

**CIHM
Microfiche
Series
(Monographs)**

**ICMH
Collection de
microfiches
(monographies)**



Canadian Institute for Historical Microreproductions / Institut canadien de microreproductions historiques

© 1997

The copy filmed here has been reproduced thanks to the generosity of:

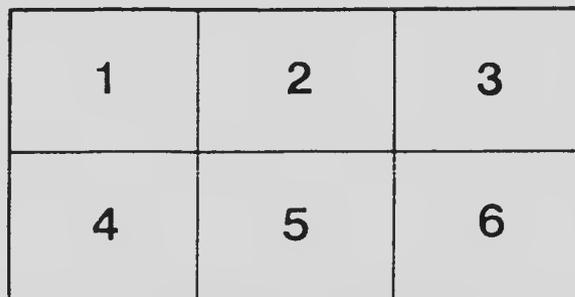
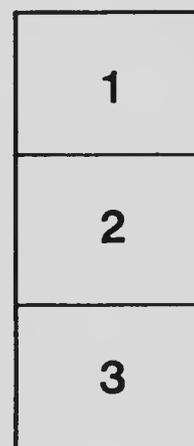
Library
Agriculture Canada

The images appearing here are the best quality possible considering the condition and legibility of the original copy and in keeping with the filming contract specifications.

Original copies in printed paper covers are filmed beginning with the front cover and ending on the last page with a printed or illustrated impression, or the back cover when appropriate. All other original copies are filmed beginning on the first page with a printed or illustrated impression, and ending on the last page with a printed or illustrated impression.

The last recorded frame on each microfiche shall contain the symbol \rightarrow (meaning "CONTINUED"), or the symbol ∇ (meaning "END"), whichever applies.

Maps, plates, charts, etc., may be filmed at different reduction ratios. Those too large to be entirely included in one exposure are filmed beginning in the upper left hand corner, left to right and top to bottom, as many frames as required. The following diagrams illustrate the method:



L'exemplaire filmé fut reproduit grâce à la générosité de:

Bibliothèque
Agriculture Canada

Les images suivantes ont été reproduites avec le plus grand soin, compte tenu de la condition et de la netteté de l'exemplaire filmé, et en conformité avec les conditions du contrat de filmage.

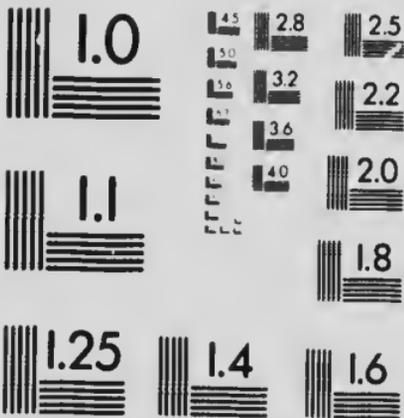
Les exemplaires originaux dont la couverture en papier est imprimée sont filmés en commençant par le premier plat et en terminant soit par la dernière page qui comporte une empreinte d'impression ou d'illustration, soit par le second plat, selon le cas. Tous les autres exemplaires originaux sont filmés en commençant par la première page qui comporte une empreinte d'impression ou d'illustration et en terminant par la dernière page qui comporte une telle empreinte.

Un des symboles suivants apparaîtra sur la dernière image de chaque microfiche, selon le cas: le symbole \rightarrow signifie "A SUIVRE", le symbole ∇ signifie "FIN".

Les cartes, planches, tableaux, etc., peuvent être filmés à des taux de réduction différents. Lorsque le document est trop grand pour être reproduit en un seul cliché, il est filmé à partir de l'angle supérieur gauche, de gauche à droite, et de haut en bas, en prenant le nombre d'images nécessaire. Les diagrammes suivants illustrent la méthode.

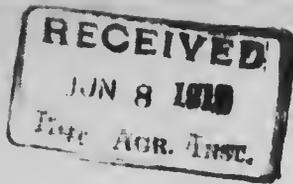
MICROCOPY RESOLUTION TEST CHART

(ANSI and ISO TEST CHART No. 2)



APPLIED IMAGE Inc

1651 East Main Street
Rochester, New York 14609 USA
(716) 482-0300 - Phone
(716) 288-5989 - Fax



CIRCULAR No. 20.

(Printed by order of the Legislature.)

PROVINCE OF NOVA SCOTIA.

COLLEGE OF AGRICULTURE.

TRURO, N. S., 1917.

M. CUMMING,
PRINCIPAL.

H. W. SMITH,
PROF. OF BOTANY

DISEASES OF FRUIT PLANTS.

