

EXPERIMENTAL FARM NOTES

No. 3.



HORTICULTURAL DEPARTMENT.

BLACK KNOT

OF THE

PLUM AND CHERRY.

OTTAWA
GOVERNMENT PRINTING BUREAU
1894

BLACK KNOT OF THE PLUM AND CHERRY.

FLOWRIGHTIA MORBOSA (Schw.) Sacc.

BY JOHN CRAIG, *Horticulturist.*

The object of publishing this bulletin is not to give to the public the results of new experiments in treating a destructive enemy to fruit-growers, but to stir up and create a wholesome feeling of the danger of allowing this disease to multiply and spread the contagion, and of the necessity of united action in stamping it out. Why should we not exercise the same precautions in preventing the spread of contagious diseases affecting plants, as are employed in checking the spread of diseases of a similar nature affecting animals. Every inducement which incites a desire among orchardists to study this enemy in all its bearings, is a source of congratulation ; as a study of its habits cannot fail to reveal its dangerous character, nor fail to point out the only remedy known thus far, by the thorough application of which it may be successfully prevented. It is for this reason then, viz., that of directing attention to the necessity of combined and coöperative action in fighting this enemy, that it is deemed advisable to review briefly the life history of this disease, stating at the same time as concisely as possible the facts upon which the belief in the fungous nature of this malady is based.

The disease known as Black Knot was carefully studied by Dr. Farlow, of Cambridge University, about twenty years ago, then and now the leading mycologist of America. We are indebted to this eminent scientist for much valuable data regarding its habit of growth and multiplication. Not the least important part of his investigations, was that which at once proved its fungous nature, and the possibility of transmitting the disease by inoculation from wild forms of cherries, to cultivated garden and orchard varieties.

Dr. Farlow states in a bulletin of the Bussey Institute, issued March, 1876, that "we have made direct experiments to show that the spores of the knot on the *choke cherry* will germinate and produce the knot in healthy plum-trees." These experiments disprove the theory which held the necessity of insect agency or assistance in developing the knotty growth.

The Black Knot is an exceedingly troublesome disease, found attacking the branches and stems of sweet and sour cherries, *bird cherries*, *choke cherries*, and all varieties of plums, including the wild plum of the hedge-row and thicket, which frequently is a prolific source of infection, and a menace to neighbouring orchards.

Writing of this fifty years ago the most prominent horticulturist of the time, Mr. A. J. Downing, said that "in some parts of the country this is a most troublesome disease, and has even destroyed the whole race of plum-trees in neighbourhoods where it has been suffered to take its course." Prof. S. A. Beach, Horticulturist of the New York Experiment Station, commenting on this in bulletin No. 40, says: "Could he have looked into the future and seen the plum industry literally wiped out of existence by Black Knot not only 'in whole neighbourhoods' but in whole counties along the famous Hudson River Valley, doubtless the strong words quoted above would have seemed to him a faint statement of the destructive character of this disease. Although Downing did not know the real cause of the trouble yet he urged upon his readers the proper remedy, namely, the destruction of all affected parts by fire; but he advocates burning as early as possible in spring, while, as will be shown hereafter, it is advisable to burn again just after the leaves fall. He also gave the following sound advice:—"It will be necessary to prevail on your neighbours, if they are near ones, to enter into this plan, or your labours will be of little value." Had his advice been followed and the work of burning all Black Knots wherever found, been systematically undertaken at that time and enforced by wise laws, supported by strong public sentiment in their favour, there is little reason to doubt that in the favoured localities along the Hudson River commercial plum orchards might have been paying good profits for the last twenty years, instead of presenting as they do discouraging pictures of loss and decay.

It was believed by early writers on this subject that the characteristic knotty excrescences were caused by insects, but this erro-

neous belief has been clearly disproved by many investigators. Where the disease is abundant the knots are as a rule much infested by insects. It has also been found that they are inhabited by various insects belonging to different orders. Prof. Webster in

Entomological News for October, 1893, records having bred nine distinct species from one lot of knots collected in a single garden, and this collection did not include the plum curculio well known to breed in the knots as well as in the fruit.

In an excellent bulletin on this subject Prof. B. D. Halsted (New Jersey Ag. Ex. Sta. Bul., No. 78), the life history of this parasite is given at length and an appeal is made to fruit-growers to induce them to make greater efforts to eradicate so pernicious a foe.

Prof. Halsted says:—In the first place let the reader get a clear understanding of the nature of the enemy that it is proposed to conquer. There is no question whatever about the black knot being caused by a low form of vegetable growth classed with fungi, which sends its minute threads through the substance of the twigs and branches. It is therefore, necessary to gain a knowledge of this fungus, and for this purpose the accompanying engravings have been prepared. (These engravings have been kindly furnished by Dr. Halsted.) While it is generally assumed that the appearance of the disease is familiar to most of our readers, it has been thought well to give some illustrations.

