way and it will soon become large enough for use. Always keep the bed full. As soon as one crop is taken out put in something else.

Open the bed and let in fresh air when the weather permits. As it becomes warmer the sash may be removed altogether during the middle of the day, but must always be replaced when it turns cool towards evening. When water begins to gather on the inside of the glass, it shows that the air is getting damp and heavy, and if it is not changed the plants will smother, or the temperature will get too high; but always avoid letting in a cold draught directly on to the plants. Water sparingly in cold weather and never when the sun is very bright, for the drops of water on the leaves under the glass act as a lens and burn the leaves so that they will turn brown. For this reason in bright weather the watering should be done either in the morning or evening. If too much water is given the bed will become soggy and dead and the plants will turn yellow and cease to thrive. To avoid this let the bed become quite dry before watering and then give it a thorough soaking. On cold nights or in stormy weather the glass should be covered with matting or boards, or even hay or straw, to keep the temperature from falling too low. A well managed hot-bed will more than pay any family for the trouble. Once enjoyed it will be made every spring. It will require a little attention every day, but the pleasure of having early vegetables will be an ample reward.  
—*American Agriculturist*.

#### METHODS OF KEEPING AND STORING FRUITS AND VEGETABLES.

##### APPLES.

1. Keep the fruit as cool as possible without freezing. Select only normal fruit, and place it upon trays in a moist but well ventilated cellar. If it is desired to keep the fruit particularly nice, allow

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no fruits to touch each other upon the trays, and the individual fruits may be wrapped in tissue paper. For market purposes pack tightly in barrels, and store the barrels in a very cool place.

2. Some solid apples, like Spitzenberg, are not injured by hard freezing, if they are allowed to remain frozen until wanted and are then thawed out very gradually.

3. Many apples, particularly russets and other firm varieties, keep well when buried after the manner of pitting potatoes. Sometimes, however, they taste of the earth. This may be prevented by setting a ridge-pole in forked sticks over the pile of apples, and making a roof of boards in such a manner that there will be an air-space over the fruit. Then cover the boards with straw and earth. Apples seldom keep well after removal from a pit in spring.

4. Apples may be kept by burying in chaff. Spread chaff (buckwheat chaff is good) on the barn floor, pile on the apples and cover them with chaff and fine broken or chopped straw two feet thick, exercising care to fill in the interstices.

#### PEARS.

Pears should be picked several days or a couple of weeks before they are ripe, and then placed in a dry and well ventilated room, like a chamber. Make very shallow piles, or better, place on trays.

#### CRYSTALLIZED OR GLACE FRUIT.

The principle is to extract the juice from the fruit and replace it with sugar syrup, which hardens and preserves the fruit in its natural shape. The fruit should be all of one size and of a uniform degree of ripeness, such as is best for canning. Peaches, pears, and similar fruits are pared and cut in halves; plums, cherries, etc., are pitted. After being properly prepared, the fruit is put in a basket or bucket with a perforated bottom and immersed in boiling water to dilute and extract the juice. This is the most important part of the process, and requires great skill. If the fruit be left too long, it is over-cooked and becomes soft; if not long enough, the juice is not sufficiently extracted, and this prevents perfect absorption of the sugar. After the fruit cools, it may again be assorted as to softness. The syrup is made of white sugar and water. The softer the fruit, the heavier the syrup required. The fruit is placed in earthen pans, covered with syrup and left about a week. This is a critical stage, as fermentation will soon take place, and when this has reached a certain stage the fruit and syrup are heated to the boiling point, which checks the fermentation. This is repeated, as often as may be necessary, for about six weeks. The fruit is taken out of the syrup, washed in clean water, and either glazed or crystallized, as desired. It is dipped in thick syrup, and hardened quickly in the open air for glazing, or left to be hardened

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slowly if to be crystallized. The fruit is now ready for packing, and will keep in any climate.

#### PRESERVING FRUITS FOR EXHIBITION.

Sulphur is sometimes used as follows: Put 30 gallons of water in a 40-gallon barrel; float on top of the water a tin pan, in which put a little sulphur. Set the sulphur on fire and cover tightly until the fire goes out; renew the sulphur several times, opening the barrel for renewal of air between the doses. This fluid is then used as a preservative.

A satisfactory fluid is made by placing an ounce of salicylic acid in five gallons of water and then adding a little glycerine. The amount of glycerine will depend upon the juiciness of the fruit. The greater the juiciness, the more glycerine must be added. From eight to fifteen per cent. may be considered an average.

#### CABBAGE.

The most satisfactory method of keeping cabbages is to bury them in the field. Select a dry place, pull the cabbages and stand them head down on the soil. Cover them with soil to the depth of six to ten inches, covering very lightly at first to prevent heating—unless the weather should quickly become severe—and as winter sets in cover with a good dressing of straw or coarse manure. The cabbages should be allowed to stand where they grew until cold weather approaches. The storing-beds are usually made about six or eight feet wide, so that the middle of the bed can be reached from either side, and to prevent heating if the weather should remain open. Cabbages quickly decay in the warm weather of spring.

Cabbage for family use is most conveniently kept in a barrel or box half buried in the garden. Cabbages and turnips should never be kept in the cellar, as when decaying they become very offensive.

#### CELERY.

For market purposes, celery is stored in temporary board pits, in sheds, in cellars, and in various kinds of earth pits and trenches. The points to be considered are, to provide the plants with moisture to prevent wilting, to prevent hard freezing, and to give some ventilation. The plants are set loosely in the soil. There are several methods of keeping celery in an ordinary cellar for home use. The following methods are good:

Take a shoe or similar box. Bore one-inch holes in the sides, four inches from bottom. Put a layer of sand or soil in the box, and stand the plants, trimmed carefully, upon it, closely together, working more sand or soil about the root part, and continue until the box

is full. The soil should be watered as often as needed, but always through the holes in the side of the box. Keep the foliage dry.

Celery may also be stored and well blanched at the same time, in a similar way, by standing it in a barrel upon a layer of soil. Some roots and soil may be left adhering to the plants. Crowd closely, water through holes near the bottom as in the case of box storage, and keep the plants in the dark.

Blanched celery can also be preserved for a long time by trimming closely and packing upright in moss inside of a box. A large quantity of the vegetable may thus be stored in a small place.

#### ONIONS.

Onions demand a dry cellar, and the bulbs should be thoroughly dried in the sun before they are stored. All tops should be cut away when the onions are harvested. If a cellar cannot be had, the bulbs may be allowed to freeze, but great care must be exercised or the whole crop will be lost. The onions must not be subjected to extremes of temperature, and they should not thaw out during the winter. They can be stored on the north side of a loft, being covered with two or three feet of straw, hay or chaff to preserve an equable temperature. They must not be handled while frozen, and they must thaw out very gradually in the spring. This method of keeping onions is reliable only when the weather is cold and tolerably uniform.

#### ROOTS.

Roots of all sorts, such as beets, carrots, salsify, parsnips, etc., can be kept from wilting by packing them in damp sphagnum moss, like that used by nurserymen. They may also be packed in sand. It is an erroneous notion that parsnips and salsify are not good until after they are frozen.

#### SQUASHES.

Squashes should be stored in a dry room in which the temperature is uniform and about 50 degrees. Growers for market usually build squash houses or rooms and heat them. Great care should be taken not to bruise any squashes which are to be stored. Squashes procured from the market have usually been too roughly handled to be reliable for storing.

#### TOMATOES.

Pick the firmest fruits just as they are beginning to turn, leaving the stems on, exercising care not to bruise them, and pack them in a barrel or box in clean and thoroughly dry sand, placing the fruits so that they will not touch each other. Place the barrel in a dry place.

In the autumn, when frost appears, tomatoes, if carefully picked and laid on straw under the glass of cold-frames, will continue to ripen

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until near Christmas. Fruit ripened in this way seems to be as good as that ripening naturally on the vines.

The ripening of tomatoes may be hastened ten days bagging them as grapes are bagged.

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#### A FRUIT HOUSE.

In some localities it is rather difficult to secure a good cellar without considerable work. Often draining by digging a trench is necessary; and when this is the case it will often pay to build a fruit house about the ground, rather than to run the risk of water flooding in and damaging the fruit and vegetables. A fruit house, if well built, so as to be frost-proof, is much more convenient than a cellar in many ways, but care must be taken in doing the work if good results are to be secured.

Two by six studding is the best; that is, not less than this should be used. They may be placed two feet apart, and it is usually best to brace the corners. Eight feet is high enough but, in most cases six is sufficient. It should be built close to ground, so that it can be banked up readily on all sides. On the outside rough boards can be nailed on first, and over this a layer of tarred paper or heavy straw paper, and then the whole should be carefully weatherboarded.

When it can be done, it is best to fill the space between the studding with sawdust, taking care to fill it in tightly. Rough boards may be nailed on the inside, and over this tarred paper should also be tacked.

Overhead a tight layer of boards should be put and on them a good layer of sawdust. A chimney or place for ventilation should be provided. Care should be taken to make the building tight; the door and ventilator should be all the openings. Good, close-fitting doors, one to open outside and one inside, will help. Boxes or bins should be built inside about four inches from the walls. This will give air space between the walls and the fruit. To make doubly sure, an old stove set in the room in which a little fire may be made in the severest weather, will be found a benefit, as a very little fire will lessen very materially the danger of damage. A house of this kind, in an ordinary winter, will keep fruit and vegetables without freezing, but in winters such as we sometimes have, a little fire will be necessary.—*Fruit Grower's Journal*.

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#### ANOTHER FRUIT HOUSE.

The foundation of my fruit house is of boulders and "slush lime," two feet in the ground all round; then a wall of hardened brick

eighteen inches high and twelve inches thick on the boulders; then sills twelve inches high on the brick wall. With close ceiling, weather boarding, and brick floor it is rat and mouse proof. I have sawdust about eighteen inches deep on the ceiling overhead. An eight inch square opening in the centre of the building through the ceiling, with an eight inch box over it, long enough to keep the sawdust from falling in, gives sufficient ventilation. This ventilator should not extend through the roof, as a strong draught is not desirable. The foul air will pass out through openings between the shingles, etc. Tack a bit of screen over the top of the ventilator, to keep out insects or mice, should any find their way up there. Put a slide on the under side of the ventilator so that all draught may be shut off in very cold weather. I think a brick or cement floor preferable to a plank one. Wood will soon rot, and a "dead air" space below the floor is not desirable, as the warmth from the ground, which is needed in cold weather, would be somewhat held back by it. One tightly fitting door opening inside and another opening outside, with a wire screen door between them, are necessary. One small window with sash and glass inside and out, is sufficient. When fruit is put in, and the weather is warm, a low temperature may be maintained by giving all the ventilation possible at night and by closing up tightly during the day. If extreme cold continued several days, I used to put a gallon iron pot nearly full of live coals, inside at night, to prevent things freezing. Screen wire over the pot made it safe. I now use a small natural gas jet. Though my building is very satisfactory, were the sawdust wall eighteen inches thick, I think both heat and cold could be the better kept out.

#### A HOUSE FOR FRUIT STORAGE.

A cheap and substantial fruit house can be made by the following plan: First, as you wish to have it rat proof, put in a cement floor. You can excavate or not, as you think best, but if the land is of such a character that there will be no danger of water coming in, it may be best to dig a few feet; but I would not have it so deep that the fruit must be carried up and down stairs; so, if you excavate, have one end on level with the outside land so that you can walk in. No stone work or foundation will be necessary if Portland cement is used for the floor, but under where each post is to stand you must dig down to a solid foundation, either rock or hardpan, and fill to near the level of the floor with grout made of six parts of coarse gravel or finely broken stone thoroughly tamped to within four inches of the top and finished with cement, one part, and sharp sand, two parts. On my soil, I do not need to dig more than fifteen or eighteen inches deep and a foot square for each post, but on a different soil it might be necessary to make it deeper and wider, I think, for a house of the capacity named.

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I would build twenty feet wide and would arrange it in this way : A row of bins, or rather shelves, each side three and a half feet wide, then a three foot passage, and a double width row of shelves in the centre, seven feet wide, three and a half feet to be reached from each passage. To make this shelving for the front, set up studding on the cement floor and let the top of them extend to the ceiling above, so that they can be fastened there, and also studding against the wall, and then bolt two by four pieces across to support the floors of the shelves. These supports for the shelving need not be nearer to each other than eight or ten feet, the space being narrow, and as it is not designed to put the apples more than eight inches deep, the weight will not be heavy on them. The upright studding, if of hard wood, will only need to be two by four inches, but if soft pine be used it may be best to use two by six. I would not nail the boards used as floors to these receptacles for the fruit, as they will lie on the cross pieces just as well without. The bottoms of the studding will not need to be mortised into the cement floor, for made in this way its own weight will hold it in place. Make the shelves sixteen inches apart as you will not want to put the apples deep, for you want the air to circulate over them, and so you can easily assort to remove specked apples. I think eight inches deep enough to place the fruit.

With a ceiling ten feet high, you can get in seven shelves, as the lower one may be near the floor. Estimating that two square feet of the shelving will hold a bushel of fruit, our twenty-eight shelves would hold a little over forty bushels of fruit for each foot of the length of the building, or a building twenty feet long would hold something over eight hundred bushels. It is not designed to have any openings in the side walls of this building, but to have a door and a window at each end for ventilation, and for partial light ; but in handling the fruit you should have a lamp with a strong reflector on a pivot so that the light may be thrown on any part of the shelving. This lamp should be movable, and nails ought to be arranged to hang it on so that the light can be had where wanted. The room must be floored tightly over head so no dust can rattle through, and the floor covered with six inches of sawdust.

The outer walls of the building are made by using wide studding, and packing the space between with sawdust, dry leaves, or any good non-conductor. In my climate an 8-inch wall would be sufficient, but in a higher latitude 12 inches would be better, or if a cheap temporary house is wanted as an experiment, the sides can be made of one thickness of inch lumber, and the building covered on the approach of cold weather with a straw or fodder stack. This would answer very well for the farmer who has but a few hundred bushels of fruit, and, perhaps, only a crop once in two or three years. In fact, the danger of freezing is small, for with a large quantity of fruit in such a room,

a good deal of latent heat will develop, and the design of making the thick walls or protecting with straw or fodder is to keep the warm and damp out, as much as the cold, and the end doors or windows should be opened frequently in moderately cold, clear weather, but tightly closed in damp, warm weather, and in very cold weather. A thermometer should be kept in the house, and I would keep the temperature at or below 40 degrees, if possible, and when it gets above or much below that try and get back as soon as possible to it.

By all means have the building rat-proof, and this can be easily and cheaply done by the cement floor and covering the outside with corrugated iron, which is not expensive. Old tin roofing will do to cover it with as well, and can often be had for little or nothing. The building will not look neat finished in this way, but the tin may be put on the inside instead, and will answer just as well; though in this case, as you do not want rats in your partition, to work out the packing, it must be protected at the bottom to prevent the rats from entering. This can be done by setting up a board two and a half or three inches from the building and pouring in cement behind it. This should come a few inches above the ground, for if rats get in, it will be at the bottom, for they cannot cling to a perpendicular wall and gnaw through.

I have a sweet potato cellar 14 feet square, two sides of which are made with studding and boarded, and I lined it with an old tin roof which cost but 50 cents. It will pay every farmer to make a house of this kind near his barn—unless he has a barn cellar—in which to store roots, fruit, pumpkins, &c. The work can be done by the farm hands as there is no framing about it, and any one who can use a level, square, saw, and hatchet, can put up a building of this kind.

The size and shape may vary to suit the builder's taste or needs. One thing I ought to have mentioned is that at the ends there should be double doors, so that in very cold weather the house can be entered without allowing too much cold to get in.—*Waldo F. Brown in Country Gentleman.*

#### COLD STORAGE OF FRUIT.

The system of cold storage of fruit from Australia is one in which an even temperature combined with a constant influx of cold, fresh air is maintained, and this system, or rather principle, is, it is said, the only satisfactory one for use in the case of fruit, as a merely cold air without the necessary ventilation and influx of fresh air has been proved to be insufficient to keep fruit in good condition for any length of time. The fruits experimented with thus far consisted of the following varieties, viz.: Apples, pears, plums, peaches, nectarines,

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grapes, mangoes, pineapples, tomatoes, and passion fruit, and were obtained from fruit growers in various parts of the colony. Different materials were tried for packing, and the fruit was tested under various conditions, wrapped and unwrapped, in light cases and in open, well ventilated cases, and in various stages or degrees of ripeness. The average temperature was 42 degrees and was very evenly maintained. The extreme limit of variation ranged from 37 degrees to 51 degrees and these extremes were only reached on two or three occasions. The ventilation was at all times satisfactory. The experiments have shown that apples, mid-season and late varieties of pears, solid-fleshed plums, and tough-skinned, fleshy grapes may be kept in perfect condition without any appreciable loss for a period of two months, when stored in a cold, dry, fresh air, maintained at an even temperature of 41 to 43 degrees, provided that the fruit is carefully gathered, handled, and packed, and that all blemished fruit is discarded. It appears that apples will keep equally well if the temperature is raised 10 degrees, but the other fruits require the lower temperature. Two months allows for the extreme outside time required to place the fruit on the English market.

#### PICKING FRUIT.

Every person, child or adult, when plucking fruit of any sort, should be taught how to separate the stems from the twigs or spurs without damaging the buds that contain the embryos of a future crop. When plucking apples or pears, instead of pulling off fruit with spurs, buds and leaves, take hold of the apple or pear and at the same time thrust the thumb nail against the base of the stem and pull on the fruit, and thus sever the stem from the fruit spur at the seam prepared in the growth of the stem and spur for the separation of fruit and spur. When plucking cherries, take hold of the long stems and separate them with the thumb nail, handling the fruit by the stems rather than by taking hold of the fruit. If the hand clasps a cluster of cherries, and the fruit is pulled off carelessly, the fruit-spur will be broken off together with all the half matured fruit. Then, if the cherries are fully ripe, and they are clawed off without taking hold of the stems, the fruit and stems will be separated, to the great damage of the ripe fruit. When cherries are to be used immediately they may be pulled off the stems. But when the fruit is to be sent to market, the stems should not be separated, as the rupture of the fruit incident to the separation of the stems will hasten decay and damage appearance, because as soon as the stems of cherries are removed from the fruit the juice will flow out.

Almost every variety of cherries fails to ripen with desirable uniformity. For this reason the persons who pluck the fruit should be

instructed to glean only the ripe fruit without pulling off immature specimens. But whoever is allowed to pluck cherries should have this brief precept—"be careful of the fruit spurs"—reiterated, until he or she will understand that the fruit buds—the fruit-spurs—the little branches that are loaded with fruit, must not be crushed by the feet or pulled off by careless hands. Make every dullard understand that every twig and fruit-spur broken off represents a cluster of cherries of next year's crop, and the fruit for many future years actually lost by inexcusable heedlessness. There should be many placards posted up where pickers can read the important words: "Do not break off the fruit-spurs."

Fruit should be handled as carefully and as little as possible, and so packed that it cannot move in the package until it is taken out for consumption. To this end we must be provided with proper tools, viz., baskets, ladders, and sorting table, also packages and packing material. Baskets of light ash or oak splits with swinging bails, holding about half a bushel, are best, and should be lined with blanket or other thick woollen material, and have a hook made of 5-16 inch iron, tied securely to the bail, to hang it to a branch or the round of the ladder when picking.

*Ladders*—Are made of light spruce poles cut at midsummer and peeled. Bored for the bottom rounds with an inch bit, the middle  $\frac{3}{8}$ -inch and the upper  $\frac{3}{4}$ -inch, then ripped in two and seasoned under cover. Rounds are made of seasoned white maple, lower one  $2\frac{1}{2}$  feet, upper 8 inches; the sides are brought together above the upper round and secured with two or three clinch nails. They are made of different lengths, and are very light and strong.