CONTENTS

- Sprays and Fungicides.
- Sulphur Dusting.
- Apple Diseases.
- Wounds of Trees.
- Polyporus, Brown Rot of Wood.
- Bacillus amylovorus, Blight, Fire Blight.
- Blackberry and Raspberry Diseases.
- Cherry and Plum Diseases.
- Currant Diseases.
- Gooseberry Diseases.
- Pear Diseases.
- Strawberry Diseases.
- The Winter Care of Fruit Trees.
- Early Spring Care of Fruit Trees Till Apples Blossom.
- Later Spring Care of Fruit Trees.

DISEASES OF FRUIT PLANTS.

H. W. Smith.

Nearly all the recognized diseases of plants are due to the growth of parasitic plants; a few diseases are rare and are due to some physiological cause and some to unknown causes. This article will deal chiefly with diseases due to parasitic plants.

When a plant appears unhealthy and an attempt is undertaken to find the cause the fruit grower should first make sure that it is not due to climate, soil, culture or situation. He should then look for injuries from animals, particularly insects and finally for a disease, as the disease is usually the most difficult to detect. As the symptoms of disease in fruits are so many and various no attempt will be made to summarise them here but rather the following directions are offered as probably the most efficient for an inexperienced fruit grower. The experienced fruit grower will be familiar with the healthy appearance of the plant and will notice the unusual or unhealthy growth. It is suggested that where a disease is suspected that the fruit grower look up the different symptoms of each of the different diseases till he finds those that corresponds to those present on his plants. It is to be borne in mind however that these symptoms are not present except at certain seasons and that their absence is to be so interpreted till the proper time for them to appear. Also it is to be remembered that diseases may occur that are not here recorded nor in any text available to our fruit growers. Where the grower is unable to determine the trouble satisfactorily he should appeal to the Agricultural College or The Experimental Farms at Ottawa. Even then a satisfactory answer may not be forthcoming. It is not always easy or possible to solve these problems.

For convenience the plant under cultivation is called the host and the plant causing the disease is the parasite. The latter is relatively small and often entirely inside of the host and not visible except where it sends special parts to the surface for reproduction. Sometimes the parasite may be external and conspicuous. As a rule plants thus causing disease are fungi (including Bacteria) and the special reproductive bodies are very minute and of various kinds depending on how they are produced. In general, these are called spores.

If none of these parasitic plants occurred in a locality then there would be no disease which would spread from plant to plant in that locality. While such an ideal condition does not exist with us, there are localities free from certain plant diseases just as localities may be free from certain contagious diseases among mankind. It is important to keep all diseases possible out of each locality. To do this all unhealthy plants, parts of plants and prunings from imported stock should be burned. Also it is evident that healthy plants are less likely to become diseased than unhealthy and every effort should be made to keep the fruit plants healthy by selecting suitable soil, situation and exposure, by proper cultivation and treating the plants the same each year, especially by avoiding excessive culture one year and giving none another year, (or the next year) by avoiding excessive fertilization as with nitrates or soluble fertilizers but rather by applying moderate amounts each year. Finally diseases in the main are to be prevented. The purpose of spraying is to prevent the spread of diseases. It will not kill the disease where it has become established. There is no known cure for plant diseases in the sense used for animal diseases. In some cases the disease may be removed with part of the plant but the important treatment is prevention. For this purpose spraying the healthy plants or parts with some application is often beneficial. As spraying will be treated in other articles in this series the reader is referred to them for further information except a few suggestions which might be overlooked. Plenty of lime in the Bordeaux mixture is desirable.

Sprays and Fungicides.

Bordeaux Mixture: This is prepared by dissolving one pound of quick lime in a little water and adding gradually more water to this and straining through cloth till the solution amounts to about nine gallons. In another vessel dissolve one pound of blue vitriol (copper sulphate) in nearly a gallon of water. This is more easily done if the water is hot and the salt is suspended in a cloth near the surface of the water. Cool this solution and add it to the lime solution with constant stirring. Use only wooden utensils. This mixture should be used soon after mixing the two solutions and should be kept well stirred. There are many published methods of making this mixture. One method is about as good as another providing that one of the solutions or both are as dilute as possible.

Bordeaux mixture was the earliest used and in general has proven the best spray. It was the spray that demonstrated the value of spraying to control plant diseases.

Lime-Sulphur: This is the most convenient spray to use, as it is prepared so that all that is necessary is to follow the manufacturer's directions but it is only suitable for certain crops as the fruits and should not replace Bordeaux mixture for potatoes nor for other crops except where it has been demonstrated to be as good. Always use lead arsenate in this spray as it increases its fungicidal value.