The beginnings of a young knot are first seen in a manifest swelling of the young twig, which is soon followed by a cracking of the bark, and in the rifts thus formed the threads of the fungus come to the surface and clothe it with a covering of olive filaments bearing multitudes of spores. A young branch is shown in figure 1, which exhibits the characteristic swelling of the initial knot and the crack in the back in which the spores are borne. A highly manifested portion of a rift in the bark is



Fig. 1.

shown in figure 2, in which the superficial stalks and their spores are seen. These spores are carried in all directions by the wind, and falling upon the surface of young shoots, germinate, send their filaments through the barks into the growing ring of soft tissue beneath and institute another knot.

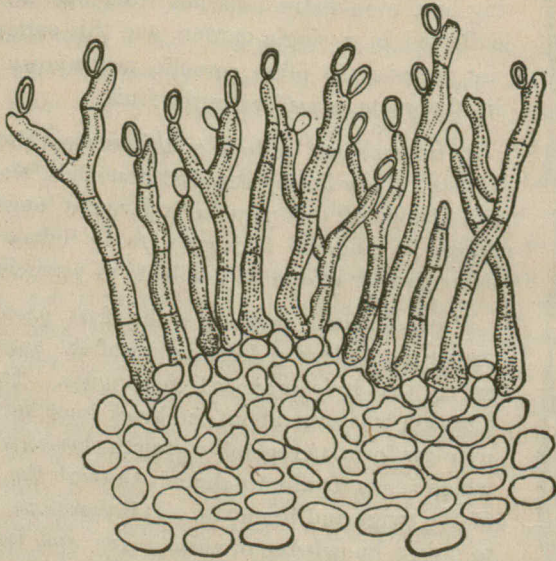


Fig. 2.

As the season advances the young knots and the fresh growth of older ones lose their olive, velvety appearance turn a dark colour, and develop a hard incrustation upon the surface. Within the substance of this black and brittle layer many spherical pits are formed, as shown in fig. 3, and as winter advances, minute sacs are produced on the wall of the cavity, that toward spring bear each eight oval bodies that are known as ascospores. These escape from their long sacs and pass out through a pore at the top of the cavity, and are then ready to be carried by the wind to the surface of a young cherry or plum twig, and thus begin another knot, which, in the course of time, produces a new crop of summer and another of winter spores, and thus the disease is preserved and propagated. In fig. 4 is shown two of the sacs with the eight spores in each. A free spore is also shown in

the process of germination. It is a fact that cannot be too emphatically stated here that the ascospores above mentioned are matured during the winter months, and that they will continue to ripen when the knots have been removed from the trees, and therefore may be omitted from special mention. The fact of their existence only strengthens the previous conviction that in the black knot we have a fungus perennial in its character, and wonderfully provided with methods of spore formation for the rapid spreading of the malady at all seasons of the year."

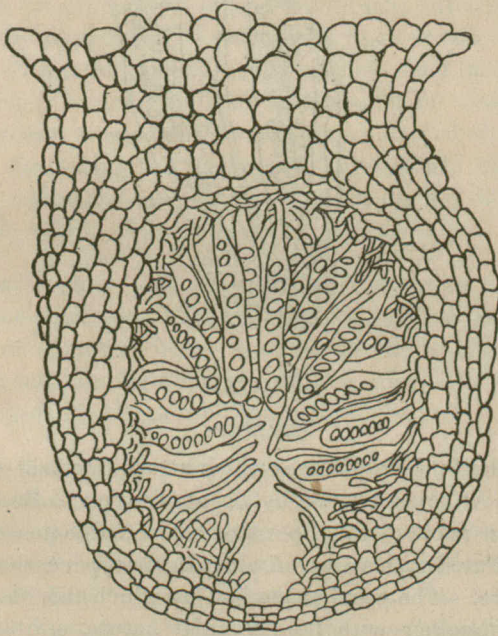


Fig. 3.

This pest is known to attack at least eight species of the genus *prunus*—plum and cherry family. The appearance of the knot varies somewhat among the various species, but, as Dr. Halsted points out, "it has been demonstrated by direct inoculation that spores from the knot of the choke cherry will produce the quite

dissimilar excrescences common to the garden plum," a fact that in this connection it is important to know.

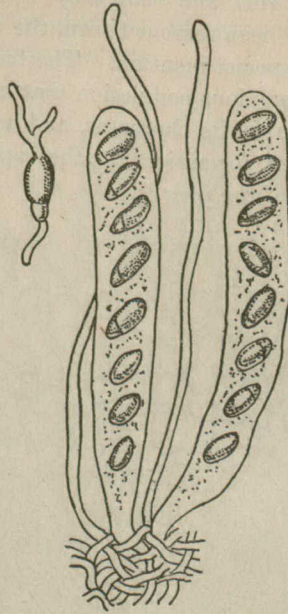


Fig. 4.

REMEDIES.