*Sorting Table*.—This is made of  $\frac{1}{2}$ -inch pine, on a light frame, well braced. It is about  $3\frac{1}{2}$  x 7 feet with a 4-inch rim around the edge; the legs at one end are short and attached to a long axled wheelbarrow wheel. The others are well spread at the bottom to make the table steady, a pair of handles provided to move it by, and a common, coarse grey blanket is spread on the table when in use.—S. E. Todd.

#### MARKETING FRUIT.

It is hard to explain just how ripe fruit should be when picked for market. In all instances, it is best to consult the wishes of the shipper or dealer. If fruit is intended for the local market, it should be ripe enough for immediate use, and yet firm enough to "stand up" for two or three days before showing signs of decay. For shipping purposes, much depends on the distance the fruit is to go and the length of time it is expected to "stand up" before reaching the consumer. Take the suggestion of a shipper in every instance, for, as a

rule, he knows had much success were picked turned from blush of color because he has picking then

Peaches colored, and net of fruit. larger and the thing under a offered hurts should be per pounds.

All varieties the trees with wrist should transferring it circumstances pears should be 45 pounds of fruit

All varieties allowed to remain before packing be sure you pack merchantable a new standard tightly and full in the box will box, a guarantee how shippers will pack. It pays

Every large on his place. A market can be a large prune on the different systems in this article.

rule, he knows what he wants and how he wants it. The writer has had much success with shipping peach plums, simply because they were picked before they had their full growth and just after they had turned from green to their peculiar white cast—before getting even a blush of color. During previous seasons he had lost money on them because he had invariably waited for them to get a "blush" before picking them for distant shipping purposes.

#### PEACHES.

Peaches for distant shipment, should be firm and fairly well colored, and wrapped and packed in boxes containing about 20 pounds net of fruit. Grade the fruit so as to make two tier boxes of the larger and three tier boxes of the smaller peaches. Do not ship anything under a three tier peach to market; it is not saleable, and being offered hurts the sale of the better stock. For local use, riper peaches should be packed in common splint baskets containing about 18 pounds.

#### PEARS.

All varieties of pears should be picked as soon as they will leave the trees without pulling or breaking the stem. A gentle twist of the wrist should bring the fruit off the tree. Don't bruise the fruit in transferring it from your baskets to the orchard boxes, and under no circumstances gather fallen fruit for shipment. For distant shipment, pears should be wrapped and packed in standard pear boxes containing 45 pounds of fruit.

#### APPLES.

All varieties should be carefully gathered in their season and allowed to remain in orchard boxes or small heaps for a week or more before packing for shipment. Cull out all small or wormy fruit and be sure you pack only selected apples. It does not pay to send unmerchantable apples or any unsaleable fruit to market. Always use new standard boxes and face the first layer. Then fill in the box tightly and full, so that when the bottom is nailed down not an apple in the box will move in its place. Make your name, branded on the box, a guarantee of the fruit contained therein, and you will soon see how shippers will seek your brand and pay top prices to secure your pack. It pays big to build up such a reputation.

#### DRIED FRUIT.

Every large orchardist should have an evaporator of some kind on his place. All over-ripe fruit and fruit that is too inferior for the market can be easily taken care of in a small evaporator. If you have a large prune orchard a good sized evaporator will be necessary. Of the different systems of drying it will be impossible to say anything in this article. Each system has its peculiarities, its advantages and

disadvantages. Use only new boxes (either 25 pound or 50 pound standard spruce boxes) or new cotton sacks for marketing your dried fruits. When packing in boxes line them first with clean white paper, and next to that lay a sheet of waxed paper. Always face your fruit on this sheet of waxed paper, then fill it to the required weight and press into the box. The neater the package and the style of packing, the more readily your dried fruit will sell, and the higher the price realized therefor.

Attractiveness has much to do with the selling qualities of everything offered. Your fruit may be equal, and, perhaps, superior, to that of your neighbor's, but if your neighbor has packed his fruit more carefully and more attractively, he has undoubtedly been able to sell his output for a higher price than you.

SIZES OF FRUIT PACKAGES.

The Committee on Sizes of Fruit Packages recommended the following as standard sizes:

	<i>Inches long.</i>	<i>Inches wide.</i>	<i>Inches deep.</i>
Apple boxes.....	18 $\frac{1}{4}$	12	11 $\frac{1}{2}$
Pear boxes.....	18 $\frac{1}{4}$	12	8 $\frac{1}{2}$
Peach, No. 1.....	18 $\frac{1}{4}$	12	5 $\frac{1}{8}$
Peach, No. 2.....	18 $\frac{1}{4}$	12	4 $\frac{3}{4}$
Peach, No. 3.....	18 $\frac{1}{4}$	12	3 $\frac{3}{4}$
Cherry.....	18 $\frac{1}{4}$	9 $\frac{3}{8}$	2 $\frac{3}{8}$

Crates for grapes, plums, etc., 4 $\frac{3}{4}$  deep, 16x16 inside.

Double crate, 10 $\frac{3}{4}$  deep, 16x16 inside.

No. 2 or No. 3 of the peach box can also be used as plum and prune box.

Apple and pear box ends  $\frac{3}{8}$ , all other  $\frac{5}{8}$ -inch material.

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## Insecticides and Fungicides.

### USEFUL INFORMATION FOR FRUIT GROWERS GATHERED FROM RELIABLE SOURCES.

[REVISED AND AMENDED BY MR. R. M. PALMER, PROVINCIAL  
INSPECTOR OF FRUIT PESTS.]

That Spraying is necessary there is no doubt or question, and science each succeeding year brings its valuable experience to aid us in a successful effort to rid our orchards, nurseries, and vineyards of destructive insects and injurious diseases.

It should not, however, be supposed that the practice of spraying is offered to the fruit grower as a universal panacea for all the phases of ill health and non-productiveness affecting fruit trees, but rather as an additional weapon with which, assisted by good cultivation and liberal supplies of the necessary plant food, to ward off injurious enemies. Good cultivation, with an abundance of plant food does much towards lessening the amount of diseases and pests by rendering the trees and plants vigorous and healthy and thus resistant to attack.

#### SPRAYING MIXTURES.

The substances used in spraying may be divided into two classes: insecticides and fungicides; the former being used against insects and the latter against fungi.

#### INSECTICIDES.

or the mixtures used for the extermination of insects, may also be divided and classed according to their mode of action: 1, Those which take effect by being eaten along with the ordinary food of the insect; and 2, Those which act from the outside, closing the breathing pores, or causing death by irritation. The first are for insects that destroy by eating, and the second for those that suck the juice. The most popular insecticides of the first class are the various combinations of arsenic known as Paris green, London purple, slug shot, etc., while those of the second class are kerosene and soap emulsions, lime spray, tobacco decoction, hellebore, pyrethrum, etc.

## FUNGICIDES.

The fungi are an entirely different class of enemies to contend with. A fungus is a plant that feeds upon organic matter adapted to its wants. At certain stages of their existence most parasitic fungi may be checked quite easily, and at such times they should be attacked. When a fungus has become established in a plant, it cannot be reached without destroying the host in the affected places. The parasite must be destroyed before it reaches the host or before it has established itself—this is the principle underlying the application of most fungicides. The application should be preventive, not curative, for the latter is practically impossible when the fungus is once established. The principal fungicides used in spraying are certain salts of copper in the following various combinations: Bordeaux mixture, eau celeste, carbonate of copper, Galloway's mixture, potassium, sulphide, etc.

Fungous diseases will in all probability increase in proportion as the food plants upon which they prey are multiplied, and as climatic and other conditions are favorable to their development. Spraying, therefore, must be resorted to, and in order to derive the greatest benefit, it should be generally practised. The value of the efforts of one man who faithfully sprays his orchard is greatly lessened if his neighbor neglects preventive measures and so allows his orchard to serve the purpose of a breeding ground for the spores of fungous diseases such as pear and apple "scab."

## HOW TO SPRAY.

As the treatment is entirely preventive, in order to make spraying effective it must be commenced early. All parts of trees or plants must be reached with the preventive agent. Drenching is not necessary and is expensive. A thin film or coating of the fungicide deposited upon the foliage will prevent the development of the spores as well as a complete soaking; but it is important that all the leafy surface should be wetted at least on the upper side. For orchard work a good forcepump, which may be fitted into a barrel—side or end—will give satisfaction. It must be of sufficient strength, and fitted with a nozzle which will project the spray in a fine state of division, yet with sufficient force to enter the deeper recesses of the foliage. More expensive pumps drawn and operated by horse may be purchased, but are seldom necessary except for large orchards.

## CO-OPERATIVE SPRAYING.

Some factors which are deterrents to the progress of spraying may be enumerated as follows: (This work, on account of involving new lines of thought and action, is sometimes regarded by the farmer as impracticable on a large scale.) It *must* be done at certain periods of

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the year—otherwise it is ineffectual ; it involves the purchase of implements and materials which are sometimes difficult to obtain just when required. The success of the work depends also on intelligent adaption of the treatment to the climatic conditions existing during the spraying period.

To obviate some of these difficulties I would suggest the adoption of a co-operative plan of spraying.

First, where orchards are not large, a few farmers might combine and purchase a spraying outfit, which would serve the community, and if it were possible to have it continuously operated by the same individual, whom practice would lend superior facility in using it, an additional advantage would be gained. Another arrangement could be made as follows :

A complete spraying outfit, including chemicals, might be purchased by a person who would be prepared to spray under contract, by the acre, or at a stated figure per tree. If this system of combating fungous and insect enemies was introduced, it would obviate much of the prejudice and inconvenience now connected with the work, and spraying would probably, in a few years, to the great benefit of orchardists, become the general practice.

Most seasons, from November to April, is the time for thorough work in destroying fruit pests in orchards, on various trees and plants of this Province.

It is the only season when successful work is done with a view to exterminate the pests, entirely without injury to plant life.

Summer spraying is beneficial, but results only in holding the damaging insects in check, while the washes given in this supplement for winter spraying are of such strength as will destroy the egg germs if properly applied. The soap and lye, also the lime, sulphur and salt washes are excellent summer washes, and will benefit trees wherever applied. These washes should be used in every orchard.

Every person purchasing young trees should see that the same have been disinfected, as advised in this supplement.

The San Jose Scale or Pernicious Scale, Woolly Aphis and Codlin Moth are the insects to be guarded against more than any other, and for protection it will pay to wash every tree being planted, or that is now in the orchard.

Merchants should be forbidden to dispose of fruit boxes, etc., for the use of fruit again, unless fumigated. All growers should avoid the practice of picking up boxes promiscuously from fruit stands, unless they have been thoroughly disinfected, because from this course many orchards have been infested.

There are many beneficial insects, which destroy the injurious insects: the practice of growers should be to learn and distinguish these and their habits, in order to best protect them. Most birds are of great benefit to horticulturists, destroying the injurious insects, and should be protected.

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**CAUTION.**

The special attention of all using any of the washes recommended is called to note carefully the difference between those for use in the winter season, when the trees are in a dormant condition, and those to be used during the spring and summer months, when the trees are in foliage. The winter washes cannot be used without injury to the fruit buds, after they have commenced to swell, and the summer washes are not of sufficient strength to be of any value for use in the winter months, when insects are in the pupal state, and therefore require much stronger solutions to destroy them than they do after they are hatched.

**AGAIN,**

Do not use the lye washes to destroy the Codlin Moth, or the London purple or Paris green to destroy the aphids. In other words, note carefully, and use the washes for the specific purposes as recommended.

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Professor Maynard, of Massachusetts Agricultural College, sums up the following facts, now pretty well settled, viz.:

- (1) That of the arsenites, Paris green gives the best results as an insecticide.
- (2) That the longer the mixture containing the arsenites stands, the greater the injury from soluble arsenic.
- (3) That the foliage of the peach, plum and cherry is more susceptible to injury than that of the pear and apple.
- (4) That the injury varies with the varieties, some being more susceptible than others.
- (5) That young leaves are less injured than those fully developed, and are more injured on weak trees than on those that are vigorous and healthy.
- (6) That Paris green cannot be used alone with safety, stronger than one pound to three hundred gallons of water, but with the lime mixture it may be safely used at one pound to from fifty to one hundred gallons.



(7) That the foliage is most injured when kept constantly wet by light rains or foggy weather, but that heavy rains lessen the injury.

(8) That the least injury is done when the liquid dries off most rapidly.

(9) That the time of day when the application is made is unimportant.

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BY E. G. LODEMAN.

In the preparation of this calendar the most important points regarding sprays have been selected and arranged in such a manner that the grower can see at a glance what to apply and when to make the applications. The more important insect and fungous enemies are also mentioned, so that a fairly clear understanding of the work can be obtained by examining the table below. When making the applications advised, other enemies than those mentioned are also kept under control, for only the most serious ones could be named in so brief an outline. The directions given have been carefully compiled from the latest results obtained by leading horticulturists and entomologists, and they may be followed with safety.

NOTICE.—In this calendar it will be seen that some applications are italicised and these are the ones which are most important. The number of applications given in each case has particular reference to localities in which fungous and insect enemies are most abundant. If your crops are not troubled when some applications are advised it is unnecessary to make any. It should be remembered that in all cases success is dependent upon the exercise of proper judgment in making applications. Know the enemy to be destroyed; know the remedies that are most effective; and, finally, apply them at the proper season. Be prompt, thorough, and persistent. Knowledge and good judgment are more necessary to success than any definite rules which can be laid down.

For Aphides or Plant Lice use Kerosene Emulsion on all plants. Black Knots on Plums or Cherries should be cut out and burned as soon as discovered

PLANT	1ST APPLICATION.	2ND APPLICATION.	3RD APPLICATION	4TH APPLICATION.	5TH APPLICATION.	6TH APPLICATION.
APPLE. (Scab, codlin moth, bud moth.)	When buds are swelling, copper sulphate solution.	<i>Just before blossoms open, Bordeaux.</i> For bud moth, arsenites when leaf buds open.	<i>When blossoms have fallen, Bordeaux and arsenites.</i>	8-12 days later, Bordeaux and Arsenites.	10-14 days later, Bordeaux.	10-14 days later, Bordeaux.
BEAN. (Anthracnose.)	When third leaf expands, Bordeaux.	10 days later, Bordeaux.	14 days later, Bordeaux.	14 days later, Bordeaux.		
CABBAGE. (Worms, aphids.)	When worms or aphids are first seen, kerosene emulsion.	7-10 days later, if not heading, renew emulsion.	7-10 days later, if heading, hot water 130 degrees F.	Repeat third in 10-14 days if necessary.	(When plants are small Arsenites may be used to check worms.)	
CARNATION. (Rust and other fungous diseases, red spider.)	When rust is first noticed, Bordeaux. Kerosene emulsion when red spider is first seen.	For rust repeat first in 10-14 days. For red spider repeat in 3-4 days.	Repeat second, using the ammoniacal carbonate of copper if plants are in bloom.	Repeat second as before if necessary.		
CHERRY. (Rot, aphids, slug.)	As buds are breaking, Bordeaux; when aphids appear, kerosene emulsion.	When fruit has set, Bordeaux; when aphids appear dust leaves with air-slaked lime. Hellebore.	10-14 days if rot appears, Bordeaux.	10-14 days later, ammoniacal copper carbonate.		
CURRENT. (Mildew, worms.)	At first sign of worms, Arsenites.	10 days later, hellebore. If leaves mildew, Bordeaux.	If worms persist, hellebore.			
GOOSEBERRY. (Mildew, worms.)	When leaves expand, Bordeaux. For worms as above.	10-14 days later, Bordeaux. For worms as above.	10-14 days later, Ammoniacal copper carbonate. For worms as above.	10-14 days later, repeat third.		
GRAPE. (Fungous diseases, leaf beetle.)	In spring when buds swell, copper sulphate solution. For leaf beetle, arsenites.	When leaves are 1-1½ inches in diameter, Bordeaux. For leaf beetle, arsenites.	When flowers have fallen, Bordeaux. For leaf beetle, arsenites before green.	10-14 days later, Bordeaux.	10-14 days later if any disease appears, Bordeaux.	10-14 days, ammoniacal copper carbonate. Repeat applications of this if necessary.
NURSERY STOCK. (Fungous diseases.)	When first leaves appear, Bordeaux.	10-14 days, repeat first.	10-14 days, repeat first.	10-14 days, repeat first.	10-14 days, repeat first.	10-14 days, repeat first.
PEACH, NECTARINE, APRICOT. (Rot, mildew.)	Before buds swell, copper sulphate solution.	Before flowers open, Bordeaux.	When fruit has set, Bordeaux.	When fruit is nearly grown, ammoniacal copper carbonate.	5-10 days later repeat fourth.	5-10 days later repeat fourth if necessary.
PEAR. (Leaf blight, scab, psylla, codlin moth.)	As buds are swelling copper sulphate solution.	Just before blossoms open, Bordeaux. Kerosene emulsion when leaves open for psylla.	After blossoms have fallen, Bordeaux and arsenites. Kerosene emulsion if necessary.	8-12 days later, repeat third.	10-14 days later, Bordeaux. Kerosene emulsion applied.	10-14 days later, repeat fifth if necessary.
PLUM.						

CURRENT, . . . . . (Mildew, worms.)	At first sign of worms, Arsenites.	10 days later, hellebore. If leaves mildew, Bordeaux.	If worms persist, hellebore.		
GOOSEBERRY, . . . . . (Mildew, worms.)	When leaves expand, Bordeaux. For worms as above.	10-14 days later, Bordeaux. For worms as above.	10-14 days later, Ammoniacal copper carbonate. For worms as above.	10-14 days later, repeat third.	
GRAPE, . . . . . (Fungous diseases, leaf beetle.)	In spring when buds swell, copper sulphate solution. For worms as above.	When leaves are 1-1½ inches in diameter, Bordeaux. For worms as above.	When flowers have fallen, Bordeaux. Paris green as before.	10-14 days later, Bordeaux.	10-14 days later if any disease appears, Bordeaux.
NURSERY STOCK, . . . . . (Fungous diseases.)	When first leaves appear, Bordeaux.	10-14 days, repeat first.	10-14 days, repeat first.	10-14 days, repeat first.	10-14 days, repeat first.
PEACH, NECTARINE, APRICOT, . . . . . (Rot, mildew.)	Before buds swell, copper sulphate solution.	Before flowers open, Bordeaux.	When fruit has set, Bordeaux.	When fruit is nearly grown, ammoniacal copper carbonate.	5-10 days later repeat fourth.
PEAR, . . . . . (Leaf blight; scab, psylla, codlin moth.)	As buds are swelling copper sulphate solution.	Just before blossoms open, Bordeaux. Kerosene emulsion when leaves open for psylla.	After blossoms have fallen, Bordeaux and arsenites. Kerosene emulsion if necessary.	8-12 days later, repeat third.	10-14 days later, Bordeaux. Kerosene emulsion applied forcibly for psylla.
PLUM, . . . . . (Fungous diseases, curculio.)	During first warm days of early spring, Bordeaux for black knot. When leaves are off in the fall, kerosene emulsion for plum scale.	When buds are swelling Bordeaux for black knot and other fungous diseases. During mid-winter, kerosene emulsion for plum scale.	When blossoms have fallen, Bordeaux. Begin to jar trees for curculio. Before buds start in spring, kerosene emulsion for plum scale.	10-14 days later, Bordeaux. Jar trees for curculio every 2-4 days. For San Jose scale, kerosene emulsion when young appear in spring and summer.	10-20 days later, Bordeaux for black knot. Later applications may be necessary to prevent leaf spot and fruit rot, use ammoniacal copper carbonate.
POTATO, . . . . . (Scab, blight, beetles)	Soak seed for scab in corrosive sublimate solution (2 oz. to 16 gals. of water) for 90 minutes.	When beetles first appear, arsenites.	When vines are two-thirds grown, Bordeaux; arsenites for beetles if necessary.	10-15 days later, repeat third.	10-15 days later, Bordeaux if necessary.
QUINCE, . . . . . (Leaf and fruit spot.)	When blossom buds appear, Bordeaux.	When fruit has set, Bordeaux and arsenites.	10-20 days later, Bordeaux.	10-20 days later, Bordeaux.	10-20 days later, Bordeaux.
RASPBERRY } BLACKBERRY } DEWBERRY }	Before buds break, copper sulphate solution. Cut out badly diseased canes.	During summer, if rust appears on leaves, Bordeaux.	Repeat second if necessary.	(Orange or red rust is treated best by destroying entirely the affected plants.)	
ROSE, . . . . . (Mildew, black spot, red spider, aphid.)	For mildew. Keep heating pipes painted with equal parts lime and sulphur mixed with water to form a thin paste.	For black spot. Spray plants once a week with ammoniacal copper carbonate, using fine spray.	For red spider. Spray plants twice a week with kerosene emulsion. Apply to under side of foliage.	For aphid. Spray affected parts with kerosene emulsion when necessary.	(Kerosene emulsion must be used very dilute, as rose foliage is easily injured by it.)
STRAWBERRY, . . . . . (Rust.)	As first fruits are setting, Bordeaux.	As first fruits are ripening, ammoniacal copper carbonate.	When last fruits are harvested, Bordeaux.	Repeat third if foliage rusts.	Repeat third if necessary. (Young plants not in bearing may be treated throughout the fruiting season.)
TOMATO, . . . . . (Rot, blight.)	At first appearance of blight or rot, under glass or out doors, Bordeaux.	Repeat first if diseases are not checked.	Repeat first when necessary.		
VIOLET, . . . . . (Blight, red spider)	When blight is first seen in summer, Bordeaux. Kerosene emulsion for insects when necessary.	Repeat first in 10-20 days for blight.	Repeat first in 10-20 days for blight.	Repeat first if necessary.	(Bordeaux mixture has been tested for violet diseases only to a limited extent.) (Kerosene emulsion must be used very dilute, as violet foliage is easily injured by it.)