Corrosive Sublimate.—This solution is prepared by dissolving one ounce of mercuric chloride (Corrosive sublimate) in six or seven gallons of water. Use wooden utensils.

Formaldehyde (Formalin).—This solution is prepared by adding one pound of formaldehyde of about forty per cent strength to thirty gallons of water or one part to three hundred parts of water.

Copper Sulphate (Blue Vitriol).—One pound is dissolved in fifteen gallons of water as directed under Bordeaux mixture.

Potassium Sulphid.—One ounce is dissolved in two and a half gallons of water.

Caution.—The above reagents are all poisonous and the utmost care should be exercised that the solutions and the utensils used in their preparation are not left where they may be accessible to live stock nor to persons unacquainted with them.

Sulphur Dusting.

The attention of the fruit grower is called to the method of dusting trees with a mixture of very fine sulphur and dry "fluffy" lead arsenate using eighty five pounds of sulphur to fifteen of the poison. This material can be diluted with terra alba. Where this dry material is properly mixed and applied it has been found as efficient and much cheaper than liquid sprays and not only more easily used but more rapid in application and capable of being applied when needed. It promises a great step in advance in the control of fungus diseases in the orchard. In rainy seasons apply the dust once a week.

With the great increase in the cost of spray materials, it becomes important to utilize every other method of disease control. This can not be over emphasized. It does not mean, however, that no spraying should be done. Quite

the contrary. But what is more important than ever, it should be done intelligently.

Apple Diseases.

Cankers.—These are caused by a number of different diseases and where a canker is discovered the reader is advised to examine those descriptions occurring under the following diseases:

- Blight cankers on twigs, branches and trunk.
- European canker, on branches and trunk.
- Coral canker, chiefly on twigs and branches.
- Blister canker, on twigs, branches and trunk.

Black rot cankers, while occurring on all parts are much more common on twigs than elsewhere.

Cankers should always be removed and not be allowed to remain on the tree to spread the disease. It is usually best to remove the entire limb on which a canker occurs but it can often be successfully cut out and the wound washed with a disinfectant.

Wounds of Trees.

The healing of wounds in fruit trees deserves further investigation. Much that is written about it seems based on theory rather than any extended observation. It has long been known to botanists that an injury to a healthy apple tree was followed by the formation of a layer of cork just under and parallel to the injured surface. This takes place in healthy living wood but so frequently in this climate the center of the stems and branches of apple trees is killed that entirely different methods may have to be resorted to. It seems fairly certain, however, that exclusive of grafting wax most if not all substance usually applied to wounds do more injury than good in promoting healing.

As a rule it would seem best to let the injury alone after reducing it as much as possible and trimming off any irregularities and washing it with an antiseptic like corrosive sublimate solution or cover it with grafting wax if the heart wood is dead.

While corrosive sublimate attacks metals and therefore should not be used to wash utensils, the injury is very slight to the knife used in trimming or pruning if it is wiped dry or rinsed with clean water when through using, nor does the dipping of the knife into the solution materially weaken it.

The pruner can easily carry a glass or porcelain dish or pail of granite ware with the solution in it when pruning and a wooden handle with a swab attached.

Sphaeropsis Malorum, Black Rot.—This disease causes (1) decay of fruit especially such as is left on the ground. (2) Spots on leaves, which are easily recognized, as they are definite, usually circular and do not spread to involve the entire leaf, but the dead center frequently drops out leaving a hole. (3) Canker on trunks, limbs, and twigs. The trunk and limb cankers are not common here but the twigs are frequently affected. Orchards in which the leaves are affected with the spots mentioned above and twigs affected with a rough bark are probably injured by this fungus. The characteristic leaf spots serve for identification, but these cankers are hard to distinguish from other cankers except by careful observation.

Treatment.—Burn all dead twigs and cankers. Use formalin or corrosive sublimate wash for utensils and wounds. Thus far this is not a serious disease in Nova Scotia but it is common. Thorough spraying with Bordeaux mixture as practised for scab with the aid of a winter spray of copper sulphate (or lime-sulphur) using one pound of the salt to 20 gallons of water, should help to control this disease.

Polyporus, Brown Rot of Wood.—Various Fungi which have fruit in the form of toad-stools, shelves or brown patches, attach fruit trees. Heart wood of such trees is dead, but the disease can not be identified till the Fungus fruits.

Treatment.—Usually nothing can be done but prevent the spread of the disease by destroying all the fruits of the fungus as soon as they appear.

Bacillus amylovorus, Blight, Fire Blight.—This disease also attacks plums and cherries and in certain seasons is very injurious to pears and apples. It attacks young twigs, blossoms and young fruit and older parts of the tree. The appearance of these attacked parts varies with the season. This disease may remain apparently dormant doing little damage for a number of years then in a single season prove very destructive.