Many of the fungous diseases which attack our field and garden crops may now be controlled by the application of Bordeaux mixture. This is made of equal parts of copper sulphate and lime dissolved and diluted with water. Ammoniacal copper carbonate is also quite effective. The peculiar method by which this disease propagates itself, together with its perennial nature, militates against the usefulness of the copper salt remedies, as the above mixtures are called, although there is no doubt that a thorough application of Bordeaux mixture to affected trees at the time of the dissipation of the summer spores would in a measure prevent the spread of the disease; but the only sure remedy is to *cut off and burn promptly every knot which makes its appearance* on plum or cherry-tree. This remedy is effectual only in proportion as it is generally applied. A public sentiment is needed which will

call for concerted and united action. Cherry and plum-trees should be carefully examined for knots two or three weeks after growth begins in the spring and again after the leaves fall in the autumn.

When trees are badly attacked it is best to cut them down and destroy them by fire root and branch. When the smaller branches only, are affected the knots should be cut off, taking care to cut 5 or 6 inches below the knotty portion. The cut surface should then be painted with linseed oil or turpentine.

It should be remembered that an affected branch cut off, and thrown on the ground will be just as useful in spreading the disease as if left on the tree. The spores will ripen in knots on separated branches with equal facility. Single knots which sometimes appear on the trunks or main limbs of trees should be carefully pared off and the wound treated with a mixture of linseed oil and red oxide of iron. Saturating the knots with kerosene will kill them, but it will also injure the healthy wood, and if applied freely will cause the branch to die.

In many cherry and plum growing districts neglected fence corners and thickets of choke cherry, native plum and cherry, breed millions of spores of black knot which are a constant source of danger to surrounding orchards. These infested trees which act as breeding grounds should be rigorously destroyed.

It has been already pointed out, and it is repeated again for the sake of emphasis, that a single hedge-row or thicket of knotty wild plum or cherry will furnish sufficient spores, or seeds, to spread the disease over and infect an entire neighbourhood. The remedy is simple and effective, and if united action could be incited and aided by the passing and enforcing of suitable laws, such a course would be certain to produce good results.

The disease is dangerously prevalent in the province of Quebec and Ontario. It also exists to some extent in the maritime provinces and Manitoba. Its presence in British Columbia has not yet been reported. The provinces of Ontario and British Columbia have very wisely passed laws which, if strictly enforced, will leave the fruit growers little to fear from this disease.

The following is a summary of the Act relating to the suppression of this disease now in force in Ontario. Most of the fruit growing States of the Union have laws of a similar nature in operation.

BLACK KNOT LAW.

In Ontario an Act was passed in 1893, intitled the "Yellows and Black Knot Act." This Act provided that—

3. "It shall be the duty of every occupant of land, or if the land be unoccupied it shall be the duty of the owner :—

"(1) To cut out and burn all black knots found on plum or cherry-trees on his land so often each year as it shall appear on such tree;" and in relation to the yellows, a fungous disease of contagious character, attacking peach-trees, owners and occupants are ordered—

"(2) To cut down and burn any peach, nectarine or other trees on his land affected with the disease known as the "yellows" and to destroy all the fruit of these trees so infected."

Municipal councils have the power to appoint district inspectors whose duty it is to enforce the law. A fine of "not less than \$5.00 and not more than \$20.00." may be imposed for every offence or case of non-compliance with the requirements of the Act.

The Act also provides for an appeal from the decision of the Inspector, as well as outlining the duty of municipal councils.

RECAPITULATION.

A few of the salient points in connection with the nature of this disease, and the measures which should be adopted for its prevention, may be briefly enumerated as follows :—

1. Black Knot is due to a fungous disease and spreads rapidly by means of spores.

2. Several species of insects have been observed inhabiting the knots, but none of them belong to the gall-producing kinds, and most of these insects are also found upon other trees which never produce knots.

3. The same fungus attacks the wild species of plum and cherry and may be communicated by them to cultivated forms.

4. The only sure remedy is to examine carefully for knots all plum and cherry-trees twice each year. The first time two or three weeks after growth begins in spring, and again after the leaves fall in autumn.

5. Cut off all knots five or six inches below the affected portion and paint the wounds with turpentine or linseed oil.

6. Burn all prunings and affected branches which are removed.

7. United action on the part of all fruit-growers is necessary in order to secure the best results from the enforcement of these recommendations.

JOHN CRAIG,
Horticulturist.

WM. SAUNDERS,
Director.

The first of these is the fact that the
the first of these is the fact that the
the first of these is the fact that the

The second of these is the fact that the
the second of these is the fact that the
the second of these is the fact that the

The third of these is the fact that the
the third of these is the fact that the
the third of these is the fact that the

The fourth of these is the fact that the
the fourth of these is the fact that the
the fourth of these is the fact that the

The fifth of these is the fact that the
the fifth of these is the fact that the
the fifth of these is the fact that the

The sixth of these is the fact that the
the sixth of these is the fact that the
the sixth of these is the fact that the

The seventh of these is the fact that the
the seventh of these is the fact that the
the seventh of these is the fact that the

The eighth of these is the fact that the
the eighth of these is the fact that the
the eighth of these is the fact that the

The ninth of these is the fact that the
the ninth of these is the fact that the
the ninth of these is the fact that the