## FORMULAS\* FOR AND PREPARATION OF SPRAYING MIXTURES.

### SPRAY NO. 1.

(Winter Spray for Woolly Aphis, Pear Leaf Mite, Scale Insects and Peach Leaf Curl.)

#### INGREDIENTS.

Lime, unslacked.....	30 lbs.
Sulphur, powdered.....	20 "
Salt, coarse.....	15 "
Water .....	60 gals.

#### DIRECTIONS.

Place 10 pounds of lime and 20 pounds of sulphur in a boiler with 20 gallons of water, and boil over a brisk fire for two hours, until the sulphur is thoroughly dissolved. It will then be amber-colored. Next place 20 pounds of lime in a cask and pour enough water over it to thoroughly slack it. Add the salt. When dissolved, add to the lime and sulphur and boil half an hour longer. Add enough water to make 60 gallons. Apply lukewarm.

#### DIRECTIONS FOR USE.

Spray when the trees are dormant, or as soon as the leaves fall, and again in the spring before the buds swell. A good force pump should be used, and care must be taken to thoroughly cover the infected trees with the mixture, which should be constantly stirred when applying. A most useful general purpose mixture, having considerable value as a fungicide and can be obtained in solid form requiring only the addition of water to be ready for use.

### SPRAY NO. 2.

(For the Woolly Aphis, Scale Insects and Codlin Moth.)

#### INGREDIENTS.

Sulphur .....	100 lbs.
Lime .....	100 "
Blue vitriol.....	8 "

#### DIRECTIONS.

Place 100 lbs. sulphur and 80 lbs. lime in a boiler with about 100 gallons water, and boil slowly until the sulphur is thoroughly dissolved. Dissolve 8 lbs. blue vitriol in hot water, add to the remainder

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of the slacked lime, and mix the whole together. This mixture will keep any length of time. When ready to spray, take one pound of the mixture to two and one-half gallons of hot water, for winter use, applying luke-warm. This formula may be used for a summer spray by using one pound of the mixture to 8 or 10 gallons of water.

## DIRECTIONS FOR USE.

Spray when the trees are dormant, or as soon as the leaves fall, and again in the spring before the buds swell. A good force-pump should be used, and care must be taken to thoroughly cover the infected trees with the mixture.

## FOR CODLIN MOTH.

To the amount of ingredients given, add one-half pound Paris green and one-half pound London purple, and water enough to make 300 gallons. In mixing Paris green, first mix it with water to the consistency of a paste, before adding to the mixture, and keep constantly stirred when applying.

## SPRAY NO. 3.

(Summer remedy for San Jose Scale and Woolly Aphis.)

## INGREDIENTS.

Whale oil soap, 80 per cent.....	20 lbs.
Sulphur .....	3 "
Caustic soda (strength 98 per cent.)..	1 "
Commercial potash .....	1 "
Water to make.....	100 gals.

## DIRECTIONS.

Place the sulphur, potash and caustic soda together in about two gallons of water, and boil for at least half an hour, or until thoroughly dissolved. Dissolve the soap in a vessel by boiling, mix the two and boil for a short time. Apply with spraying machine when about 130 Fahrenheit in the vessel, as it cools rapidly when applying.

## SPRAY NO. 4.

(Bordeaux Mixture for Apple-scab and all Fungous Diseases.)

## INGREDIENTS.

Sulphate of copper (bluestone)..	4 lbs.
Unslacked lime .....	4 "
Water .....	50 gals.

## DIRECTIONS.

Dissolve the sulphate of copper in 4 gallons of hot water. Slake the lime with 6 gallons of hot water, and when cool strain through a coarse gunny-sack into the dissolved bluestone, and add water to

make 50 gallons. The lime solution should be poured into the blue vitriol solution, and not the other way, or the copper sulphate is liable to be decomposed and formed into black oxide of copper which is of no use. Also the copper sulphate or blue vitriol should be dissolved in a copper or wooden vessel; when dissolved in an iron kettle the blue vitriol is changed into black oxide of copper and the sulphuric acid combines with the iron of the kettle and forms copperas which is of no value for spraying. When applying, keep constantly stirred, using a force-pump with special nozzle. The first application should be made as soon as the fruit is gathered, in the fall, a second application early in the spring when the buds are swelling, and a third application after the blossoms have fallen, repeating again at intervals of two or three weeks until fruit attains the size of a walnut.

SPRAY NO. 5.—KEROSENE EMULSION.

Hard soap.....	1/2 lb.
Boiling water.....	1 gal.
Kerosene .....	2 gals.

Dissolve the soap in the water, add the kerosene, and churn with a pump for 5 or 10 minutes. Dilute 10 to 25 times before applying.

Or this: Dissolve in 2 qts. of water 1 qt. of soft soap or 1/4 lb. of hard soap by heating to the boiling point. Then add 1 pt. of kerosene oil and stir violently for from three to five minutes. This may be done by taking a common force pump and putting the end of the hose back into the mixture again. This mixture should be diluted to twice its bulk with water, or about 14 times as much water as kerosene. The kerosene emulsion is successful in destroying cattle lice and sheep ticks, as well as all varieties of plant lice.

SPRAY NO. 6.—TOBACCO AND SOAP WASH.

Soak 4 lbs. waste tobacco in 9 gals. hot water for four or five hours; (or in the same quantity of cold water 4 or 5 days), dissolve 1 lb. whale oil soap in 1 gal. hot water; strain the tobacco decoction into the dissolved soap and apply the mixture to affected trees with a spray pump, using a fine nozzle and all the force possible. Or the mixture may be applied directly to the insects with a swab or brush. A good summer wash for all forms of aphides.

SPRAY NO. 7.

Resin Wash for Green and Woolly Aphis.—(Prof. Koebele.) A good Summer Spray for Scale Insects.

INGREDIENTS.

Resin .....	4 lbs.
Sal soda .....	3 "

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## DIRECTIONS.

Place resin and sal soda in kettle with 3 pints of cold water. Use soft, or rainwater, always. Boil or simmer slowly until thoroughly dissolved, when it will look black. The sal soda will adhere to the sides of the kettle, and must be scraped down. When it looks dissolved, if there are pieces of resin in the bottom of the kettle, it needs more boiling. When sufficiently boiled, add enough hot water to make 50 gallons. After adding the water it will become thick, but after boiling again it becomes thin. The above is ready for immediate use and should be applied cold or only luke warm.

If desired for future use, boil the above amount of ingredients as directed, and add water to make five gallons, boil until thick. This will stand any length of time, and is always ready for use. When required, use one part or gallon of compound with the following number of gallons of boiling water and stir thoroughly when applying:

For hop louse, 1 gal. of compound to 9 gals. of water.

For woolly aphis, 1 gal. of compound to 7 gals. of water.

For San Jose scale, 1 gal. of compound to 6 gals. of water.

The above spray is not injurious to the tree, for after three or four days of sunshine it dissolves and leaves the pores of the bark open. To be used with spray pump.

## SPRAY NO. 8.

(For Pear and Cherry Tree Slug, Gooseberry and Currant Worms, and Other Leaf-eating Insects.)

## INGREDIENTS.

Fresh hellebore.....	1 oz.
Water .....	2 gals.

Mix and apply with spray pump.

## SPRAY NO. 9.

(For Codlin Moth and Leaf-eating Insects.)

## INGREDIENTS.

Paris green.....	4 oz.
Lime .....	1 lb.
Water .....	50 gals.

## DIRECTIONS.

Make a paste of the Paris green with a little water. Slack the lime and make into milk of lime with water. Mix together and add water to make the required amount.

Paris green is a heavy powder and does not remain long in suspension, hence it must be kept constantly stirred when using.

London purple may be used in place of Paris green, but is more liable to injure foliage.

Paris green and Bordeaux mixture (No. 4) may be applied together with perfect safety.

#### SPRAY No. 10.

(For Fungous Growths.)

##### INGREDIENTS.

Carbonate of copper..... 5 ozs.  
Strong liquid ammonia ..... 3 pts. or more.

##### DIRECTIONS.

In an ordinary pail mix the copper carbonate with enough water to make a thick paste. To this add the ammonia in sufficient quantity to dissolve the paste. Dilute with water, 30 to 50 gallons. Use the stronger solution before the buds swell, and the weaker three or four times afterwards.

#### SPRAY No. 11.—EAU CELESTE.

(For Fungous Growths.)

In two gallons hot water dissolve one lb. sulphate of copper. In another vessel dissolve two lbs. carbonate of soda (sal soda) in water. Mix the two and after a few hours add one and a half pints ammonia, and dilute with water to make 22 gallons for winter spraying and 30 to 40 for summer spraying.

#### SPRAY No. 12.—A NEW FUNGICIDE.

Professor Prillieux, of the National Agronomic Institute, at Paris, has tried a new fungicide, which he claims to be superior to the Bordeaux mixture or the ammonia-copper liquid. The Board respectfully submits it to the fruit growers.

For 50 gallons of this spraying liquid, slake and make into "milk of lime" four pounds of quick lime; dissolve four pounds of molasses in a gallon of water and mix it with the milk lime—this will make a solution of saccharate of lime; stir thoroughly and let stand for a few hours. Next dissolve four pounds of blue stone in eight or ten gallons of water, and pour it into the lime-molasses solution while stirring briskly. The mixture becomes very turbid with the gypsum formed, which may be allowed to settle out, leaving a clear, greenish solution of "saccharate of copper," which may be drawn off from the sediment, thus obviating all danger of clogging the spray

nozzle, as it may be thus the strength.

Slack water. D tion. Dis then add 1 Spray cold limb, and and other as the leaf swell; the the fruit h made after For winter Paris green

All infe infected by trated lye) of water, the in a vat or infected by ce every 100 cu potassium ( fluid ounces be placed in wards add ti closed tight minutes. T pests or the



nozzle, and leaving the leaves clean ; or if to be used on leafless trees, it may be at once thinned down to the 25 gallons wanted, since even thus the liquid is much thinner than the Bordeaux mixture of equal strength.

SPRAY NO. 13.—FUNGICIDAL AND INSECTICIDAL  
COMBINATION WASH.

(Oregon Board of Horticulture.)

INGREDIENTS.

Lime (unslacked).....	4 lbs.
Blue Vitriol.....	4 "
Whale-oil soap.....	4 "
London purple or Paris green.....	4 oz.
Water.....	40 gals.

DIRECTIONS.

Slack the lime and put it in a barrel containing the 40 gallons of water. Dissolve the vitriol in hot water and add it to the lime solution. Dissolve the whale-oil soap in hot water and add to the above ; then add the London purple and Paris green and mix thoroughly. Spray cold. This wash is recommended for fungous diseases on leaf, limb, and fruit, and for green and black aphids, codlin moth, slugs, and other skeletonizers. The first application should be made as soon as the leaves have fallen ; the second, just before the buds begin to swell ; the third, after the blossoms have fallen off ; the fourth, when the fruit has attained the size of walnuts. Two sprayings should be made afterwards at intervals of three weeks, reducing to 60 gallons. For winter spraying omit the whale-oil soap and London purple or Paris green, but for summer spraying all the ingredients must be used.

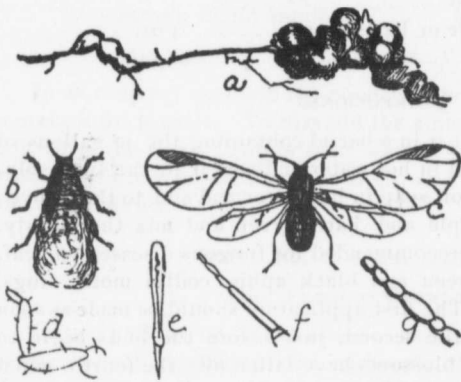
NO. 14.—TREATMENT OF NURSERY STOCK.

All infected nursery stock should, before being distributed, be disinfected by dipping in a solution of one pound caustic soda (concentrated lye) and one pound whale-oil soap to every five imperial gallons of water, thoroughly dissolved, and applied at 103 degrees Fahrenheit, in a vat or any suitable vessel ; or the said nursery stock may be disinfected by covering it with an air-tight tent or box, and for each and every 100 cubic feet of space therein, one ounce of fused cyanide of potassium (58 per cent.), one fluid ounce of sulphuric acid, and two fluid ounces of water should be used. The cyanide of potassium should be placed in an earthenware vessel, the water poured over it, and afterwards add the sulphuric acid. The tent or box should be immediately closed tightly and allowed to remain closed for not less than forty minutes. Treatment for disinfection should continue until all insect pests or their larvae are destroyed.

## INSECT PESTS.

WOOLLY APHIS (*Schizoneura lanigera*). After Riley.

(a), an infested root; (b), the larva—color, brown; (c), winged adult—colors, black and yellow; (d), its leg; (e), its beak; (f), its antennæ; (g), antennæ of the larva; all highly magnified.



The Woolly Aphis is a small insect covered with a white, woolly substance, hence its name. Its color is a reddish brown, and when crushed it yields a red juice. They infest the apple tree in particular both roots and branches. They live upon the sap of the bark and produce small warts and granulations on it.

They increase with astonishing rapidity, and in the fall the wind carries the winged form of them from one tree to another by the light down in which they are enwrapped, and thus they spread quickly from one orchard to another. Not a moment should be lost in destroying the first one that puts in an appearance.

The insect appears in two forms, one of which attacks the trunks of the apple tree, the other works under the ground and produces on the roots wart-like swellings and excrescences of all shapes and sizes. While it usually confines itself to the roots of trees, it is sometimes found on the suckers that spring up from the roots, and occasionally the mature lice crawl up the branches of the trees, where they also form colonies during summer, and then are known as the Woolly Aphis of the apple. The insect which attacks the trunk and limbs of the apple tree is of the same species as that which works on the root, having the same cotton-like covering. In October a considerable number of these appear with wings, having but little downy substance upon their bodies. Late in the autumn the females deposit eggs for another generation the following spring, and thus furnish the parents of countless hosts to infest the trees another season.

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During there may b the crevices of the bark of the apple also about t the buds, a very minute ing black e are the egg Apple Tree called the Gro ed in the aut color, but gra

For the insects found above ground, the most effective spraying can be done when the trees are in a dormant condition. The trunk and main limbs of infected trees should be carefully scraped, and all dead or diseased bark removed, to expose the insects to the action of the spraying mixtures used. When the trees are dormant, use spray No. 1, or a solution made by dissolving one pound of concentrated lye in 5 gallons of water. For summer spraying use either spray No. 6 or 7, or Kerosene emulsion. Apply with spray pump, using all the force possible, on account of the woolly covering of this pest, which protects it. They may also be killed by touching them with a swab dipped in coal oil, but care must be used, as the coal oil will injure the trees if used too freely.

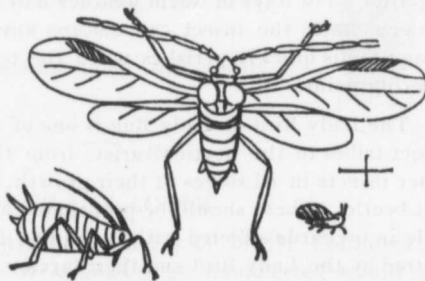
For the root form, the application of fresh gas lime has proved to be a lasting destroyer of the insect, and also a valuable fertilizer for the tree—a couple of shovelfuls for each tree, spreading it over the surface around the tree to cover about six feet in diameter. If the soil is deep and well drained, a much larger quantity may be safely used. Care should be taken not to put it around the body of the tree, as the solution of gas water formed by the rains might scald the bark. It will be well also to use in connection with the gas lime a shovelful of fresh ashes around the base of the tree.

#### SOAP.—FOR YOUNG TREES.

Two pounds of home-made soft soap to one and one-half gallons of water, poured around the roots of the nursery stock (young apple trees), destroy the Woolly Aphis, the earth being first cleared away from the trees. The roots of young apple trees should be dipped before planting.

#### THE APPLE TREE APHIS.

During the winter there may be found in the crevices and crooks of the bark of the twigs of the apple tree, and also about the base of the buds, a number of very minute oval, shining black eggs; these are the eggs of the Apple Tree Aphis, also



(Green Aphis.—Greatly Magnified.)

called the Green Aphis, and Apple Tree Louse. These eggs are deposited in the autumn, and when first laid are of a light yellow or green color, but gradually become darker and finally black. As soon as the

buds begin to expand in the spring, these eggs hatch very tiny lice, which locate themselves upon the swelling buds and the small tender leaves, and inserting their beaks feed upon the juices. All of the lice then hatched are females, and reach maturity in ten or twelve days, when they commence to give birth to living young, producing about two daily for two or three weeks, after which the older ones die. The young locate about the parents as closely as they can stow themselves, and they also mature and become mothers in ten or twelve days, and are as prolific as their predecessors; they thus increase so rapidly, that as fast as new leaves expand, colonies are ready to occupy them. As the season advances, some of the lice acquire wings, and dispersing found new colonies on other trees. When cold weather approaches, males as well as females are produced, and the season closes with the deposit of a stock of eggs for the continuance of the species another year. The leaves of trees infested by these insects become distorted and twisted backwards, often with their tips pressing against the twig from which they grow, and they thus form a covering for the aphid, protecting them from rain. An infested tree may be distinguished at some distance by this bending back of the leaves and young twigs. It is stated that the scab on the apple often owes its origin to the punctures of these plant lice.

#### REMEDIES.

Very much can be accomplished in the destruction of the eggs that have been deposited during the winter months while the trees are in a dormant condition by washing or spraying them with Spray No. 1, or a solution of lye water, made by dissolving one pound of Gillet's concentrated lye in five gallons of water, care being observed not to use this strength of wash after the buds have commenced to swell; this strength of wash will also remove the moss from the limbs and bark of the trees. A frost occurring after a few days of warm weather will kill millions of them. In the egg state, the insect can endure any amount of frost, but the young aphid quickly perishes when the temperature falls below the freezing point.