As a rule it is not hard to distinguish the perennial cankers in this province as they are more characteristic than west of here, but the blossom and twig blight due to this disease is not easily distinguished from that due to other causes and without accompanying material and data, especially after drying and the death of the bacillus can not be

distinguished so far as I am aware. Hence the identifying of this disease in the twigs is dependent upon these other data.

The *Perennial or Older Cankers* are situated upon the trunk or older limbs, those over three years old and usually much older unless in a very protected situation. These cankers usually extend lengthwise of the limb of a uniform width and about one fourth or less of the circumference but this varies. This strip usually extends till the limb joins another and it is bordered by a slightly elevated bark. In moist weather this bark is spongy and markedly unhealthy. As the canker grows older the bark cracks along these strips and adjacent limbs become involved in the same way or the entire limb dies. On the large limbs and the trunk of older trees, the affected area may not extend along the part and in such a case the canker becomes rounded. Such cankers where I have had the opportunity to see and watch them, do not live many years. Unless the canker progressively extends each year into fresh tissues it dies and the tree recovers. While the greater number of pear trees attacked by these perennial cankers die the reverse is true of apple trees but the injury often renders them worthless. These perennial cankers are the source of future danger to the orchard as it is in them the disease lives from year to year and they annually take toll from twigs and blossoms. On or about the time the trees are in blossom if these cankers are examined in moist weather or late in the evening, in fog or heavy dew, the unhealthy spongy bark will be found saturated and often the liquid oozing from it. This sap is loaded with sugary material and the bacteria which cause the disease. While it is stated that this sap flows in the day time and is visited by flies and bees I have found nothing to confirm this in our climate and after spending many hours searching for these I accidentally found some of our transporters of this disease. I had been collecting moths in the evening from baited trees and went into the orchard to see if some could not be had from the apple blossoms. In passing near the cankers which I had so fruitlessly watched during the day I found them overflowing with sap and many moths, especially cutworm moths, Noctuidae, feeding upon it. These moths were also visiting the blossoms and would undoubtedly carry the bacteria with them.

Blossom and Twig Blight caused by this disease is not so easily recognized as the older cankers if we are to accept the commonly held view that most dead twigs are due to this disease. If a growing branch three years old or younger is

attacked by this disease in June or July, the bacteria develop so rapidly that the entire branch is soon killed and the leaves blacken and remain hanging to it. This is very characteristic of the disease, especially on pears where it is common and occasionally on apple, cherry and plum. Pear leaves are also blackened by leaf blight, but only the leaves are then affected and not the twigs. Apple leaves may also be blackened without the twigs being killed, by certain troubles. When the bacteria of this disease are conveyed to the blossoms then the blossom dies and the disease ends there or the infection enters the twigs and dies. If the fruit spur is on an older branch then a perennial canker develops.

Treatment.—This consists in removing all affected branches and older cankers. The bacteria do not live long outside of the older cankers but it is best to burn all the parts removed. The saw or knife or whatever comes in contact with the disease should be dipped into formalin solution before using upon the next tree and the wounds washed with this solution or corrosive sublimate as soon as through operating. Remove the disease as soon as it is discovered no matter at what season of the year. Examine for older cankers in winter and again during blossoming, and damp weather.

Nectria ditissima, European Canker.—These cankers occur most commonly on older limbs or trunks or in the crotches. They annually become larger and each year's growth is marked by a ring surrounding the canker, which is quite characteristic. The fruit of the fungus is often conspicuous in the early spring as small, round, yellow to brown bodies on the bark surrounding the canker.

Treatment.—Remove all cankers whenever discovered and burn. Use corrosive sublimate to wash the wounds. Spraying the trees with Bordeaux mixture is considered beneficial.

Nectria cinnabarina, Coral Canker.—This canker occurs chiefly upon twigs and branches and fruits very abundantly. These fruits are red to brown when dry but in moist weather they are a very bright coral red and often in clusters as large as a pea.

Treatment.—Remove and burn all affected twigs and branches.

Nummularia discreta, Blister Canker.—Specimens of this disease have appeared on nursery stock imported recently and on young trees. The cankers have the dead bark of the

affected area more or less retained and on this the fungus fruits giving its surface an appearance as if covered with pimples or blisters.

Treatment.—Remove and burn.