The Lady Bird or Lady Bug is one of the most beneficial of the insect tribes to the horticulturist, from the fact that they prey on other insects in all stages of their growth, from the larvæ to the perfect beetle. These should be propagated and protected so far as possible in orchards afflicted with the aphid, for myriads of them are devoured by the Lady Bird and their larvæ.

For summer remedies use either of Sprays No. 6 or 7, or Kerosene emulsion, being careful to apply the spray on the first appearance of the pest, as after the leaves of infected trees or plants are curled up, it is difficult to reach the insects.

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The Currant Aphis (*Myzus Ribis*) found on the underside of leaves of currant bushes in the spring, may be successfully treated in the same manner.

### THE WOOLLY MAPLE BARK LOUSE.

(*Pulvinaria Innumerabilis*.)

The presence of the Woolly Maple Bark Louse is manifested in the spring and early summer by the occurrence upon the twigs of maple trees, especially on the under side, of a brown, circular, leathery scale, about one-quarter of an inch in diameter, beneath which is a peculiar, fluffy, cotton-like mass, presenting the appearance of Fig. A. In the spring there may be found in each of these masses great number (700 to 1,000) of small, white, spherical eggs.

Early in summer these eggs hatch into young lice, which scatter over the trees, wandering about on the twigs and leaves for a few days, and finally, fixing themselves upon the lower leaf surface, insert their beaks and suck out the sap.

This scale infests the maple trees, currant bushes, and fruit trees.

They also attack the quince tree.

In autumn the males issue as winged insects, but the females remain on the tree, removing, however, from the leaves to the twigs or branches.

The cut shows eggs as hatched in the spring.

There is a species of black ant that destroys the egg sac, and on that account it does not increase as do some of the other insect pests.

Use the remedies recommended for woolly aphid.



(FIG. A.)

### HOP PLANT LOUSE.

The hop louse invaded the hop fields of British Columbia last season to a large extent and if allowed to go unmolested would soon ruin that industry.

“Wherever it occurs, whether in England or on the continent of Europe, in New York, Wisconsin or on the Pacific coast, the hop plant louse (*Phorodon humuli*) has substantially the same life-round. The

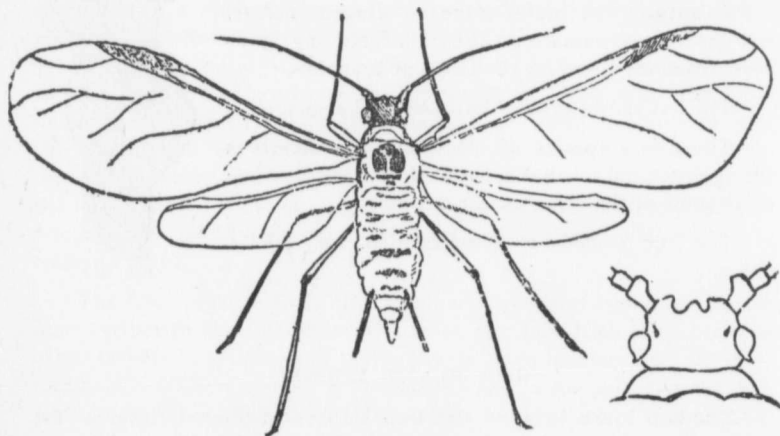
eggs are laid in the fall on different varieties and species of the plum, both wild and cultivated. They are small, glossy black, and ovoid, and are attached to the terminal twigs, especially in the more or less protected crevices around the buds. (Fig. A.)

From an egg there hatches in the spring, about the time when the plum buds begin to burst, a stout female plant louse, known as the stem-mother, which differs from the summer individuals in having longer legs and shorter honey tubes.

She gives birth, without the intervention of the male, to living young, and this method of propagation continues until the last generation of the season. The second generation grows to full size and gives birth to a third, which becomes winged (Fig. B), and develops after the hops have made considerable growth in the yards. The winged lice then fly from the plums to the hops, deserting the plum trees entirely and settling upon the leaves of the hops, where they begin giving birth to another generation of wingless individuals. They multiply with astonishing rapidity. Each female is capable of producing on an average about a hundred young, at the rate of three per



(FIG. A.)  
Winter egg of the hop plant louse and shrivelled skin of the sexual female which laid them. (Enlarged.)



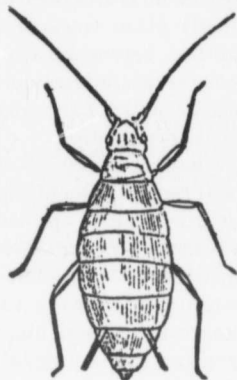
(FIG. B.)

The Hop Plant Louse, third generation on plum—the generation which flies to the hop plant. Head below at right. (Both enlarged.)

day, under favorable conditions. Each generation begins to breed about the eighth day after birth, so that the issue from a single indi-

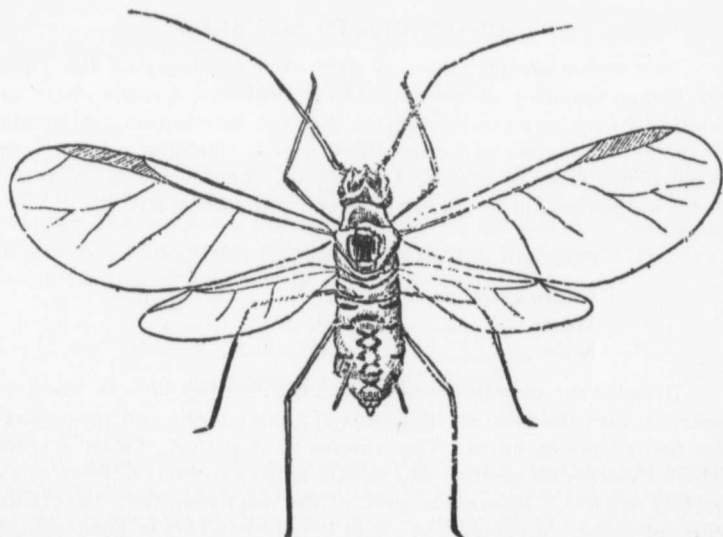
vidual run from a single blight hurt five to two carrying u ing season of winged to the plum sexual females wings and time this g quires but the temper are the true hop fields true female soon there there is by viduals pro life-round-trees; the evening genetic). Th

vidual runs up, in the course of a summer, to trillions. The issue from a single stem-mother may thus, under favorable circumstances, blight hundreds of acres in the course of two or three months. From five to twelve generations are produced in the course of the summer, carrying us in point of time to the hop-picking season. There then develops a generation of winged females (*sexuparæ*), which fly back to the plum trees and give birth to the true sexual females (Fig. C), which never acquire wings and never leave the plum tree. By the time this generation has matured, which requires but a few days, varying according to the temperature, belated individuals, which are the true males (Fig. D), fly in from the hop fields. These fertilize the wingless true females upon the plum leaves, and these soon thereafter lay the winter eggs. Thus there is but one generation of sexed individuals produced, and this at the close of the life-round—the females (wingless) on plum trees; the males (winged) on hops. All intervening generations are composed of virgin females only (*parthenagenetic*). This is the invariable round of the insect's life.



(FIG. C.)

The Hop Plant Louse, true sexual female. (Enlarged.)



(FIG. D.)

The Hop Plant Louse, male—enlarged.

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REMEDIES.

From the life history just given, three important facts are obtained: (1). It will pay to make a preventative application of some of the mixtures mentioned further on, with apparatus before described, to all plum trees in the neighborhood of hop yards, either in the spring, before the appearance of the first winged generation and its consequent migration to hop, or in the fall after hop picking and after the lice have once more returned to the plum, and are making their preparations for the laying of winter eggs. The latter time will, perhaps, be preferable, for the reason that in the fall the plum trees will be less susceptible to the action of the washes, and a stronger solution can be applied without danger to the trees. (2). All wild plum trees in the woods through a hop-growing country should be destroyed. (3). The hop vines should be either burned or thoroughly drenched with kerosene emulsion as soon after the crop is harvested as possible, with a view of killing the males, and thus preventing the impregnation of the females. (4). If the above measures have been neglected and the lice have attacked the vines, the crop can still be protected by spraying with insecticide mixtures, which, if thoroughly applied will prove effective, and there will be no danger of reinfestation from neighboring infested yards, since during the summer the lice cannot migrate except by crawling from one yard to another.

SUBSTANCES TO BE USED.

Last season several solutions were used for spraying the vines; but from a majority of the reports received, the quassia chips and whale oil soap seems to have given the best satisfaction. A number of the growers failed to prepare the kerosene emulsion properly, the mixture not forming a perfect emulsion. The formulas in any of these washes should be closely observed and carried out.

FORMULA FOR KEROSENE EMULSION.

Cheap kerosene .....	8 pts.
Water .....	4 "
Soap.....	$\frac{1}{2}$ lb.

Dissolve the soap in the water and add, boiling hot, to the kerosene. Churn the mixture by means of a force pump and spray nozzle for five or ten minutes. The emulsion, if perfect, forms a cream which thickens on cooling, and should adhere without oiliness to the surface of glass. Dilute one part of the emulsion with twenty-five parts of water. A common grade of kerosene, which is good enough for this work, can be bought in most localities at eight cents per gallon by the barrel, and the soap used can be made for one cent per pound. This would make the batch given above cost eight and one-

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half cents, and diluted with twenty-five gallons of water to one of the emulsion would make thirty-eight and one-half gallons of wash. At this rate one hundred gallons would cost twenty cents.

#### FORMULA FOR TWENTY-FIVE POUNDS FISH-OIL SOAP.

Crystal potash lye.....	1 lb.
Fish-oil.....	2 pts.
Soft water.....	3 gals.

A strong suds made at the rate of one pound of this soap to eight gallons of water will also be found a uniformly safe and satisfactory wash to use, killing the lice and not harming the vines. After standing three days, however, the suds will lose their efficiency.

The Board also recommends the Quassia Chips' solution which has been used with great efficiency in the hop yards of the Puyallup valley. Formula as follows:

#### QUASSIA CHIPS SOLUTION.

8 pounds of Quassia Chips.
7 " " Whale-oil Soap.

The quassia chips are boiled in about one gallon of water to each pound of chips, for one hour. The soap is added while hot, and allowed to dissolve. This solution is then diluted with 100 gallons of water. Use with sprayer.

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#### THE CHERRY APHIS.

(*Myzus cerasi*)

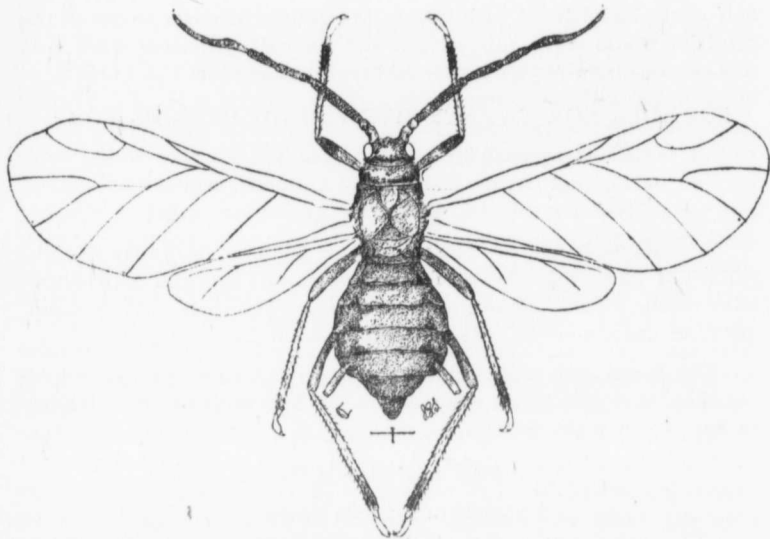
The twigs and under surface of the leaves of cherry and plum trees are often infested, during May and June by small, shining, black plant lice that suck out the sap and curl up the leaves. This insect winters over in the same manner as the Green Aphis, and the remedies recommended for that pest should be used.

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#### THE PEACH TREE APHIS.

(*Myzus Persicæ*)

This aphis begins to work upon the young leaves of the peach trees almost as soon as they burst from the bud, and continues throughout the greater part of the season unless swept off, as sometimes happens with surprising rapidity by insect enemies. The perfect winged females are about one-eighth of an inch long, black, with the under side of the abdomen dull green; the wingless females rusty red, with

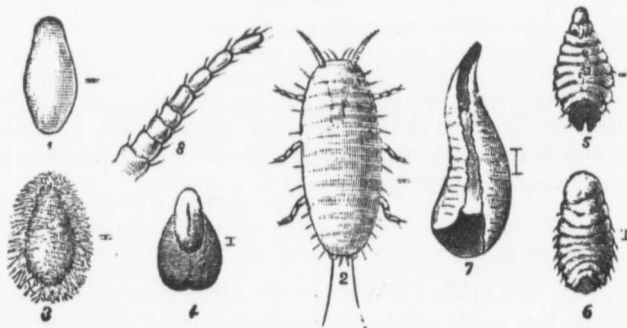


Peach Tree Aphis.

the antennæ, legs and honey tubes greenish. The winged males are bright yellow, streaked with brown, with black honey tubes.

Use the remedies recommended for Green Aphis.

THE OYSTER SHELL BARK LOUSE.



The scale is of a brownish or grayish color, about one-sixth of an inch in length, nearly the color of the bark of the tree, and in shape resembles the shell of an oyster—hence its name.

In some instances the branches and trunks of the trees become literally covered with these scales. Under each scale, as shown in the figure above at 1, may be found a mass of from twenty to one hundred

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eggs. In May or early June they hatch, and appear as shown, highly magnified, at 2. In a few days a fringe of delicate, waxy threads issues from their bodies, as seen at 3. Gradually the insect assumes



the form shown at 4; 5 and 6 present the larvæ as nearly full grown and when detached from the scale. Before the end of the season the louse has secreted for itself the scale covering shown at 7, in which it lives and matures.

#### REMEDIES.

For winter spraying use Spray No. 1. When larvæ are first hatched they can be easily destroyed by using either of Sprays No. 5, 6 or 7.

The following is also recommended for winter wash; one pound of concentrated lye (American or Babbitt's), one-half pound of rosin, two and one-half gallons of water.

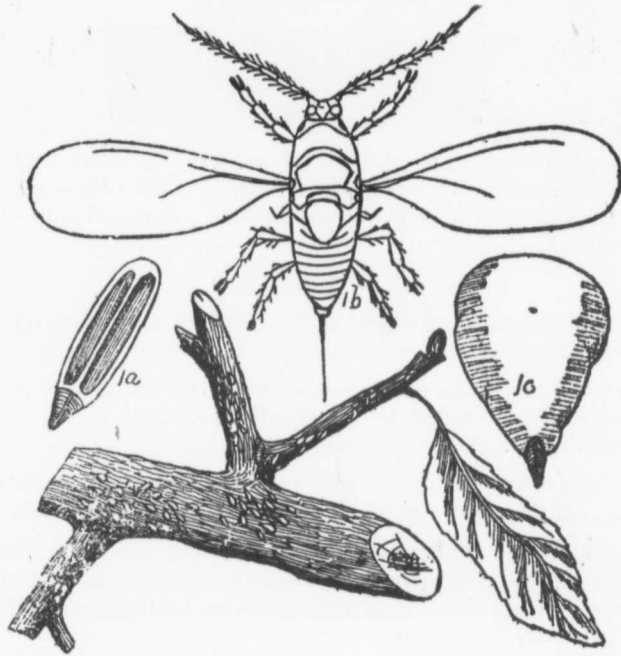
First dissolve the lye in water, and when thoroughly dissolved by heating, add the rosin; use at a temperature of 100 degree Fah.

For use when the tree is in foliage, dilute by using ten times the quantity of water. The summer wash is attended with best results if applied when a majority of the insects are hatched out. The first brood generally appears when the cherries are turning color. Badly infested trees should be treated to several applications of the wash with an interval of ten days.

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## THE SCURVY BARK LOUSE.

*(Chionaspis Purpurs)*

This insect has been found in the Okanagan district where it was doing considerable damage. It resembles in some respects the Oyster Shell bark louse, yet it is sufficiently dissimilar to be readily distinguished from it. In this species the scale of the female is oblong in form, pointed below, very flat, of a greyish white color and about one-tenth of an inch long.

It is found chiefly on the apple but sometimes affects the pear and also the mountain ash. It is far less common than the Oyster Shell bark louse and is nowhere anything like as injurious as that insect.

## REMEDY.

Same as for the Oyster Shell bark louse.

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(FIG. 4

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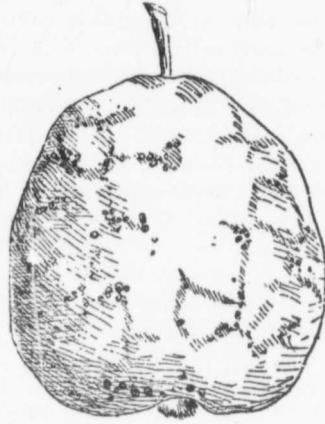
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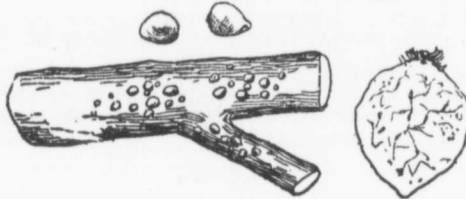
THE SAN JOSE SCALE OR GREEDY SCALE.  
(*Aspidiotus Perniciosus.*)



(FIG. A.)



(FIG. C.)



(FIG. B.)

(FIG. D.)

A and B, portions of branches infested; C, a pear infested;  
D, larva of female, (enlarged.)

This dreaded and most destructive enemy of not only the fruit, but of the ornamental and forest trees as well, has secured a hold in some of the orchards in Oregon and Washington, and it is feared that it will be ultimately found in this Province. Careful enquiry from parties with whom the scale is found, develops the fact that they have been brought into Oregon on trees shipped from California. As trees from California have been pretty generally distributed all over the coast by the industrious tree pedlar, so it may be expected that these destructive insects have doubtless gone with them.

The remedy to be applied to the Scale is much more simple than the one to be applied to the tree pedlar or the careless person who buys his trees without first knowing whether they are coming from infested nurseries or not.

This is, without exception, the most pernicious scale insect known in this country. It affects all the deciduous trees. It has also

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been found on some of the evergreen varieties. It infests the bark of the trunk and limbs of the tree, also the leaves and fruit. Its presence upon the bark will soon turn the sap part of the wood beneath the bark to a reddish color. Its presence upon the fruit causes the latter to be covered with bright red spots, and, when badly affected it shrivels up and cracks open.

The scale of the female is circular and flat, gray in color, except the centre, which is of a reddish yellow. The scale of the male is black, and is somewhat elongated when fully grown. The full grown scale is scarcely one-sixteenth of an inch in diameter. The eggs are yellow. The young larvæ are very active and of a pale yellow color, and barely to be seen by the naked eye. The young scales appear like fly specks. They multiply and grow with great rapidity, there being three broods in one season. The first hatching is usually in the latter part of May, the second in July and the third in September.

The fact that they multiply so rapidly and infest to the death nearly every variety of tree and shrub, makes their presence in our midst one of great danger to not only our fruit trees, but to our shade and ornamental trees as well.

The most effective spray to use against this pest is No. 1. For bad cases three applications should be made when the trees are dormant. If summer spraying is necessary use Spray No. 3 or 7.

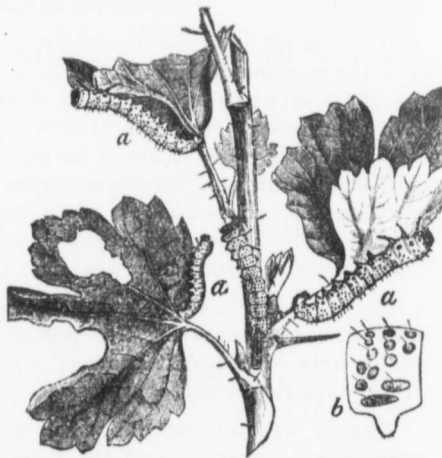
This pest is so readily detected during the month of May, that wherever trees are infested they will be noticed at once, and where they were not destroyed last season, the trees or bushes should be sprayed or thoroughly washed.

#### THE CURRANT AND GOOSEBERRY SLUG OR WORM.

(*Nematus ventricosus*.)

The full grown worms are about three-fourths of an inch long, and are shewn at (a); (b) gives the position of the black spots upon a magnified joint of the body.

This voracious insect differs from the Cherry Slug. The flies are yellow, not black. The slugs are green or green dotted with black, and not brown. They feed on the gooseberry or currant, and eat the leaf entire, instead of merely removing the cuticle; it is so readily dealt with



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by the timely application of remedies, that there can be no possible excuse for the shocking damage often seen done to these useful fruits about town and country homes.

POWDERED HELLEBORE.

Hellebore is the best of known remedies, and a perfectly effectual one. Properly applied, no harm can possibly result from it. It should, according to Prof. Lintner, be used in the following manner ; Early in the spring, as soon as the leaves of the currant have fully put forth, watch for the first indications of the hatching and commencement of the young larvæ. You have only to look for these on the *lowest leaves on the bushes near the ground*. The indications will be numerous *small holes eaten into the leaves*. Sprinkle powdered hellebore over these leaves, renewing it if washed away by rain, and the desired end is accomplished. If the hellebore remains upon the leaves during the time that the larvæ are hatching, all will be killed, and none will remain for subsequent spreading over the leaves and for the need of future attention. If the first brood of worms is thus destroyed, there will be few, if any, to form a second brood in June.

Hellebore can be applied very quickly with Leggett's Powder Gun.

HAND PINCHING.

Some find it convenient to watch for the first eaten leaves, and to pinch them off by hand and destroy them. The eggs are always to be found conspicuously arranged in rows upon the veins of the under side of the leaves.

Hellebore can also be used with spraying pump. See spray No. 8.

THE PEAR AND CHERRY TREE SLUG.

Growers should be on the look-out for this destructive pest about the middle of June and again in early August, and if the young slugs are then abundant, they should be then promptly attended to, since if neglected, they soon play sad havoc with the foliage, feeding upon the upper side of



the leaves and consuming the tissues, leaving only the veins and under skin. The foliage deprived of its substance, withers and be-

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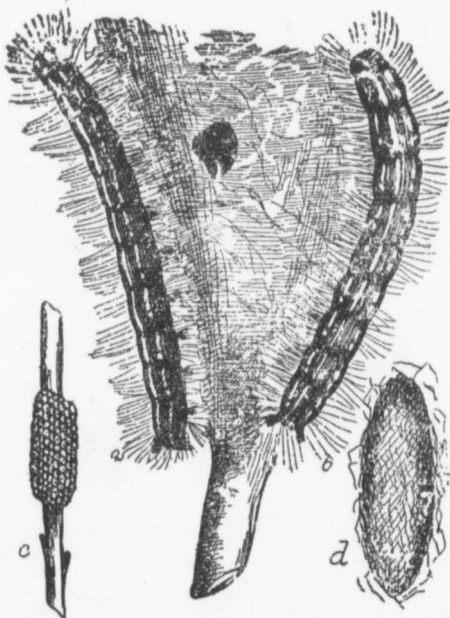
comes dark colored, as if scorched by fire, and soon afterwards it drops from the tree. Trees badly infested often become as bare of foliage in July as they are in January. In such cases the tree is obliged to throw out new leaves, and this extra effort so exhausts its vigor as to interfere seriously with its fruit-producing powers the following year. Although very abundant one season, they may be very scarce the next, as they are liable to be destroyed in the interval by enemies and by unfavorable climatic influences.

#### REMEDIES.

##### Hellebore Spray No. 8.

Fresh air slacked lime, sand, ashes or road dust on the foliage is said to be an efficient remedy. - But these latter are unsatisfactory measures and usually of little value, especially if applied late in the season.

#### THE APPLE-TREE TENT CATERPILLAR.



(a), Side view; (b), back view, full grown at about six weeks old; (c), cluster of eggs; (d), cocoon, oval of pale yellow color.

The moth is of a pale, dull reddish-brown color, crossed by two oblique parallel whitish lines, being usually paler than the general color, although sometimes quite as dark, or darker. It lives but a

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few days in the winged state, merely long enough to provide for a future generation, by the deposition of eggs. The moths are usually most abundant during the first two weeks in July. The eggs, conical, and about one-twentieth of an inch long, are deposited in July upon the smaller twigs in a ring-like cluster.

The young caterpillars are fully matured in the egg before winter and thus remain till favorable spring weather, when they begin to move about and soon construct for themselves a shelter by extending shoots of web across the nearest twig upon which they were hatched, for retreat at night and stormy weather. In five or six weeks they become from one inch to one and three-quarter inches in length.

While these pests are small they return to their nests at night, and the twigs bearing them can be cut off and the whole burned, or they may be destroyed by using a torch made of rags dipped in coal oil, applied to the nests. As the insects become larger they distribute themselves over the entire surface of the trees, sometimes completely defoliating them, and spraying becomes necessary.

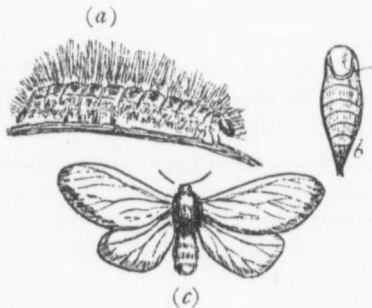
For this purpose use Sprays 8, 9, or 13.

#### THE FALL WEB-WORM.

(*Hyphantria Textor.*)

This insect appears towards the end of the summer and is totally different in all its stages from the common tent caterpillar. The moth of this species deposits her eggs in broad patches on the under side of the leaves near the end of a branch in the month of June, hatching out in July and August.

As soon as the young larvæ appear they begin to eat and to spin a web over themselves for protection. They devour only the pulpy portion of the leaves, leaving the veins and skin of the under surface untouched. From their birth the web-spinning habits of these larvæ promptly leads to their detection, and as soon as seen they should be removed, by cutting off the twig or branch and destroying it. As they remain constantly under the web for so long a period the removal of the branch insures in most instances the destruction of the whole colony. See also remedy recommended for Apple Tree Tent caterpillar.



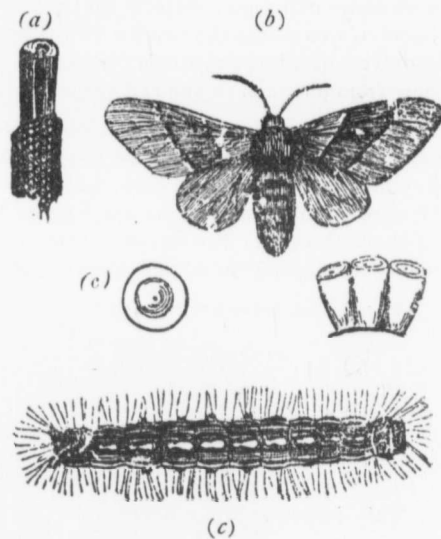
## THE FOREST TENT CATERPILLAR.

This insect closely resembles the common tent caterpillar described on another page. The eggs are of almost uniform diameter, and from three to four hundred in each cluster, squarely cut off, as shown in (a). After the insects are hatched in spring they are often seen marching about in single or double column. In about six weeks these insects are full grown, as shown in (e).

They are from one to one and a half inches long, and of a pale, bluish color, with black points and dots. On the back is a row of ten or eleven oval or diamond-shaped white spots, by which it may be at once distinguished from the common tent caterpillar, while on the sides there are pale, yellowish stripes somewhat broken and mixed with gray.

While particularly injurious to the apple, the insect also attacks various species of forest trees, such as oak, thorn, ash, basswood, plum, cherry, walnut, etc.

When full grown the larvæ spins its cocoon in some suitable place, when after two or three days there is a change to a chrysalis of a reddish brown color, densely clothed with short hair, and after two or three weeks the moth appears, when, having deposited its egg, it perishes.



(a), egg cluster; (b), moth; (c), one of the eggs much enlarged, as seen from the top; (d), a side view of the same; (e), the caterpillar.

## REMEDIES.

These egg clusters must be sought for and destroyed during the winter months. They can be readily detected, and are easily dislodged and destroyed. If left unmolested they will hatch out in spring and be the cause of much damage. See also, remedy recommended for Apple-Tree Tent Caterpillar.

The caterpillar is a greenish yellow color, with a pale brown tinge, affecting the terminal part of the insect forms.

This species is found in that two of the trees which appear a bright orange color, the third brood is an example.

The eggs are found on other trees and the young foliage.

Here they are found within the foliage of yellow moths, which are moths of which the brood which die in sheltered places previously stated.

This pest should be destroyed before it forms protective coverings or is.

Other varieties of damage to fruit trees should be used.

The Eye-spotted Caterpillar made its appearance on trees imported.

The caterpillar is found as its point of attack.

It is a small insect when full-grown, and its next segment is

## THE LESSER APPLE-LEAF ROLLER.

*(Teras minata.)*

The caterpillar of this species is a greenish yellow larva, smooth, with a pale brown head and whitish markings, affecting the young leaves of the terminal twigs, with which the insect forms a protective case.

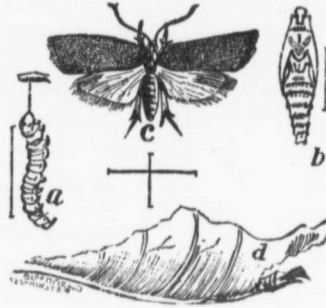
This species is remarkable in that two of the three broods of moths which appear during the year are of a bright orange color, while those of the third brood are reddish gray. It is an example of what naturalists call dimorphism.

The eggs are laid in the spring, on the unfolding leaves of apple and other trees, and bushes, the larvae soon hatching and feeding on the young foliage, some of which they roll into a protective covering.

Here they continue feeding for about a month when they pupate within the folded leaves, and a week or so later emerge as small orange yellow moths. These moths lay eggs for another brood of larvae the moths of which are also yellow, and they in turn lay eggs for a third brood which develops in the fall as reddish gray moths. These winter in sheltered places and in the following spring deposit their eggs as previously stated.

This pest must be closely watched, as spraying to be effective should be done when the caterpillars are quite young, before they form protecting cases of the leaves. For this purpose use Sprays 2, 9, or 13.

Other varieties of Fortricidæ or Leaf Rollers have done much damage to fruit trees the past season. The remedies given above should be used.



## THE EVE SPOTTED BUD MOTH.

The Eye-spotted Bud-moth (*Imetocera ocellana*) has made its appearance in the vicinity of Vernon on young trees imported from the east.

The caterpillar of this insect selects the opening bud as its point of attack.



It is a small, naked larva about three quarters of an inch long when full-grown, of a pale, brownish color, the head and top of the next segment are black.

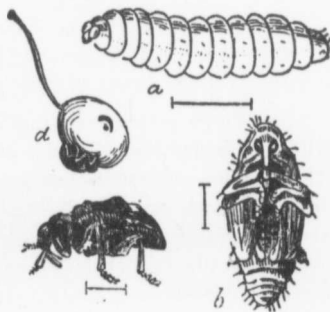
It is very partial to the blossoms and newly formed fruit, attacking both apples, cherries and plums. Its tenement is a dried, blackened leaf, portions of which are drawn together to form a case, which is lined with silk. The remedy suggested by Prof. Saunders is to pull off and crush the withered clusters of leaves containing the caterpillars or chrysalids early in spring. Sprays No. 8 and 9 are also recommended, but must be used very early, just as the leaf buds are opening.

### THE PLUM CURCULIO.

(*Conotrachelus nenuphar*.—Herbst.)

The different stages are shown in the engraving below: [a] represents the grub much magnified; [b] the chrysalis, and [c] the beetle, both magnified; [d] the young fruit, showing the crescent-shaped mark made by the insect, and the curculio, life size, at its work.

There is perhaps no insect so well known as the Plum Curculio, the perfect insect belongs to the family known as snout-beetles, from the shape of the head, which is elongated into a beak. It is small, rough, grayish beetle, about one-fifth of an inch long. The females lay their eggs in the young fruit of plums and cherries frequently destroying the whole crop.



### REMEDIES.

The beetles are sluggish in the early morning and drop from the trees if a sudden jar be given to the trunk. For this purpose a metal spike is driven into the trunk, which is struck sharply with an iron hammer. This gives the sharp jar necessary to dislodge the beetles which fall on sheets or into receptacles placed beneath the trees. They are then collected and destroyed.

Of late years abundant evidence has proved the efficacy of spraying the trees, as soon as the fruit has formed, with Paris green, 1 pound to 200 gallons of water, and ten days afterwards a second time with a weaker mixture, one pound to 300 gallons. Should heavy rains occur immediately after these sprayings, they must be repeated. See Sprays Nos. 2, 9 and 13.

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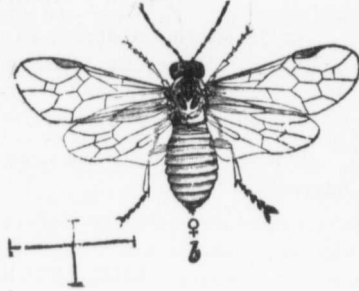
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THE CURRANT FLY.

The perfect female is shown in the above figure, the lines showing the actual size.



This insect will ruin the currant and gooseberry crop, if once it has gained an entrance and is allowed to go unmolested. In its perfect state it is a small two-winged fly which lays its eggs on the fruit while it is small. The larvæ enter the fruit yet green and feed on its contents, leaving a small black scar at point of entering. The affected fruit ripens prematurely and soon decays and drops to the ground, when on opening it a small, white grub will be found, about one-third of an inch long.

REMEDIES.

The Hellebore Spray No. 8 is recommended in Oregon. Fresh slaked lime scattered over the fruit bushes and on the ground under them, when the parent fly is active, will act as a preventative to egg laying. Fallen leaves and rubbish should be raked up and burnt.

THE IMPORTED CURRANT BORER.

(*Ægeria Tipuliiformis.*)

This insect has made its appearance in Vancouver and New Westminster cities, and is a serious impediment to successful currant culture.



The parent of this destructive larvæ is a pretty wasp-like moth, and appears about the middle of June, when it may be found in the hot sunshine darting around with rapid flight. The female is said to lay her eggs near the buds when in a few days they hatch into small larvæ which eat their way to the centre of the stem where they burrow up and down feeding on the pith all through the summer, enlarging the channel as they grow older, until at last they have formed a hollow several inches in length.

While this insect chiefly infests the red and white currants, it attacks the black currant also and occasionally the gooseberry. Where the hollow stems do not break off, indications of the presence of the borer may be found in the sickly look of the leaves and the inferior size of the fruit.

## REMEDIES.

In the autumn or spring all stems found hollow should be cut out and burnt. During the period when the moths are on the wing they may often be captured and destroyed in the cool of the morning at which time they are comparatively sluggish.

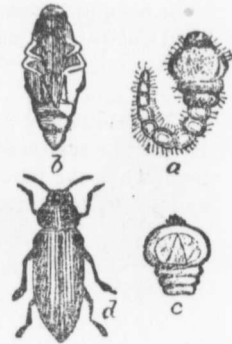
The use of lime, in the same manner as for the Currant Fly, is advised.

## THE APPLE TREE BORER.

(*Chrysothris femorata*.)

[a]. Shows larva; [b] chrysalis; [c], primary stage; [d], the perfect insect.

Of these there are a number of species. The two-striped or round-headed is extremely destructive to apple orchards, from the boring of the grub into the wood of the tree. The mature beetle appears during May and June, and being strictly nocturnal, is seldom seen except by those who hunt for it. The female deposits her eggs mostly in June, in the bark near the foot of the tree, and also in the forks of the main branches. The eggs hatched, the minute grub commences boring into the wood, generally downward the first year, and upward and near the bark the second year. The borer lives in the wood of the tree until the third year when it emerges a perfect beetle. It infests healthy as well as unhealthy trees, and is very destructive.



The flat-headed borers, while working in the same class of trees, are totally unlike the others. Boring an oval hole twice as wide as high, the beetle flies by day instead of at night, and besides the apple tree, attacks the oak, peach, soft maple, ash, willow, tulip, and even the elm and cotton wood; it also attains its full size in one year from the egg. This borer attacks limbs and trunk indiscriminately.

## REMEDY.

The natural enemies of these insects are the birds of the woodpecker tribe.

Artificial remedies are to find the cast of the larvæ, and kill them by piercing with a flexible wire. Prevention is, however, the only sure remedy. Keep the base of every tree clear of weeds and trash, and apply a solution of soft soap reduced to the consistence of a thick paint by the addition of a strong solution of washing soda in water.

This, if applied to the collar, and in a few days after rain. This is the latter

All trees examined at the base of the protruding should be treated with the contact with the oil used away with usually by labor and labor,

The food of the tree, in order to keep the tree from infesting these parts of lard dissolved in crude castor oil water and

This Beetle. It is a small insect, in length, and lives beneath.

Unlike the state, this insect attacks apple, pear, and wards through the holes and partly made by

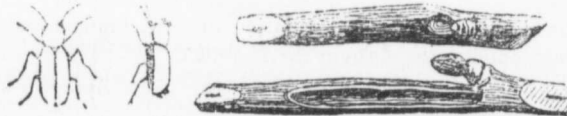
This, if applied to the bark of the tree, especially about the base or collar, and thence up the trunk and over the larger branches, will dry in a few hours and form a tenacious coating not easily dissolved by rain. This soap solution should be applied in May, and a second time the latter part of June.

All trees liable to be troubled with borers of any kind should be examined at least twice each year and the earth removed from about the base of the tree, and wherever the castings of the larvæ are found protruding through the bark an application of unadulterated coal oil should be made by means of a small can. The saw-dust castings absorb the coal oil, and it permeates the burrow and soon comes in contact with the larvæ which ends their destructive work. The amount of oil used will in no way endanger the health of the tree and does away with the old process of digging them out with a knife, which usually badly mutilates the tree; and it is also a great saving of time and labor, as a person can inspect and treat many trees in an hour.

The following wash, applied hot to the trunk and large limbs of the tree, in May and again in the latter part of June, will not only keep the trees free from borers but also from any other insect that infest these parts of the tree, viz.: One pound of potash and one pound of lard dissolved in five gallons of boiling water, stirring in one pint of crude carbolic acid; slack four pounds of lime in one gallon of water and while hot mix all together adding four gallons of water.

### THE APPLE-TWIG BORER.

(*Omphircus bicaudatus*.)



This Borer was found in some numbers in the Chilliwack district. It is a small cylindrical beetle, from one-fourth to one-third of an inch in length, and of a dark chestnut brown color above and black beneath.

Unlike most other borers which do their mischief in the larvæ state, this insect works in the beetle state, boring into the branches of apple, pear, and cherry trees just above a bud, and working downwards through the pith in a cylindrical burrow one or two inches long. The holes appear to be made partly for the purpose of obtaining food and partly to serve as places of concealment for the beetle. They are made by both sexes alike. They work throughout the summer

months, causing the twigs operated on to wither and their leaves to turn brown.

This insect does not often occur in such numbers as to inflict any material damage. Should it at any time inflict serious injury, the only remedy as yet suggested is to search for the bored twigs in June and July and cut them off and burn them.

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#### THE RASPBERRY ROOT BORER.