Pseudomonas tumefaciens, Crown Gall.—This disease occurs particularly on nursery stock and on garden vegetables occasionally. On nursery stock the name is so descriptive that little further description is required. It should not be necessary to state that only healthy stock and cion should be used by the nurseryman and that all diseased material should be burned but often crown galls appear only after being planted in the nursery row and the young tree otherwise seemed healthy enough. The galls are swelling or growths upon the stem where it was grafted or where injured in cultivating or sometimes where no apparent injury has occurred. It is when well developed, a nodular outgrowth.

Treatment.—Any material having an unhealthy growth upon it should be burned. If galls are found in the nursery the plants bearing them should be burned and a careful watch kept as other diseased plants are sure to appear. If it occurs commonly such ground should not again be used for nursery for some time. In no case should the galls be cut out and the knife used for further pruning until sterilized by dipping in formalin. In the orchard, affected trees should be removed but not replaced the same season by other trees. In every case these galls should be looked for in spring and again in summer and on large trees removed early in the season as they break down in autumn. They are light colored at first and become darker and more wood-like as the season advances.

Cylindrosporium Pomi, Fruit Spot.—A number of similar spots occur upon the apple from different causes. Hail occasionally marks the fruit and an obscure trouble called "Stippen" may occur but the most common trouble of this kind is due to a fungus, *Cylindrosporium Pomi*. When the fruit is mature a spot like a small round bruise is present and the affection extends towards the core as a cone of brown material. Spots can be detected when quite small late in July. The spores late in the season occur just beneath the affected skin.

Treatment.—Do not leave affected fruit in the orchard to decay. Continue the fungicidal spray used for Scab till late July using it rather weaker and if Bordeaux is used add more lime to the mixture.

Venturia Pomi and Venturi Pyrina, Apple and Pear Scabs.—The ascospores are mature from about a week or two weeks before blossoming till some time after the blossoms have fallen. All do not mature at once. These ascospores if they fall on the fruit at this time almost always cause it to fall or "Drop;" if on the leaf a spot or scab is formed. This takes ten days or two weeks to mature so that it shows or breaks the epidermis. As soon as a scab appears it begins to shed spores which are capable of growing on the fruit or leaves and causing scabs. These scabs live and produce spores, in this way for a long time. The young or immature scabs and possibly the older spots *after* the leaves have fallen, undergo a change during which the fungus grows and by the *following Spring* produces ascospores which may reach maturity shortly before the trees come in bloom.

The twigs of certain varieties as the McIntosh and pear twigs are also attacked by this fungus and may be killed, seriously injured or only slightly affected. The fungus remains alive over winter in some of these spots but I have found no ascospores produced there but it is possible that they may continue to produce conidia and this may be one of the causes of such varieties being more seriously affected by this disease. Affected twigs should be removed and burned.

Treatment.—Spray the trees thoroughly with Bordeaux mixture or Lime-sulphur or Dust Spray as the bud unfold and at frequent intervals as every ten days or two weeks, for three or four applications. It is desirable to have one application follow blossoming as soon as possible as this is the season of most rapid growth of foliage and the most abundant production of ascospores. Winter sprays of lime-sulphur should always be used where twigs are infected. The complete plowing under of all leaves in the fall or early spring is desirable.

Pink Rot.—This disease may follow scab but has not proven injurious in this province. The spray used for other diseases should control it.

Stereum purpureum, Silver Leaf.—This disease occurs chiefly on young trees usually within a few years after transplanting from the nursery. The leaves of a branch or of the entire tree in midsummer assume a silvery appearance and break or tear apart as they become old. The tree may otherwise appear thrifty. In the course of a few years, about the time it should begin bearing, usually it dies and purple sporophores, shelf-like fungi, appear on the branch affected or on the trunk near the ground if the entire tree is affected. They may appear on limbs also.

Treatment.—Remove and burn all affected trees as soon as detected.

Sclerotinia fructigena, Brown rot of Fruits.—This is the common cause of decay of fruits. It is promoted by warmth and moisture and retarded by cold. Insects are the efficient means of spores gaining entrance to the fruit. Practically all the brown dust or mold on the decaying fruit consists of the spores of this fungus. If such fruit is allowed to remain on the ground for two years under suitable conditions it then produces ascospores. Either of these spores if they find an injured fruit as where bitten by an insect readily penetrate and cause the fruit to rot. The curculio beetles are very injuries in this way. This is the common rot of stone fruits and is common on all early apples and pears.

Treatment.—Spray the trees early in the season with poisons to kill all insects that eat foliage and fruit and if plant lice or other sucking insects are present use contact sprays to destroy them. Pick and burn all wormy fruit from the trees if possible or utilize pigs to consume the fallen fruit. Thinning the fruit on the trees where it is set too thick also helps. Keep the fruit as cool as possible after it is picked and during shipping. The fungus often invades the twig from the fruit and kills it giving it the appearance of "Blight." Remove all such branches.