(*Bembecia Marginata.*)

The stems of raspberries and blackberries are sometimes injured by a whitish caterpillar that bores the root and base of the stem. No other remedy than that of cutting out the larvæ, or pulling up and burning the infected canes, has yet been discovered. The adult insect is a clear-winged moth.

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#### THE RASPBERRY CANE BORER.

(*Oberia bimaculata.*)

The adult of this insect is a slender-bodied, black beetle with a yellow band just behind the head. It appears in the spring or early summer and deposits eggs in the young canes of raspberries or blackberries. Shortly afterwards the eggs hatch into small cylindrical larvæ which bore downwards. The canes will wilt soon after they are punctured and should be cut off below the larvæ and burnt.

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#### THE RED CLOVER MITE.

This minute pest, a near relative of the common red spider, is becoming common throughout the Province.

It may be kept in check by using the No. 1 Spray in winter and No. 5 or 7 in Summer.

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#### THE PEAR LEAF MITE.

(*Phylloptus Pyri.*)

The leaves of the pear are sometimes noticed in spring to have small reddish spots upon their upper surface. As the season advances these spots become darker colored, finally almost black. The tissues of the leaf where they are being dry or dead. This is caused by the above insect, an extremely minute creature.

Infected trees are best treated in the winter by using Spray No. 1 or strong Kerosene emulsion.

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## THE PEACH TREE BORER.

*(Ægeria exitiosa).*

This pest, so destructive to peach orchards, is very widely disseminated. The moth appears from about the first of June to the middle of September. The female deposits her eggs in the bark of the tree at the surface of the ground. They are very small, oval in form, slightly flattened and of a dull yellowish color. They are deposited singly and are fastened to the bark by a gummy secretion. As soon as the worm is hatched, it works downward in the bark of the root, forming a small winding channel, which soon becomes filled with gum. As it increases in size, it devours the bark and sap wood, and causes a copious exudation of gum, which eventually forms a thick mass around the base of the tree, intermingled with the castings of the worm. When full grown the worm measures over half an inch in length and about a quarter of an inch in diameter. It is a naked, soft, round grub, of a pale whitish color, with a reddish, horny looking head, and black jaws. In badly infested trees the whole of the bark at the base of the tree is sometimes consumed for an inch or two below the surface. Nor does the insect always confine itself to the base of the tree. It occasionally attacks the trunk further up, and sometimes the forks of the limbs. But exuding gum invariably points out the spot where the enemy is at work. Its operations are not always confined to the peach; it also works on the plum.

## REMEDIES.

Several remedies have been proposed to meet this evil. Where the borers are present they are easily detected in consequence of the exudation of gum. Hence, early in the spring the trees should be examined, a little of the earth removed from about the base of the tree, and if masses of gum are found, the grub should be searched for and destroyed. Hot water has been found very effectual in killing them. It should be used boiling hot, and after the earth has been removed from about the base of the tree.

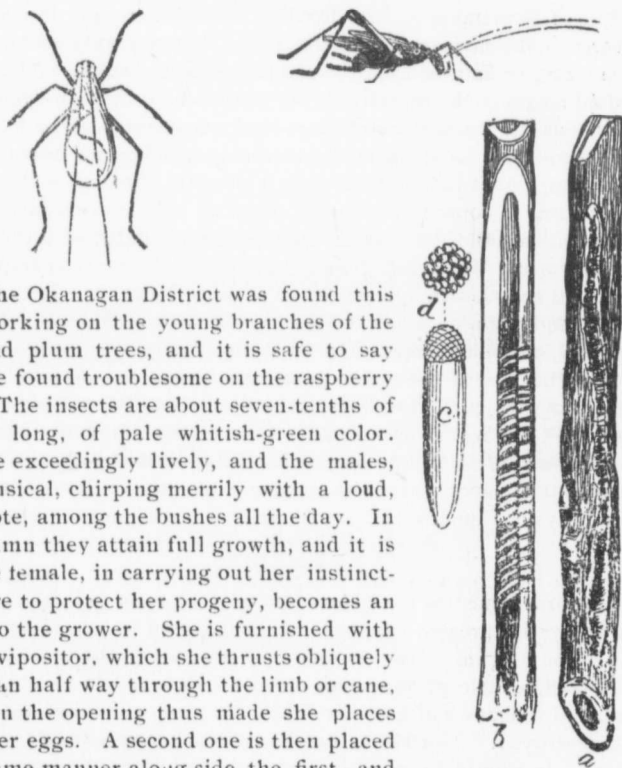
Among the preventive measures much has been written in favor of mounding the trees, banking the earth up around the trunk to the height of a foot or more, and pressing it firmly about the tree. Some allow the mounds to remain permanently, but the better way is to mound up late in the spring, and level off the ground again in Sep-



tember, after egg laying has ceased and the moth has disappeared. Another preventive, which we regard as much better than mounding trees, is the use of stiff paper one foot high about the base, extending some two inches below the surface, and fastened at the top with string or wire. The washes recommended for the apple tree borer are also good to be used on the peach.

### THE TREE CRICKET.

(*Æcanthus Niveus.*)



In the Okanagan District was found this insect working on the young branches of the apple and plum trees, and it is safe to say it will be found troublesome on the raspberry canes. The insects are about seven-tenths of an inch long, of pale whitish-green color. They are exceedingly lively, and the males, quite musical, chirping merrily with a loud, shrill note, among the bushes all the day. In the autumn they attain full growth, and it is then the female, in carrying out her instinctive desire to protect her progeny, becomes an enemy to the grower. She is furnished with a long ovipositor, which she thrusts obliquely more than half way through the limb or cane, and down the opening thus made she places one of her eggs. A second one is then placed in the same manner along side the first, and so on until from five to fifteen eggs have been placed in a row.

Owing to the presence of these eggs the limb is much weakened and is liable to break on slight provocation. Sometimes the part beyond the puncture dies, but if it survives and escapes being broken in the winter, it is very apt to break from the action of the wind on the weight of the foliage as soon as it has expanded in spring, and the

crop, which or sometime or cane and on plant lie food.

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Of these places of cutting off a plant, there *Agrotis*, being of gray, brown may well be

These trees loss to the fact the caterpillar which fly at ( B), are smooth one-half an inch. They feed at species are large quarter of the in a torpid condition

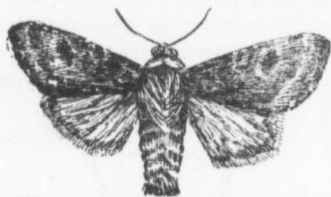
crop, which would otherwise be realized, is lost. About midsummer, or sometimes earlier, the insects hatch. They at once leave the limb or cane and do not further injure it. At first they feed more or less on plant lice but later in the season on ripe fruit and other succulent food.

#### REMEDIES.

Late in the fall or early in the spring cut out all those portions containing eggs and burn them. Wherever the eggs are deposited the regular rows of punctures are easily seen. The mature insects may also be destroyed in the autumn by suddenly jarring the bushes or canes on which they collect, and when they drop to the ground, they may be trodden under foot before they have time to hop or fly away.

#### CUT WORMS.

(*Agrotis*, *Noctuidæ*, etc.)



(FIG. A.)



(FIG. B.)

Of these destructive worms, which have the habit of leaving their places of concealment in the soil at night, coming to the surface and cutting off almost every kind of newly set vegetable and flowering plant, there are now known to be many species. Those of the genus *Agrotis*, being mostly thick, greasy-looking caterpillars of some shade of gray, brown, or green, variously marked, are the best known and may well be looked upon with dread.

These troublesome pests, which are doubtless the cause of more loss to the farmer in the spring months than any other insects, are the caterpillars of a number of different dull-colored moths (Fig. A.) which fly at night. The worms, one kind of which is shown in (Fig. B), are smooth greasy looking, dark caterpillars, ranging from about one-half an inch to two inches in length at the time they injure crops. They feed at night and hide during the day time. The eggs of most species are laid in autumn, and the young caterpillars make about a quarter of their growth before winter sets in. They pass the winter in a torpid condition, and are ready in spring to attack the young

crops as soon as they come up. The full growth of most species is completed by the first week in July, when the caterpillar forms a cell in the earth and changes to a chrysalis, from which the moth appears about a month later.

#### REMEDIES—CLEAN CULTURE.

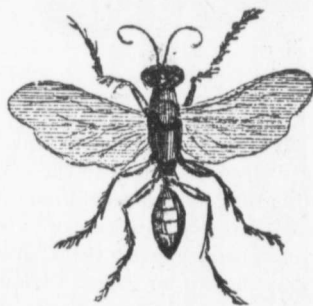
As the young caterpillars of many species hatch in autumn, the removal of all vegetation from the ground as soon as possible in autumn deprives them of their food supply and also prevents the late-flying moths from laying their eggs in that locality. Fields or gardens, which are allowed to become overgrown with weeds or other vegetation late in the autumn, are almost sure to be troubled with cut worms the next spring.

#### NATURAL REMEDIES.

There are two enemies which deserve especial notice, and, from the good service they do, should be known by sight to every cultivator. They are the Fiery Ground-beetle or Cut Worm Lion (*Calosoma calidum*, Fab.)—Fig. C—and the Black Ground Wasp (*Ammopila luctuora*)—Fig. D. Both of these are desperate enemies of cut worms, the former feeding on them in all of their stages, the latter digging them out and storing its nest with them as food for its young grubs.



(FIG. C.)



(FIG. D.)

#### BANDING AND WRAPPING.

It will be found to well repay the trouble and expense to place a band of tin around each cabbage or other plant at the time of setting out. These may very easily be made by taking pieces of tin six inches long and two and half wide, and bending them around a spade or broom handle so as to form short tubes. In placing them around a plant the two ends can be sprung apart to admit the plant, and then the tube should be pressed about half an inch into the ground. This will be found a useful means of disposing of empty tomato and other cans. To prepare these easily, they need only be thrown into a

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bonfire, when the tops and bottoms fall off and the sides become unsoldered. The central piece of tin can then be cut down the centre with a pair of shears, and will form two tubes.

#### POISONING.

Put a teaspoonful of Paris green or London purple in two gallons of water and sprinkle handfuls of grass, green sod, or other vegetation, which should then be scattered throughout the patch, walking crossways of the harrow marks. By doing this towards evening after the last harrowing, the cut worms, that are deprived of their food, will, at night, be out looking for fresh pastures, and will appropriate the prepared bait, the smallest particle of the poison of which will kill them. If the worms are very troublesome, the remedy may be repeated, it being easily applied.

#### SHIELDING THE STEM.

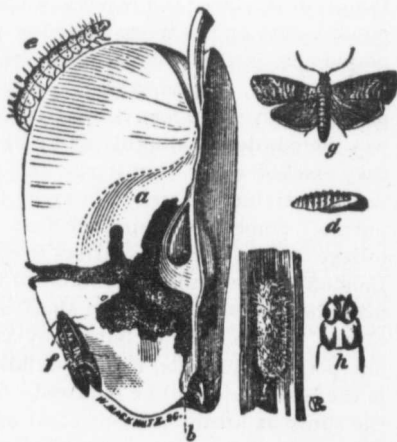
By encircling each plant, that is set, with a piece of tar paper, or any other paper, the ravages of the worm may be prevented. The paper should extend upwards several inches from a point just beneath the surface of the soil.

#### HUNTING AND KILLING.

By closely examining the surface of the soil in the morning, in the vicinity of their spoils, through drooping plants or otherwise, their places of retreat may usually be discovered, and the worms killed.

#### THE CODLIN MOTH.

This insect, which appears in the early worm-eaten apples and pears, in the form of a reddish white grub, was introduced into this country with the apple tree from Europe. It causes the fruit to fall prematurely from the trees. "The perfect insect," says Charles Downing, in his work on *Fruit and Fruit Trees of America*, "is a small moth; the fore wings grey with large, round, brown spots on the hinder margin. These moths appear in the greatest numbers in the warm evenings of June, and lay their eggs in the eye or blossom end of the young fruit, especially of the early kinds of apples and pears. In



The puncture made by the moth is represented at [b], the borings of the larva at [a], the mature worm at [e], the moth with wings closed at [f], the moth with wings expanded at [g], and the cocoon at [i]; [d], the chrysalis, and [h], the anterior part of the body, magnified.

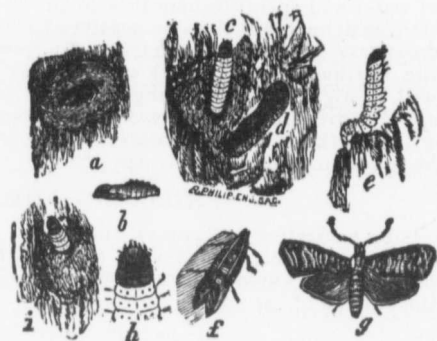
a short time, these eggs hatch and the grub burrows its way till it reaches the core. The fruit then ripens immediately and drops to the ground, when the worm leaves the fruit and creeps into the crevices of the bark and hollow of the tree and spins its cocoon; which usually remains there till ensuing spring when the young moth again emerges from it.

There are two modes of fighting them generally made use of—one is to prevent the hatching of the egg, or the killing of the young worm while working into the fruit; the other is the catching of the worm in traps as it is escaping from the fruit, or having the fruit eaten by hogs as soon as it drops from the tree and before the worm escapes. The first mode is without doubt the most successful, and is also the

least expensive. This is accomplished by spraying the trees with London purple or Paris green. (See Sprays 2, 9, or 13 ) Paris green is a compound of arsenic and copper. It is a far more powerful poison than arsenic alone, and is not soluble in water, hence it will remain much longer on the trees. London purple is another arsenical compound. It is the residue from the manufacture of aniline dye, and contains lime, arsenuous acid, and carbonaceous matter. It is soluble, more adhesive, and less poisonous than Paris green. It is better to wet the powder thoroughly and make a paste before putting it into the vessel of water, that it may not form lumps. The liquid should then be strained, thereby removing the sediment that is in the London purple. Some have reported that the London purple burned the foliage. This doubtless, arises from difference in the strength of the London purple, and we recommend that care be exercised and tests be made before using, so that it shall not be too strong. The spray is caused by forcing the liquid, by means of a force pump, through a fine perforated nozzle, made specially for the purpose. The finer it is the less liquid will be required. The important thing is to scatter the spray on all the fruit.

#### WHEN TO SPRAY.

The Codlin Moth, soon after the fruit sets, lays her eggs upon the calyx or blossom end of the young fruit. The grub, as soon as hatched, eats its way into the centre of the sound fruit, and there,



[a], Nest of larva on outside of tree, under the old bark; [b], pupa; [c], larva exposed from nest; [d], old nest; [e], larva about to build nest; [f], the moth at rest; [g], moth with wings spread; [h], head of larva.

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growing with its growth, works its mischief. In its early state the young fruit is erect, its calyx or blossom end upwards, and the least particle of poisoned water falling upon it is sufficient to destroy the young worm when it attempts to eat its way into the fruit. Therefore, the best and most opportune time for spraying the tree is soon after the fruit is set, and when it is about the size of a small pea. Experiences teaches, however, that it is not safe to depend upon the one early spraying to accomplish the results sought for; still the facts remain that in many places the Codlin Moth does not sting the fruit and lay the eggs until later in the season. Therefore, to obtain the best results, the spraying should be continued with an interval of two weeks until the first of August, and even later than this on some varieties. Care should be observed that vegetables are not sprayed with these mixtures, and no animals be allowed to eat the grass that has been saturated with the spray, and that the spraying is not done when the trees are in bloom, for then it is that bees are present.

#### THE CLICK BEETLE.

LADNER, B. C., August 26th, 1894.

A. H. B. MACGOWAN, ESQ.,  
Secretary Fruit Growers' Association.

Dear Sir,—Your letter of August 24th enquiring for information regarding the Click Beetle, for use in Supplement to Fruit Growers' Report for 1894, to hand. During or soon after the blossoming season of 1893, I was instructed that a very destructive insect had attacked the blossom of fruit trees in and around Mission City. Their season of depredation being over I failed to find a specimen of the insect. In giving a description some said it was a beetle that could hop; others described it as a flea, only much larger than the common insect of that name.

During the blossoming season of 1894 I watched closely for insects of this description, and found a large number of beetles of the Click family destroying certain parts of the fruit buds, eating their way down in the saucer-shaped disc of the bloom, from the centre of which protrudes the styles and leading directly down to the ovules.

Upon close examination of the buds that had been visited by the beetles, I found in all cases the style and stigma were destroyed, thereby preventing fecundation or action of the pollen tubes on the ovules. In others I found filament and anthers gone with but petals and sepals remaining, which withered and turned brown in a few hours, and young undeveloped fruit soon dropped to the ground.

As a remedy we spread a sheet under the tree, giving the tree a sudden jar causing the beetles to fall to the ground, where they remained dormant for a short time, giving ample opportunity for destroying them. We found that by going over the trees every day the trees could be kept comparatively free and save the crop.

I had specimens of the beetle forwarded to J. R. Anderson, of the Department of Agriculture. He in turn forwarded them to James Fletcher, of Ottawa. I enclose a copy of Mr. Anderson's letter, as well as one from Mr. Fletcher.

Yours, etc.,

E. HUTCHERSON.

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DEPARTMENT OF AGRICULTURE, BRITISH COLUMBIA.

Office of the Board of Horticulture,

VICTORIA, June 29th, 1894.

Sir,—The following is a copy of a letter from Mr. Fletcher regarding the beetles attacking blossoms, and are, as I suspected, the parents of wire-worms:—

"Your letter of May 28th was duly received, as well as the enclosure from Mr. Hutcherson and the accompanying beetles. These latter are as you state, Click Beetles, the parents of the injurious wire-worms. This is the same species (*Corymbites caricinus*) which was mentioned in my report for 1892, page 146. The remedy proposed by Mr. Hutcherson was perhaps the best that could be tried."

I have the honor to be, Sir,

Your obedient servant,

J. R. ANDERSON.

E. HUTCHERSON, ESQ.,  
Ladner, B. C.

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WIRE-WORMS.

(*Melanotus communis* and *Arigotes mancus*, for it appears by Bulletin No. 4 of the Experiment Station of Washington that there are both species in that country, and therefore presumably in this.)

Are reported from Spallumcheen, Notch Hill, Surrey Centre, Maple Ridge, Howe Sound, Victoria, South Saanich, Shawnigan, Comiaken, Somenos and Salt Spring Island.

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Mr. F pondents a yellow wor tivated, an town, N. S tells me he and carefu they shoul wire-worm: mentioned when he to gather ther the potatoe give the fo issued by M Imperial Pr means of p of weeds fr

This pest has occasioned severe losses especially in potatoes. The best remedy seems to be well cultivated land, as it thrives best in sods when not disturbed. The following is from Report of Ontario Agricultural Commission, p. 164:

"The wire-worms (*Agriotes mancus*)," says Mr. Bethune, "are sometimes troublesome to wheat. This insect lives altogether out of sight, underground, and hence it is not much observed by the farmers. It is a long, slender grub, usually of an orange yellow or tawny color, with six legs under the anterior portion of the body, and is very hard, unlike our caterpillars, which are soft to the touch, consequently receiving its name, the 'wire-worm.' It feeds underground upon the roots of vegetation, and is looked upon in England as one of the very worst foes of wheat. In Ontario we have not been able to estimate its ravages as resulting in any great loss, though this may be because they are carried on out of sight. It is frequently observed in ploughing.

"The wire-worm, however, does not cease to be troublesome when it quits its larval state, and appears in the shape of the spring-back beetle.

"The perfect creature," says Mr. Bethune, "is very familiar; it flies into the house at night, attracted by the light, and may be found creeping about sap exuding from trees, ripe fruit, or anything sweet."

He recommends employing children to follow the plough and pick up the wire-worm, or to turn turkeys or ducks into the ploughed fields as remedies for the too great numbers of this creature.

Mr. Fletcher says (Report 1885, page 17):—"Most of my correspondents agree that the attacks from wire-worms (sometimes called yellow worms) are much less severe upon well manured, highly cultivated, and well cleaned ground. Mr. William Miller, of Bridgetown, N. S., a gentleman of large experience and a successful farmer, tells me he can clear any ground from wire-worms by high culture and careful cleaning by the third crop. Where potatoes are grown they should be picked up immediately they are dug, and most of the wire-worms will be taken out with them and can be destroyed. He mentioned an instance of a piece of land he had just cleared which, when he took it, was so full of wire-worms that he had been able to gather them up by the handful from the bottom of the cart in which the potatoes were drawn from the field. In confirmation of this, I give the following quotation from the report which has just been issued by Mr. C. Whitehead for the Agricultural Department of the Imperial Privy Council Office in England: 'First and foremost among means of prevention (of wire-worms attacks on crops) is the abolition of weeds from the land and from the outsides of fields. This has

been recognized and adopted long ago by some agriculturists, for we find the following passage in Vol. XV. of the Journal of the Royal Agricultural Society of England, in an essay upon the farming of light land, which is always more liable to attacks of wire-worms. 'There is a farm in the neighborhood of Guildford which presents an instance of a perfectly clean farm and kept so by deep ploughing and unsparing use of horse and hand hoes. It has often been remarked that root crops and corn are unmolested by wire-worms upon this farm. The owner asserts that he starved them long ago by growing no weeds to sustain them in the absence of a crop.'

The following is taken from the *American Garden*, and will do for horticulturists:—

#### REMEDY FOR WIRE-WORMS.

"Add three or four pounds of unslacked lime to every bushel of soil. This will make the wire-worms so sick that they will give the seedling carnations a wide berth in the future; besides the health and color of the plants will be so much improved that we will think that they belong to a new race of pinks. The best way to use lime is to spread the soil in a flat heap ten or twelve inches thick, then place the desired amount of lime in lumps on the top. When the latter has become slacked and pulverized the soil should be turned over two or three times and thoroughly mixed. It is then ready for use."

#### BENEFICIAL INSECTS.

The importance of calling to our aid various beneficial insects in controlling and eradicating insect pests should be better understood and more fully appreciated by the fruit grower. It is not necessary that we should waste years experimenting in order to ascertain the benefits to be derived from the introduction and propagation of beneficial insects. California's experience with Ladybirds and other predacious insects should be a sufficient guide for us. The introduction of various Ladybirds into California saved the fruit growers of that state thousands of dollars. From the importation of one species alone—the *Vedalia-cardinals*—their orange groves were saved from utter ruin. Perhaps the most help to be received will come from the Ladybirds, although much is being done by the Syrphus Flies, Lace-winged Flies, and Ichneumon Flies towards freeing our trees and shrubs from scale and aphid. During the past season colonies of Ladybirds that were imported into California from Australia by Mr. Koebler, were found especially destructive to the scale family and the aphidæ. The Ladybirds (*Coccinellidæ*) increase very rapidly, and their larvæ are very voracious, destroying millions

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of injurious insects. In fact, it may be said that the larvæ are the most beneficial, although the mature beetle does a great deal towards eradicating the pests. The female deposits her eggs in the midst of the scale and aphid, so that when hatched the larvæ finds food at hand. To familiarize our fruit growers with the appearance of some of the imported beetles, a few cuts are shown and a brief description given of a few of the Ladybirds, also the Lace-winged and Syrphus Flies. Fruit growers should put forth every effort possible to harbor these little friends that they may increase in numbers, when they will be of great benefit to them. On trees where beneficial insects are being colonized, no spraying should be done, for the solutions used will destroy many of the larvæ and drive away the insects.

Besides the above much aid can be expected from the Ashy Grey Ladybird, the Brown-neck Ladybird, the Blood-red Ladybird, and the ambiguous Ladybird.

THE BLACK LADYBIRD (*Rhizobius ventralis*).

Perhaps none of the imported Ladybirds will prove of more benefit than the beautiful little black one which has cleaned the orchards of California from the Olive Scale (*Lecanium oleæ*). After ridding the trees of the Olive Scale, this Ladybird turned its attention to members of the aphid family, and is making great inroads on them. These Ladybirds have never been known to injure trees. This one variety alone is estimated to have saved the horticulturists of California \$100,000 a year in spraying and fumigating.

TWICE-STABBED LADYBIRD.

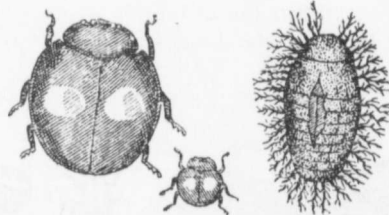
(*Chilocorus bivulneris*.)

TWICE-STABBED LADYBIRD.

(*Chilocorus bivulneris*.)

This is a beautiful little black beetle with two bright red spots on its wing covers.

The larva is shown in the cut and is black, crossed by a bright yellow band about the middle, and is armed with many soft, long, branching spines. This Ladybird preys upon various scales and is especially destructive to the San Jose Scale (*Aspidiotus perniciosus*).



Beetle.

Larva.



**BROWN-NECK LADYBIRD.**

(*Scymnus marginicollis*. Mann.)

This very small beetle feeds upon scale insects and delights in attacking the red spider. To the naked eye it appears deep black and shiny, and at the touch drops or rolls off, but before reaching the ground spreads out its wings and flies away. The color of the body is

**BROWN-NECK LADYBIRD.**  
(*Scymnus marginicollis*).



**BLOOD-RED LADYBIRD.**



yellowish grey, and is thickly covered with mealy powder. The head is black and the neck brown. The wing cases are black and covered with hair.

**AMBIGUOUS LADYBIRD.**  
(*Hippodamia ambigua*.)

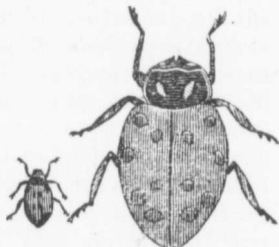
This is a blood-red Ladybird, which is very plentiful. The larva is one of the largest of the Ladybirds, and feeds upon aphides. It also attacks Woolly Aphis. Its larva feeds largely upon this aphid.

**CONVERGENT LADYBIRD.**  
(*Hippodamia convergens*.)

**CONVERGENT LADYBIRD.**

(*Hippodamia convergens*.)

This beetle works destruction to aphids and scale insects and is quite common.



**LACE-WINGED FLY.**

(*Chrysopa*.—New Sp. Coquillett.)

While the Ladybirds are great destroyers of scale and aphid, the larvæ of the Lace-winged Flies rid trees and plants of millions of *Aphidæ*.

(LACE-WINGED FLY *Chrysopa*. Sp. unnamed.)



The fly has a slender body, with delicate, gauze-like wings, and its color is generally green, with golden eyes. The eggs are deposited on pedicels and laid in the midst of a group of aphides. The larva is supplied with sharp mandibles with which it attacks the aphid.

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SYRPHUS FLIES.

The Syrphus Flies are also great destroyers of aphides. The larvæ feed entirely upon aphides, and appear and disappear as the

SYRPHUS FLIES. (Sp. unnamed.)



FIG. 1. Natural size. FIG. 2. Natural size. FIG. 3.

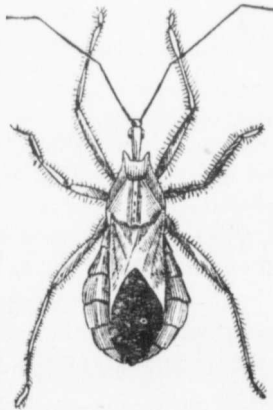
In the above cuts, Fig. 1 represents the fly, Fig. 2, magnified, the case in which it transforms into a fly, and Fig. 3, magnified, the larva.

aphides appear and disappear. The larva is a footless, eyeless, flattened, transversely wrinkled, gaily colored, green and purple maggot, having a very extensile body, which enables it to reach up and grasp the aphid with its peculiar-looking mouth. The single egg, deposited in a group of aphides, hatches forty-eight hours after it is laid, and the larva becomes full-grown and transformed into a pupa in five or six days. The reason of this extremely rapid development in the first two stages, the egg and the larva, is explained when we consider how brief is the existence of the aphid, and how suddenly its colonies appear and disappear. When the larva is actively feeding, it destroys dozens of aphides one after the other and its body changes color. When filled to repletion, the larva falls into a lethargy, lasting two or three hours during which the process of digestion changes the juices of the body to varying shades of brown. After the process of digestion has taken place, the larva again begins its work devouring aphides.

DEVIL'S HORSE OR WHEEL BUG

(*Prionidus cristatus*. Linn.)

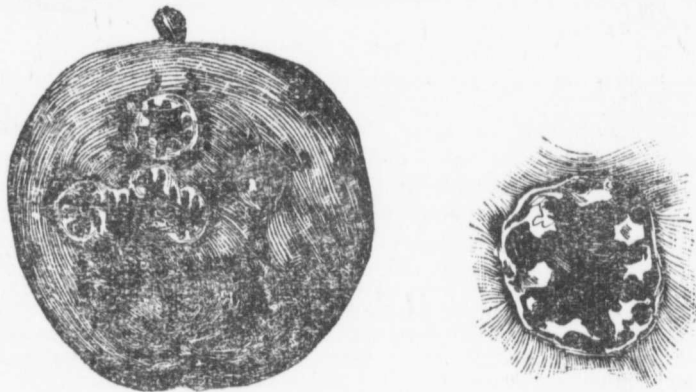
This insect feeds upon scales and aphides and destroys large numbers of caterpillars. The female deposits her eggs in a hexagonal mass on the leaves and bark of trees, on fence rails, etc. Generally, there are about seventy eggs in a bunch. The young are blood-red in color, with black marks, and resemble the adult only in form and habits. These insects prey upon pests by inserting into them their proboscis, which injects a most powerful, poisonous liquid into the wound. The victim thus pierced dies in a very short time. They then leisurely suck the juice out. The perfect insect is of a gray color and has a high, semicircular ridge or projection on the crest of its throat.



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## FUNGOUS DISEASES.

## APPLE AND PEAR SCAB OR BLACK SPOT OF THE FRUIT.

*(Fusicladium dendriticum.)*

There is probably no fungous disease of fruits so familiar to the general public as this. It is due to a fungus which produces the well known scabby spots upon the fruit, and also attacks the leaves and young wood. It first appears upon the leaves as smoky, greenish spots; these gradually enlarge and run together so as to form blotches, and as they grow older become dark in color. Sometimes the fungus develops so rapidly on the expanding leaves of varieties specially subject to the disease, as to blight and dwarf, or kill them. The newly formed fruit is next attacked.

The spores or reproductive bodies of the fungus are produced in immense numbers on these blackened spots. They are distributed by wind, etc., and when they light upon a moist leaf or fruit they germinate, sending out a little tube or root, and thus form a new centre of disease.

The spores pass the winter on the bark, twigs and small apples left on the trees, as well as on fallen leaves and fruit.

The mycelium or vegetative portion of the fungus develops just beneath the skin of the leaf or fruit, and after growing some time it pushes outward, rupturing the skin.

## TREATMENT.

Use Bordeaux Mixture (Spray No. 4) as directed. Destroy all refuse fruit and rubbish.

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## POWDERY MILDEW OF THE APPLE.

This fungus differs materially from the species affecting the apple and pear just discussed. Its vegetative system, instead of growing on the inside of the host, is almost wholly external and obtains its nourishment by means of suckers, which it sends into the cells of the leaf or stem, as the case may be. It covers the affected parts of its host with a grayish, powdery, meat-like growth—hence the name, powdery mildew.

## REMEDIES.

Spray the affected trees or seedlings with the Bordeaux Mixture, or with the ammoniacal solution of copper carbonate, first when the leaves are about half grown (or sooner if there is any sign of the fungus) and thereafter at intervals of twelve days. From three to five sprayings will be necessary.

## GOOSEBERRY MILDEW.

This disease can be effectually treated by using either ammoniacal copper carbonate or Bordeaux Mixture, but as potassium sulphide (lime of sulphur) serves the same purpose, is somewhat cheaper and more easily prepared, it is therefore recommended here.

Treatment should commence with the first signs of growth and continue at intervals of ten or twelve days till five or six applications are made.

## POTASSIUM SULPHIDE.

Dissolve one-half ounce of potassium sulphide (lime of sulphur) in one gallon of hot water. When cold apply in a spray. Used to prevent gooseberry mildew and similar diseases. Commercial lime of sulphur costs fifteen to twenty cents per pound.

## SODA HYPOSULPHITE.

Dissolve one-half ounce or one ounce soda hyposulphite in ten gallons of water. This is recommended by some for gooseberry mildew and apple scab, but it is not in general use.

## RASPBERRY MILDEW.

(*Erysiphe Rubi.*)

Has been found in Victoria, causing the death of infected plants.

It is recommended to use Bordeaux Mixture (Spray No. 4) during the growing season on the young canes, commencing in the spring, and at intervals of two or three weeks.

## CURL LEAF OF THE PEACH.

This has been proved to be the work of a parasitic fungus, working in the tissues of the leaf, on the shoots and in the buds.

In Oregon a thorough application of Spray No. 1, three or four weeks before the buds open in the spring, has been found an effectual preventative. During the summer, infected leaves and shoots should be cut off and burnt.

## PEAR LEAF BLIGHT.

(*Entomosporium maculatum.*)

This is probably the most generally destructive fungus disease to which the pear is subject. It does not confine its attention to the foliage, but attacks also the stems and fruit. The latter is at first covered with reddish pimples, which finally become blackened and rough, and usually cause the pear to crack open in such a manner as to ruin the fruit.

## REMEDIES.

Spray with Bordeaux Mixture (No. 4) in the manner recommended for apple scab, or the Carbonate of Copper Spray (No. 10.)

## PLUM ROT.

(*Monilia fructigena*)

This is a fungous disease affecting plums, cherries and other stone fruits. The fruit at first turns brown in one or two spots, these gradually enlarge, until, finally, the whole becomes brown and rotten. The diseased fruit usually continues to hang upon the tree, gradually drying up.

## TREATMENT.

Early in the winter pick off and burn all mummied plums, and follow this with Bordeaux Mixture. Spray first before the blossoms open, repeat when the fruit is well formed, and again two or three weeks later.

## BLACK KNOT.

(*Flowrightia morbosa.*)

It is noticeable that Prof. Farlow, of Harvard University, has successfully used red oxide of iron with linseed oil as a paint to destroy black knot on plum trees. Would not a liberal dressing of copperas around our plum and cherry trees fortify them to some ex-

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tent against the attack of fungus by absorbing some of the iron, or would plum or cherry trees not absorb it?

Again, would not iron sprayed on the trees in the early spring, before the foliage appears, be destructive to the fungus spores which might be blown upon them? SUBSCRIBER.

The plum and cherry trees would not be likely to absorb a sufficient quantity of iron to prevent the spores of the black knot from growing upon them, for trees will not take up more than a certain amount of this element from the soil, even though it be very abundant there; but spraying the trees with sulphide of iron in early spring has not only been highly recommended, but has proved itself to be a valuable remedy for black knot. This substance is used in the proportion of one pound to twenty-five gallons of water, and, although too strong to be applied when the foliage has developed, it can safely be applied when the trees are yet in bud, and will serve to destroy, not only a large number of spores of the black knot, but also of the scab, mildew, rust and other fungi.

#### KEROSENE FOR BLACK KNOT.

My next door neighbor had several plum trees bearing fine fruit, and all died covered with knots; but before dying I had secured a few sprouts and had some fine young trees, on which, when they were about six feet high, knots began to break out on the trunks, some six inches long. Having filled a small sewing machine oil can with coal oil, I gave the knots a dose; they stopped growing, but in about a month a few more made their appearance and some old ones began to swell again, then another dose finished them. The next year (last summer) a few spots appeared, they were treated before they broke out, and all the trees are now very thrifty, only scarred where the large knots were, all the knots died and fell off like loose bark, leaving dead spots over which the new bark is growing. If the trees are very badly affected, it is better to cut them down, they are so unsightly. The oil does not seem to have any bad effect on the sound part of the tree; but, like all other medicine, too much might be injurious, but I'd rather kill trying to save than let the disease have its way.—  
R. N. Y.

#### THE APPLE TREE BARK DISEASE.

A peculiar disease, the nature of which, as will be seen from the copy of Mr. Fletcher's letter below, is not at present understood. Complaints come from Messrs. W. H. DeWolf and J. Howe Bent, who are planting out a large orchard at Chilliwack (see copy of their letter). From Mr. H. D. Green-Armytage, of Nicola, who says:—

"The apple trees seem invariably to be injured in such a manner that part of the wood in the stem dies, and in time kills the whole tree." From Mr. Henry Woodward, of Alberni, who says :— "Apple trees are liable to a bad disease which affects the bark." These complaints probably all refer to the same disease.

"WOLFDALF FARM, CHILLIWACK,  
26th December, 1891.

*To the Department of Agriculture, Victoria, B. C. :*

Gentlemen,—We send by to-day's mail a small box containing a few pieces of limbs cut from our apple trees, showing how some kind of an insect is doing harm to our trees, and in some instances has killed the branch or small tree, where it has stopped the circulation of the sap.

From the appearance of the tree it looks as if an insect of some kind stung the bark and sucked out the sap.

You will also find enclosed in the box a small bottle containing a few insects we found in the holes, but we cannot say whether these are the insects that do the work, or if they are some other kind that have crawled into the holes for protection from the weather, but we presume these are the insects, as we found them on several trees.

They do not attack the old trees except in the branches, where the bark is smooth, but in the young trees they go for the trunk and branches also, and in some instances have almost girdled the young trees.

We would be glad if you will look into the matter and let us know if there is any remedy to prevent them from destroying the trees.

Yours respectfully,

W. H. DEWOLF,  
J. HOWE BENT."

"CENTRAL EXPERIMENTAL FARM,  
OTTAWA, 9th January, 1892.

*James R. Anderson, Esq.,  
Victoria, B. C.*

My Dear Sir,—I am in receipt of yours of 26th ult., enclosing letter from Messrs. W. H. DeWolf and J. Howe Bent, of Wolfdale Farm, Chilliwack, B. C. The specimens of injured apple stems are also to hand. This injury has been submitted to me three or four times before from different parts of your Province—Harrison Hot

Springs, Cowichan, Departure Bay, &c. I regret to say that I cannot give you much information about it. I have submitted specimens to specialists in the United States, but so far they have given me no light on the subject which is of practical use. Prof. Burrill, of the University of Illinois, finds an undescribed species of microscopic fungus on the wounds, but it belongs to a family not previously known to be injurious. One thing, however, is certain that the caterpillars enclosed with the specimens are in no way connected with the injury; these are caterpillars of tussock moths, which feed on the leaves, and they had only crawled to the holes in the bark to pass the winter. It is a habit with many insects to pass the winter when half grown in the larval condition, and several kinds do this on the trunks of trees and beneath mosses and lichens growing thereon. These caterpillars are dead, but I am able to recognize them by the beautiful barbed hairs and a gland on the back. In sending insects by mail alive it is best to send them in a tin box. Moisture gathers inside a tightly corked glass bottle and drowns the enclosed insects. If your correspondents would send me a few more of these caterpillars I should be much obliged for them; they might be packed in a tin box without any holes, and a piece of moss put in with them would prevent their being injured in transit. I will endeavor to find out more about the fungus disease, and will write to you again on the subject.

I am, &c..

JAMES FLETCHER,

*Dominion Entomologist.*"

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Mr. N. Butchart, Port Moody, gives the Fruit Growers' Association the following as preventive and cure, having been tested for three years by a neighbor, Mr. Coltie.