Blackberry and Raspberry Diseases.

These fruits are subject but not equal to the same diseases. In starting a plantation care should be taken to get or use only healthy plants as it is much easier to keep the diseases out than to get rid of them. Indeed the latter is in some cases impossible except by growing other crops on the land.

Glaeosporium venetum, Anthracnose.—This disease is characterized by the formation of purple or dark colored spots on the canes which as they become older usually become lighter in the centers. This produces a "Bird's Eye" appearance.

Treatment.—Plant only healthy plants. Do not use soil where the disease has previously existed. When a plant is affected remove and burn the entire plant as soon as detected. Spray with Bordeaux mixture during the early part of the season.

Cane Blight.—This is due to different causes. The canes wilt or partially wilt in the growing season. If this is not

due to insect injury then it is best to remove the affected plants and burn them.

Pseudomonas tumefaciens, *Crown Gall*.—This produces swellings on the underground parts of the plants as mentioned under Apple Diseases. Nursery land infected with this disease producing organism should not be used for either these berries or root crops but devoted to grain and grass for a number of years.

Septoria Rubi, *Leaf Spot*.—This is easily distinguished by the numerous small spots on the leaves. Each spot develops a lighter center with a colored border.

Treatment.—If discovered in time pick off and burn all affected leaves. Spray during the growing season with Bordeaux mixture and destroy all leaves in the autumn.

Gymnoconia interstitialis, *Rust*.—This disease may be found on the young canes but becomes conspicuous as the season advances by the abundance of yellow or orange colored spores produced. Eventually the host is killed after a number of years in which little or no fruit is produced.

Treatment.—There is no cure. Each affected plant should be dug up and burned as early as the trouble can be detected. Otherwise all plants will become effected.

Cronartium Ribicola, *European Currant Rust*.—This disease is not likely present unless it is or has been introduced with importations of White Pine. Wherever white pine has been imported and grown from imported trees a careful search should be made of both wild and cultivated currants for rust. The currant leaves will have spots upon them covered with a fine down or delicate hair-like growth. Any suspicious growth or appearance on currant leaves where imported white pine occurs within half a mile should be sent either to Ottawa, to the Experimental Farm or to this college with an account of the attendant circumstances. While not a serious disease of the currant it is of the pine.

Cherry and Plum Diseases.

Plowrightia morbosa, *Black Knot of Cherry and Plum*.—The black knots which disfigure plum and cherry trees are familiar to every one and are very conspicuous when the leaves have fallen but the beginning of one of these is less frequently seen. The place first swells and feels springy to the touch and the bark cracks open and exposes the fungus which is light brown and quite velvety but later gradually grows into the black knots. It begins to shed spores as

soon as the bark cracks open. This may occur at any time in the growing season but is most frequent in summer and is then easily overlooked. The ascospores are shed after the knots become black about June the following year.

Treatment.—Remove and burn all knots as soon as the leaves have fallen. In June and again in August search for the newly formed knot. If the trees are badly affected spray after blossoming with Bordeaux mixture which has been made with one third to one half more water than stated in the directions for making. Destroy all wild and neglected trees bearing knots, any where near the orchard.

Exoascus Pruni, Plum Pockets or Bladder Plums, Witches' Bloom of Cherry.—This very common disease lives in the twigs of the plum especially those bearing fruit. After blossoming the diseased fruit grows much more rapidly than healthy and soon becomes almost white, swollen and with little or no pit. The ascospores are shed from the affected fruit (Or more frequently these ascospores multiply and produce many small spores, conidia.) and inoculate other twigs.

Treatment.—As soon after blossoming as the affected fruit can be detected remove all such fruit and the twigs on which it is borne and burn them. Any affected fruit that drops off should be picked up and destroyed. With care this will remove the trouble in a couple of years, if not too badly established. Care must be taken to remove all uncultivated cherry and plum that might harbor the disease.

Bacillus amylovorus, Blight.—See Apple Disease. This disease may be confused on plum and cherry with a twig blight caused by Brown Rot of Fruit.

Sclerotinia fructigena, Brown Rot of Fruit.—This is the common cause of the decay of these fruits and is promoted and distributed chiefly by insects. Thinning the fruit is important and the destruction of all fallen fruit. The destruction of insects that feed upon these fruits is of first importance. See this disease under Apple Diseases.

Pseudomonas tumefaciens, Crown Gall.—See Apple Diseases.

Brown Rot of Wood.—See Apple Diseases.