Cut out all dead spots as they appear, using grafting wax to cover the wounds. While the trees are dormant wash the trunks and large limbs with this solution: 1 pound of Gillett's concentrated lye to five gallons of water; also spray the smaller limbs with solution, 1 can of lye to ten gallons of water.

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Mr. R. M. Palmer sends the following: The disease or condition of the bark of apple trees known as "Black Spot of the Bark" is very common, especially on the lower mainland.

It is found under widely varying conditions, usually doing most harm in young orchards having a southern or eastern aspect, and especially where, from the nature of the situation, such as the lower portion of a slope, water from higher elevations is constantly perco-

lating through the soil. But it is also noticeable as occurring on perfectly flat land and on high, gravelly ridges.

In the majority of cases a complete system of underdrainage to a depth of not less than three feet should be laid down. Where this has already been done or natural underdrainage exists, a sound, healthy growth should be maintained in the trees by supplying to the soil liberal dressings of lime and wood ashes or muriate of potash. Barn yard manure should be used very cautiously, as it stimulates wood growth, and excessive wood growth evidently renders the trees more subject to the disease, especially if the new wood is not well ripened in the fall.

I have noticed in many cases that trees were planted too deeply; it should be borne in mind that the roots of trees need air and warmth as much as the branches. If land is at all wet it is preferable to ridge up the soil and plant well on the surface, and throw the soil up to the roots.

Certain varieties of apples having hardy constitutions are not so liable to succumb to the disease as others. I have found the Canada Reinette, Yellow Belleflower, Lemon Pippin and Northern Spy very good in this respect.

As certain forms of fungous growth are found on diseased trees, Spray No. 1 should be used in the dormant season and Bordeaux Mixture during the summer. When pruning, care must be taken to disinfect the knife used on an infected tree before using it on sound trees, by passing the blade through a flame of fire.

Do not propagate from infected trees, and in buying fresh stock, get it from a nursery free from the disease.

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#### INJURIES FROM MICE, RABBITS, SQUIRRELS, AND BIRDS, WITH PREVENTIVES AND REMEDIES.

##### TO PREVENT MICE FROM GIRDLING TREES IN WINTER.

In healing-in young trees in the fall, do not use straw or litter, in which mice can make their nests. In orchards, see that tall grass, corn-husks, or other dry material does not gather about the trees in the fall. If danger from mice is apprehended, tramp the first snow firmly about the trees, in order to compact the grass and litter so that mice cannot find shelter. Where the paper-birch grows, it will be found a good plan to place sections of birch-bark from limbs or small trunks about the base of the tree. These sections roll up tightly about the tree, and yet expand so readily with the growth of the tree that they may be allowed to remain. Tie thin strips of wood, as laths or shingles, about the tree.

## WASHES TO PROTECT TREES FROM MICE.

Wash the trees with some persistent substance in which is placed Paris green. Maynard finds the following substances useful for holding the poison: Portland cement of the consistency of common paint; Portland cement ten parts and gas-tar one part; Portland cement ten parts and asphaltum one part; Portland cement ten parts and Morrill's tree-ink one part.

Lime-wash, to which is added a little sulphur, tobacco-decoction, and soap-suds.

## WASH FOR KEEPING RABBITS, SHEEP, AND MICE

## AWAY FROM TREES.

Fresh lime, slaked with soft water (old soap-suds are best); make the wash the thickness of fence or house wash. When one peck of lime is used, add when hot half a gallon of crude carbolic acid, half a gallon of gas-tar, and four pounds of sulphur. Stir well. For summer wash leave gas-tar out, and add in place of it one gallon of soft soap. To keep rabbits and sheep from girdling, wash late in the fall, or about the time of frost, as high as one can reach.

## TO REMEDY THE INJURY DONE BY MICE AND RABBITS.

1. Pare and clean the wound, and cover it thickly with fresh cow-dung, or soft clay, and bind it up thoroughly with a cloth. Grafting-wax bound on is also good. Complete girdling, when done late in the spring—when settled weather is approaching—can be remedied in this manner.

2. Insert long scions over the wound, by paring them thin at both ends and placing one end under the bark at the upper edge of the wound and the other under the bark on the lower edge. Wax thoroughly the points of union, and tie a cloth band about the trees over both extremities of the scions.

## MOSS ON TREES.

Moss on trees is usually an indication of lack of vigor. Cultivate and prune. Wash the trees with soap or lye washes. Scrape off the bark, taking care not to expose the "quick" or the tender inner bark. A good scraper is made of a small and much-worn-hoe with the handle cut to about two feet long.





## PROVINCIAL BOARD OF HORTICULTURE.

Rules and Regulations made and published under authority of Section 7 of the "Horticultural Board Act, 1894," and of the Amendments thereto.

### CONSOLIDATED FOR CONVENIENCE.

#### TITLE.

1. These Regulations may be cited as the "Horticultural Regulations."

#### DEFINITION OF PESTS.

2. In these Regulations the words "pests" shall mean and include woolly aphis, apple tree aphis, scaly bark louse, oyster-shell bark louse, San Jose scale, red scale, borers, codlin moths, currant worms, or other known injurious insects, and all fungous diseases.

#### NOTIFICATION OF THE PRESENCE OF PESTS.

3. All nurserymen, fruit growers, and all persons owning, occupying, or managing an orchard, garden, or nursery infested with any pest, shall notify the member of the Board for the district in which such orchard, garden, or nursery is located, or the Secretary or Inspector, or the agent of the Board in the district, of the fact that such orchard, garden, or nursery is so infected.

#### INSPECTION OF NURSERY STOCK.

4. All importers of nursery stock, trees, or plants must give notice to a member of the Board of Horticulture, or his agent, or the Inspector of Fruit Pests, upon the arrival of any nursery stock, trees, or plants before the removal of such nursery stock from any dock, wharf, mole, station, or warehouse where such nursery stock, trees, or plants have been landed, and if such nursery stock, trees or plants are found to be free of insect pests and fungous diseases, the said member of the Board, his agent, or the Inspector of Fruit Pests, shall issue a certificate to that effect; and all such nursery stock, trees or plants, if found to be infected with any insect pest or fungous disease, shall be dealt with according to the Rules

and Regulations of the Board. All dealers, nurserymen, or persons selling or distributing nursery stock, trees, or plants for which no clean certificate is in force shall, before distributing or offering for sale any article above mentioned, notify the member of the Board, his agent or representative, in whose district any such article is found, or the Secretary of the Board, or the Inspector of Fruit Pests, who shall inspect or cause to be inspected such nursery stock, trees, or plants, and if they are found to be free from pests shall issue a certificate to the owner or person in charge, stating that said articles appear to be free from pests. Such certificate shall be in force for three months from date of issue, unless revoked by further inspection.

#### DISINFECTION OF NURSERY STOCK, TREES, AND PLANTS.

5. All persons owning or having in their possession nursery stock, or trees and plants of any kind, infested with insect pests or fungous disease, shall cause the same to be disinfected and cleansed by using the remedies herein prescribed, or such other insecticides and fungicides as may be found effective, and are approved of by a member of this Board or the Inspector of Fruit Pests, and no such infested nursery stock, trees or plants shall be sold, forwarded, distributed, or parted with until a certificate of the satisfactory cleansing thereof shall have been obtained from a member of this Board, or his agent, or the Inspector of Fruit Pests. Any member of the Board or the Inspector of Fruit Pests may order the destruction, by rooting out and burning, all infected nursery stock, trees, or plants of any kind, if, in the opinion of such member of the Board or Inspector of Fruit Pests, such a course is considered expedient in the interests of the fruit-growing industry.

#### INSPECTION OF IMPORTED FRUIT.

6. All importers of fruit must give notice to a member of the Board of Horticulture or his agent, or the Inspector of Fruit Pests, upon the arrival of any and all shipments of fruit; and all fruit and fruit packages imported into this Province shall be inspected, and if found to be free from insect pests and fungous disease a clean certificate shall be issued therefor in conformity with the Rules and Regulations of the Provincial Board of Horticulture: Provided, however, that no fruit or fruit packages imported into this Province shall be removed from any dock, wharf, mole or station where such fruit and fruit packages have been landed, before inspection and such clean certificate thereof shall have been obtained, and all such fruit and fruit packages as may be found infested with any insect pest or fungus disease shall be either destroyed by the importers thereof by such process as any member of this Board, the Inspector of Fruit Pests, or any agent appointed by this Board may direct, or shall be reshipped

by the importers thereof to the country from whence such infested fruit was exported.

INSPECTION OF IMPORTED AND HOME-GROWN FRUIT.

7. All fruit, whether imported or grown in this Province, or exposed for sale, shall be subject to inspection under the authority of this Board, and if found to be infected with any injurious insect pest or the larva thereof, shall be quarantined or may be destroyed at the expense of the owner of said fruit by such method as the Board or its agents may direct.

STENCILLING AND LABELLING.

8. All persons shipping, sending, or delivering any fruit, fruit trees, scions, cuttings, or plants within the Province shall place upon or securely attach to each box, crate, or other package or parcel containing the same, a distinct stamp, mark, or label showing the name of the producer and shipper or sender, and the locality where grown, but boxes and barrels containing fruit shall be stencilled or stamped with letters not less than three-quarters of an inch in length.

TREATMENT OF NURSERY STOCK.

9. All infected nursery stock shall, before being distributed, be disinfected by dipping in a solution of one pound caustic soda (concentrated lye) and one pound whale-oil soap to every five imperial gallons of water, thoroughly dissolved, and applied at 103 deg. Fahrenheit in a vat or any suitable vessel, or the said nursery stock may be disinfected by covering with an air-tight tent or box, and for each and every 100 cubic feet of space therein one ounce of fused cyanide of potassium (58 per cent.) one fluid ounce of sulphuric acid, and two fluid ounces of water shall be used. The cyanide of potassium shall be placed in an earthenware vessel, the water poured over the said cyanide of potassium, afterwards adding sulphuric acid, and the tent or box to be immediately closed tightly and allowed to remain closed for not less than forty minutes. Treatment for disinfection shall continue until all insect pests or their larva are destroyed.

REMEDIES.

10. For the extirpation of the "woolly aphis" and other insect pests, the Board of Horticulture has adopted the following formula, which are found to be effectual in the States of California, Oregon, and Washington:—

SPRAY NO. 1.

(Winter Spray for Woolly Aphis and Scale Insects.)

INGREDIENTS.

Lime, unslacked.....	30 lbs.
Sulphur, powdered.....	20 "
Salt, coarse.....	15 "
Water.....	60 gals.

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DIRECTIONS.

Place 10 pounds of lime and 20 pounds of sulphur in a boiler with 20 gallons of water, and boil over a brisk fire for two hours, until the sulphur is thoroughly dissolved. It will then be amber-colored. Next place 20 pounds of lime in a cask and pour water enough over it to thoroughly slack it. Add the salt. When dissolved, add to the lime and sulphur and boil half an hour longer. Add water enough to make 60 gallons. Apply lukewarm.

DIRECTIONS FOR USE.

Spray when the trees are dormant, or as soon as the leaves fall, and again in the spring before the buds swell. A good force-pump should be used, and care must be taken to thoroughly cover the infected trees with the mixture, which should be constantly stirred when applying.

SPRAY NO. 2.

(For the Woolly Aphis and Scale Insects.)

INGREDIENTS.

Sulphur.....	100 lbs.
Lime.....	100 "
Blue vitriol .....	8 "

DIRECTIONS.

Place 100 lbs. sulphur and 80 lbs. lime in a boiler with about 100 gallons water, and boil slowly until the sulphur is thoroughly dissolved. Dissolve 8 lbs. blue vitriol in hot water, add to the remainder of the slacked lime, and mix the whole together. This mixture will keep any length of time. When ready to spray take one pound of the mixture to two and one-half gallons of hot water, for winter use, applying lukewarm. This formula may be used for a summer spray by using one pound of the mixture to 8 or 10 gallons of water.

DIRECTIONS FOR USE.

Spray when the trees are dormant, or as soon as the leaves fall, and again in the spring before the buds swell. A good force-pump should be used, and care must be taken to thoroughly cover the infected trees with the mixture.

FOR CODLIN MOTH.

To the amount of ingredients given, add one-half pound Paris green and one-half pound London purple, and water enough to make 300 gallons. In mixing Paris green, first mix it with water to the consistency of a paste before adding to the mixture, and keep constantly stirred when applying.

## SPRAY NO. 3.

(Summer Remedy for San Jose Scale and Woolly Aphis.)

## INGREDIENTS.

Whale oil soap, 80 per cent.....	20 lbs.
Sulphur .....	3 "
Caustic soda (strength 98 per cent) ..	1 "
Commercial potash.....	1 "
Water to make .....	100 ga's.

## DIRECTIONS.

Place the sulphur, potash, and caustic soda together in about two gallons of water, and boil for at least half an hour, or until thoroughly dissolved. Dissolve the soap in a vessel by boiling, mix the two and boil for a short time. Apply when about 130 degrees Fahrenheit in the vessel, as it cools rapidly when applying.

## SPRAY NO. 4.

(Bordeaux Mixture for Apple-scab and all Fungous Diseases.)

## INGREDIENTS.

Sulphate of copper (bluestone).....	4 lbs.
Unslacked lime.....	4 "
Water .....	50 gals.

## DIRECTIONS.

Dissolve the sulphate of copper in 4 gallons of hot water. Slake the lime with 6 gallons hot water, and when cool strain through a coarse gunny sack into the dissolved bluestone, and add water to make 50 gallons. When applying, keep constantly stirred, using a force pump with special nozzle. The first application should be made as soon as the fruit is gathered in the fall, a second application early in the spring when the buds are swelling, and a third application after the blossoms have fallen, repeating again at intervals of two or three weeks until fruit attains the size of a walnut.

The above preparations, Sprays Nos. 1, 2, 3, and 4, can be obtained in solid form, requiring only the addition of water to be ready for use, and owing to the difficulty of preparation the Board advises the adoption of this method. Care should be taken to add the necessary quantity of water to reduce the mixture to the strength recommended above.

## SUMMER SPRAYING.

11. Where pests or fungous diseases are found to exist during the growing season, while the trees are in leaf, spraying must be done and such remedies applied as shall be recommended by or under



authority of the Board from time to time, so that the insects or diseases can at least be held in check until the stronger washes of the dormant season can be safely applied.

DESTRUCTION OF PACKAGES.

12. All boxes, crates, or other packages or wrappings which have contained infected nursery stock shall be destroyed by fire immediately after the removal of the contents thereof.

HOP-FIELDS.

13. Where hop-fields are infected with the hop-louse, spraying must be done as the Board from time to time shall recommend.

PENALTIES.

14. Every person violating the provisions of the "Horticultural Board Act, 1894," or any amendments thereto, or the rules and regulations adopted by the Provincial Board of Horticulture, is liable, upon summary conviction before a Justice of the Peace, to a penalty not exceeding fifty dollars for each offence.

REPEALING FORMER RULES AND REGULATIONS.

15. All Rules and Regulations heretofore adopted and published under the authority of the "Horticultural Board Act," or any amendments thereto, are hereby repealed and the foregoing Rules and Regulations substituted in lieu thereof

INSPECTION AT POINTS OTHER THAN QUARANTINE STATIONS.

16. Importers or owners of nursery stock, trees or plants desiring to have such nursery stock, trees or plants inspected at points other than regular quarantine stations may have such inspection done where required, provided, however, that such importers or owners shall pay all charges of inspection and expenses of the officer employed in such inspection. Such charges and expenses to be paid before a certificate is granted.

QUARANTINE REGULATIONS.

17. STATIONS.

QUARANTINE OFFICERS.

Victoria .....	{	The Inspector of Fruit Pests, any member of the Board, and E. A. Carew-Gibson.
Vancouver, New Westminster, and Liverpool	{	T. Cunningham, any other member of the Board, and the Inspector of Fruit Pests.
Nanaimo .....	{	G. H. Holmes, any member of the Board, and the Inspector of Fruit Pests.
Comox.....	{	Geo. H. Roe, any member of the Board, and the Inspector of Fruit Pests.

STATIONS.	QUARANTINE OFFICERS.
Mission City.....	{ G. W. Henry, any member of the Board, and the Inspector of Fruit Pests.
Vernon .....	{ Isaac E. Haun, any member of the Board, and the Inspector of Fruit Pests.
Osoyoos.....	{ W. H. Bullock-Webster, any member of the Board, and the Inspector of Fruit Pests.
Kettle River.....	{ R. R. Gilpin, any member of the Board, and the Inspector of Fruit Pests.
Golden .....	{ F. C. Lang, any member of the Board, and the Inspector of Fruit Pests.
Fort Steele.....	{ R. L. T. Galbraith, any member of the Board, and the Inspector of Fruit Pests.
Nelson .....	{ Charles St. Barbe, any member of the Board, and the Inspector of Fruit Pests.

Transportation companies or persons and consignees or agents shall deliver and cause to be detained all nursery stock, trees, plants, and fruit, at one or other of the quarantine stations for inspection, as provided by the Rules and Regulations of the Board. A quarantine officer may also, if in his opinion such a course is necessary, detain any nursery stock, trees or plants, for the purpose of disinfection, at a quarantine station, until such quarantine officer is satisfied that all infection is removed.

#### INSPECTION FEES.

18. The fees for inspection of apple, pear, plum, and cherry trees shall be as follows:

On all consignments numbering—

Under 100 trees.....	\$2 50
100 trees and under 250.....	3 50
250 " " 500.....	4 50

And for every additional 500 trees or fraction thereof over 500, \$1.00 additional.

For other nursery stock the fees shall be as follows:—

\$2.50 on \$25.00 in value, or fraction thereof.

\$3.50 on any consignment over \$25.00 and up to \$50.00 in value ; and 5 per cent. additional on the value over \$50.00.

When nursery stock, trees or plants are found to be infected with insect pests or diseases, a charge of 50 per cent. will be added to the foregoing rates to pay expenses of the quarantine officers for supervising disinfection and subsequent inspections.

On fruit, viz.:—

Apples, pears, and quinces, the minimum fee shall be \$1.00 on any sum up to \$35.00, and 3 per cent. on any sum over \$35.00 in value.

Certified invoices will be required.

RECOMMENDATIONS.

Horticultural and Agricultural Societies and all those interested in advancing and protecting the interests of fruit-growing are requested to co-operate with the Provincial Board of Horticulture in the enforcement of the provisions of the "Horticultural Act" and the regulations thereunder as adopted by this Board.

CORRESPONDENCE.

All correspondence relating to the extirpation of fruit pests should be addressed to the Inspector of Fruit Pests or the member of the Board whose district may be affected. Correspondence relating to other matters should be addressed to the Secretary of the Board.

By Command,

J. R. ANDERSON,

Secretary.

Office of the Provincial Board of Horticulture,  
Victoria, 6th May, 1895.

MEMBERS OF THE BOARD.

The Honourable the Minister of Agriculture.

Jas. R. Anderson, Deputy Minister of Agriculture.

Andrew Ohlson, of Lansdowne Road, Victoria District, to represent the First Horticultural District, which comprises Victoria, Victoria City, Esquimalt, and Cowichan Electoral Districts.

Theodore Trage, of Beaver Point, Salt Spring Island, to represent the Second District, which comprises Nanaimo, Nanaimo City, Alberni, Comox, and the Island Electoral Districts.

Henry Kipp, of Chulivack, to represent the Third District, which comprises all that portion of the Westminster Electoral District situated to the south of the Fraser River.

Thomas Cunningham, of the City of New Westminster, to represent the Fourth District, which comprises the New Westminster City and Vancouver City Electoral Districts, all that portion of the Westminster Electoral District situated to the north of the Fraser River and the Cassiar Electoral District.

Thomas G. Earl, of the town of Lytton, to represent the Fifth District, which comprise all the rest of the Mainland of British Columbia not mentioned heretofore.

INSPECTOR OF FRUIT PESTS.

R. M. Palmer.