Cylindrosporium Padi, Shot hole disease or Leaf Spot.—The spore of this fungus soon germinates after coming in contact with the leaf of the cherry or plum. It penetrates the epidermis and in a few days has developed into a fungus in the interior of the leaf capable of producing spores, the

leaf tissue involved is killed and in many cases drops out leaving a somewhat circular hole which gives it one of its common names. But under other conditions this piece may remain attached to the leaf as a circular dead area. The leaves may be seriously injured.

Treatment.—Often the attack may be so far advanced when discovered that the trees lose their leaves in Summer. If the trees are in sod burn over the sod when dry in early spring so as to destroy the leaves. If in cultivation bury all leaves by careful plowing. Spray with Bordeaux mixture which has been made with about one half more water than the standard mixture. Do not wait for the appearance of the trouble the following year but repeat the treatment.

Currant Diseases.

Pseudopeziza Ribis, Anthracnose.—Small brown spots appear on the leaves and eventually on the younger parts of the canes and on the leaf stalks when the attack is severe, and the leaves fall. Compare also "Leaf Spot." This is a serious disease when introduced. It lives in these spots and in spring has developed from the same spots which produced summer spores, ascospores capable of infecting the fresh growth of that season.

Treatment.—If only a few plants are affected, it would be well to remove and burn the plants as soon as the disease is detected. Spray with Bordeaux mixture. Begin as soon as the buds open and repeat at least five times at intervals of ten days to two weeks or longer as the season advances. When possible the fallen leaves should be raked up and burned in the autumn and any remaining leaves carefully buried by spading the soil in early spring.

Nectra cinnabarina, Cane Blight.—See coral Canker under Apple. The characteristic fruit occurs on the canes and all affected canes should be removed and burned.

Septoria Ribis, Leaf Spot.—This disease occurs on both currants and Gooseberries. The spots are like those on the Raspberry leaves. They are larger than those of anthracnose and have a paler center with a colored border. They are much more distinctly defined from the healthy leaf.

Treatment.—Spray as directed for anthracnose. Pick affected leaves if only a few and burn them.

Sphaerotheca Mors-uvae, Currant and Gooseberry Mildew.—This disease occasionally causes loss in our moist climate,

especially in damp and shaded gardens. It also attacks currants. It is easily recognized by the leaves, and twigs and especially the fruit being covered with a white mildew which often gradually turns brown. Young twigs may be killed. When once established it is hard to control.

Treatment.—Spray as soon as the buds begin to swell with potassium sulphid solution or dust with sulphur and repeat in ten days or less and give a third spray ten days later. Pick and burn all affected fruit. Prune thoroughly and destroy the cuttings. Repeat the spray the following year even if no evidence of the disease appears. Winter spray of lime-sulphur may be beneficial. Sulphuric acid one part to 1000 parts of water is recommended as a spray.

Gooseberry Diseases.

Septoria Ribis, Leaf Spot.—See Currant diseases.

Sphaerotheca Mors-uvae Mildew.—See Currant Diseases.

Puccinia Pringheimiana, Rust.—The attacks of this rust occasionally occur and are very conspicuous. Portions of leaves and fruit are misshapen and become covered with cupshaped depressions filled with a yellow powder, the spores. These do not grow again on the currant or gooseberry but will produce the fungus on sedges and from these sedges the gooseberry is attacked the following year.

Treatment.—By drainage and other means destroy sedges growing near the gooseberries and pick and burn all affected fruit and leaves of the gooseberry bushes as soon as discovered in order to prevent the sedges from becoming infected. Cutting the sedges late in autumn or early spring is beneficial.

Pear Diseases.

Bacillus amylovorus, Blight, Fire Blight.—See Apple Diseases.

Pseudomonas tumefaciens, Crown Gall.—See Apple Disease.

Decay of Wood.—See Apple Disease.

Venturia Pyrina, Scab.—See Apple Disease.

Entomosporium maculatum, Leaf Blight.—This disease attacks pears and quinces. There appear at first small spots which are fairly round and which may become so numerous as to kill the leaf. As they grow older they do

not acquire a pale center but the red centers turn brown and the spots are not very evident on the lower surface of the leaf. On the fruit the red color of the young spots may help to distinguish them from "Scab,".

Treatment.—If seen when the infection is slight pick off and burn the affected leaves and in any case spray with Bordeaux mixture.

Septoria Pyricola, Leaf Spot.—In this disease the spots on the leaves grow larger than in leaf Blight and as they become older the centers become gray and eventually develop minute black dots in the gray which is in turn surrounded with a colored border.

Treatment.—Spray with Bordeaux mixture early in the season.

Gymnosporangium, Rust.—Rust occasionally attacks apples but pears and quinces are more frequently attacked in this province. The fungus causing the trouble lives alternately upon the fruit plant and dwarf juniper or cedar. The disease is easily recognized on the fruit plants. It may attack either fruit, twig or leaf. The part becomes swollen, distorted and produces cupshaped depressions filled with spores. These spores do not again grow on the fruit tree but must find the coniferous host. There in the spring they produce in damp weather gelatinous swellings.

Treatment.—Destroy the bush junipers and cedars growing near orchards. Where possible pick off and burn all affected parts on the fruit trees before the spores are shed.

Plum Diseases.—See Cherry.

Quince Diseases.

Bacillus amylovorus, Blight.—See Apple Diseases.

Entomosporium maculatum, Leaf Blight or Fruit Spot.—See Pear Diseases.

Gymnosporangium, Rust.—See Pear Diseases.

Strawberry Diseases.

Mycosphaerella Fragariae, Strawberry Leaf Spot.—These white spots with purple borders on the leaf of the strawberry are easily recognized. The disease attacks most severely Old Country varieties, and frequently does considerable damage. The spores are shed all summer from the spots. "Ascospores when produced are said to appear late in the season."

Treatment.—Remove and burn affected leaves, if no many are affected, early in the season. If very abundant cut in autumn and burn over the plantation. Exercise great care to plant only healthy plants and remove all effected leaves.

Fruit Rot.—This is caused commonly by three diseases of quite different botanical characters. Their control however is practically the same. After the fruit is picked it should be stored, or shipped in as cool and well ventilated condition as possible. Crowding, moisture and heat promote decay. Care should be exercised to reject all berries which are soft as when decay starts it soon spreads through the box.

The Winter Care of Fruit Trees.

All dead twigs and branches should be removed in winter and burned as the spores of canker particularly are produced from the dead wood. It is easy to see the dead branches and remove them at this season.

All wounds made by pruning can be washed when made, with a solution of corrosive sublimate or formaldehyde, and bound with a cloth that has been coated with grafting wax. This facilitates healing and excludes the spores, which might otherwise lodge and grow there.

Where any of the above diseases exist, as their spores may lodge on branches, twigs, or buds, it is advantageous to spray the dormant trees with some winter spray. White-wash, copper sulphate or lime-sulphur is efficient. The important point is that the spray shall be applied thoroughly to the twigs and buds as well as the larger branches and trunk. White-wash should be applied early in winter; and other sprays towards spring. Old fruit attached to trees should be picked and destroyed as they furnish a place for fungi.

Early Spring Care of Fruit Trees, Till Apples Blossom.

All cankers should be examined and every evidence of dead wood removed and burned. Such cankers as appear spongy and soft or have a fluid exude when pressed or from which a fluid escapes should be not only trimmed but great care should be taken to wash and bind the wound as directed for wounds in winter, as such cankers may be due to fireblight and actively shedding their bacteria. These the corrosive sublimate solution will kill. If there are bud-moths in the orchard or if tussock, tent or brown-tailed moths are liable to be present, so that an early spray is required when the buds are swelling, then use in addition to

Bordeaux or lime-sulphur spray the poison spray. If such poison spray is not required this early spraying may safely be omitted in orchards which have been well cared for; but it is in every case important that a thorough spraying with one of these spray mixtures should be made before the blossoms unfold. Even though no fungus has been found in the orchard, this spraying would be advantageous as a measure to prevent their gaining a foot-hold. This is the season when most of the ascospores produced on the diseased fruit and twigs begin to develop and grow.

Early in the spring, before blossoming time in cultivated orchards the ground should be plowed and all leaves and fallen fruit buried. Orchards in sod where scab is very bad should have the aftermath in autumn left on the ground and burned on some dry day in early spring so as to destroy the fallen leaves and fungi attached. The fruit grower whose fruit is not seriously injured by scab cannot afford to sacrifice such good humus. Indeed, in most cases early plowing would be the wiser course. A jointer should in every case be attached to the plow where there is difficulty in completely burying the leaves.

Later Spring Care of Fruit Trees.

After blossoms fall the spray given before blossoming should be repeated, preferably within a week after the bloom is off. This spray is second only in importance to the spray preceding the blossoming. If in previous seasons any of the above diseases have appeared in the orchards, particularly scab, this spraying must be made.

The cankers treated previously should be examined. Search for plum-pockets should be made and all such together with the twigs to which they are attached, removed and destroyed. All "black knots" in their early stage of growth, should be removed and burned.

Where the orchard has been seriously affected previous seasons with any of the above diseases, it will be desirable to repeat this spray again, and in some cases a second repetition at an interval of two weeks.

