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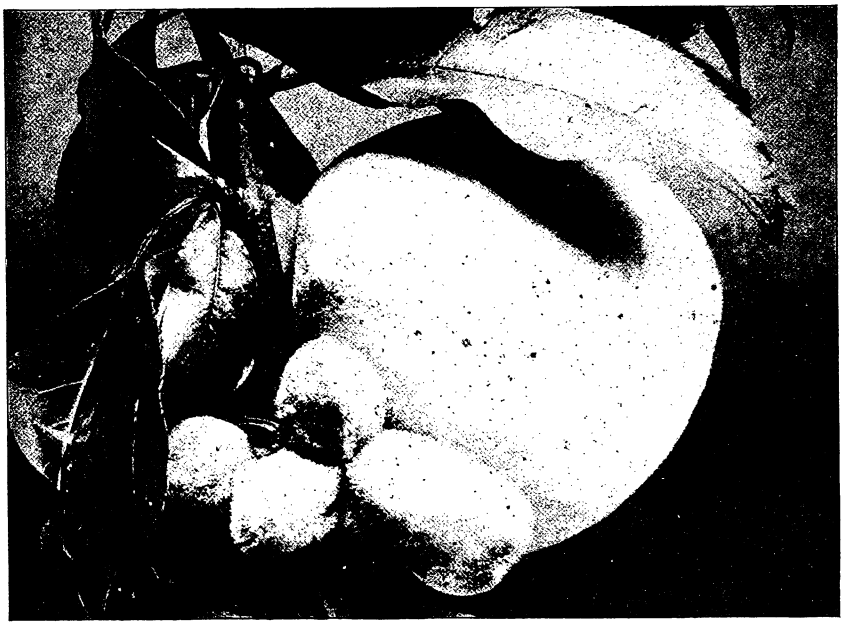

BOTANICAL BOTHERMENTS.

F. H. HALL, F. C. STEWART AND H. J. EUSTACE.

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POPULAR EDITION *

OF

BULLETINS NOS. 199 AND 200.

BOTANICAL BOTHERMENTS.

F. H. HALL.

A plant disease year.

The past year has been very different from the preceding two in conditions affecting plant diseases. Fungous troubles were comparatively harmless during 1899 and 1900; as these seasons were unusually dry ones and, considering the State as a whole, marked by very few periods of frequent showers and humid atmosphere. On the other hand, the summer of 1901 gave us abundant and well-distributed warm rains. Such weather conditions are favorable to the development of plant diseases, and, in consequence, most of the ordinary fungous foes of the farmer and fruit-grower were quite prevalent and some uncommon ones were so destructive as to attract attention.

Outbreaks not remarkable.

No virulent attacks of plant disease occurred, however; nothing to threaten the ruin of an industry, as has been the case in some previous seasons. The common diseases of fruits, vegetables and farm crops are now so well known to intelligent growers; and the efficiency of the standard remedies for most of them so thoroughly proven that it seems desirable this year to call attention only to new diseases or peculiar manifestations of old ones and to some troubles of a botanical nature not to be classed as diseases.

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* This is a brief review of Bulletin No. 199 of this Station, on An Epidemic of Currant Anthracnose, and Bulletin No. 200, Notes from the Botanical Department, both by F. C. Stewart and H. J. Eustace. Any one specially interested in the detailed account of the investigations will be furnished, on application, with copies of the complete bulletins. The names of those who so request will be placed on the Station mailing list to receive future bulletins, popular or complete as desired.

Bulletins are issued at irregular intervals as investigations are completed, not monthly.

Currant Plantations Injured.

Sudden spread of old disease.

Currant anthracnose is a fungous trouble of which traces have been found in many seasons and in various localities, both in New York and elsewhere; but one which has not often been destructive enough to attract the attention of growers. A quite general outbreak in the currant districts of New York occurred in 1889, and others, restricted to limited areas, are recorded for 1897 and 1900. In the early summer of 1901, however, probably about June 8, an epidemic of the disease broke out in the principal currant section of New York, between Highland and Newburgh in the Hudson Valley; and caused a loss in some plantations of half or even two-thirds of the crop.

A leaf destroyer.

The fungus attacks the leaves, mainly—the lower ones first—producing small, dark brown spots upon them and causing them to turn yellow and fall.

The effected plantations were readily recognizable, during the month of June, by the yellow color of the foliage; but in July this was less noticeable. By July 10 the few leaves still remaining on the bushes were scarcely at all yellow although thickly covered with anthracnose spots. After June 26, when the fruit began to ripen, the affected plantations were to be recognized by their conspicuous red color, since the falling of the leaves left the ripening fruit exposed to view.

It is to the defoliation that most of the damage is due, for the early dropping of the foliage allows the ripening fruit to be scalded and shriveled by the unbroken rays of the sun. Some of the damage is probably due to the failure of the leafless canes to supply enough water for the needs of the rapidly developing berries.

The disease also produces a spotting of the leaf stalks, fruits, fruit stems and new canes; but these injuries are of minor consequence, as, aside from causing a few of the small tip berries to drop, it is doubtful if the spotting does any particular harm. It is believed that the occurrence of the spots on the wood has not been noted previous to this outbreak of the fungus. The discovery is thought to be of considerable importance for these spots contain the spores, or seeds, of the fungus and their presence on

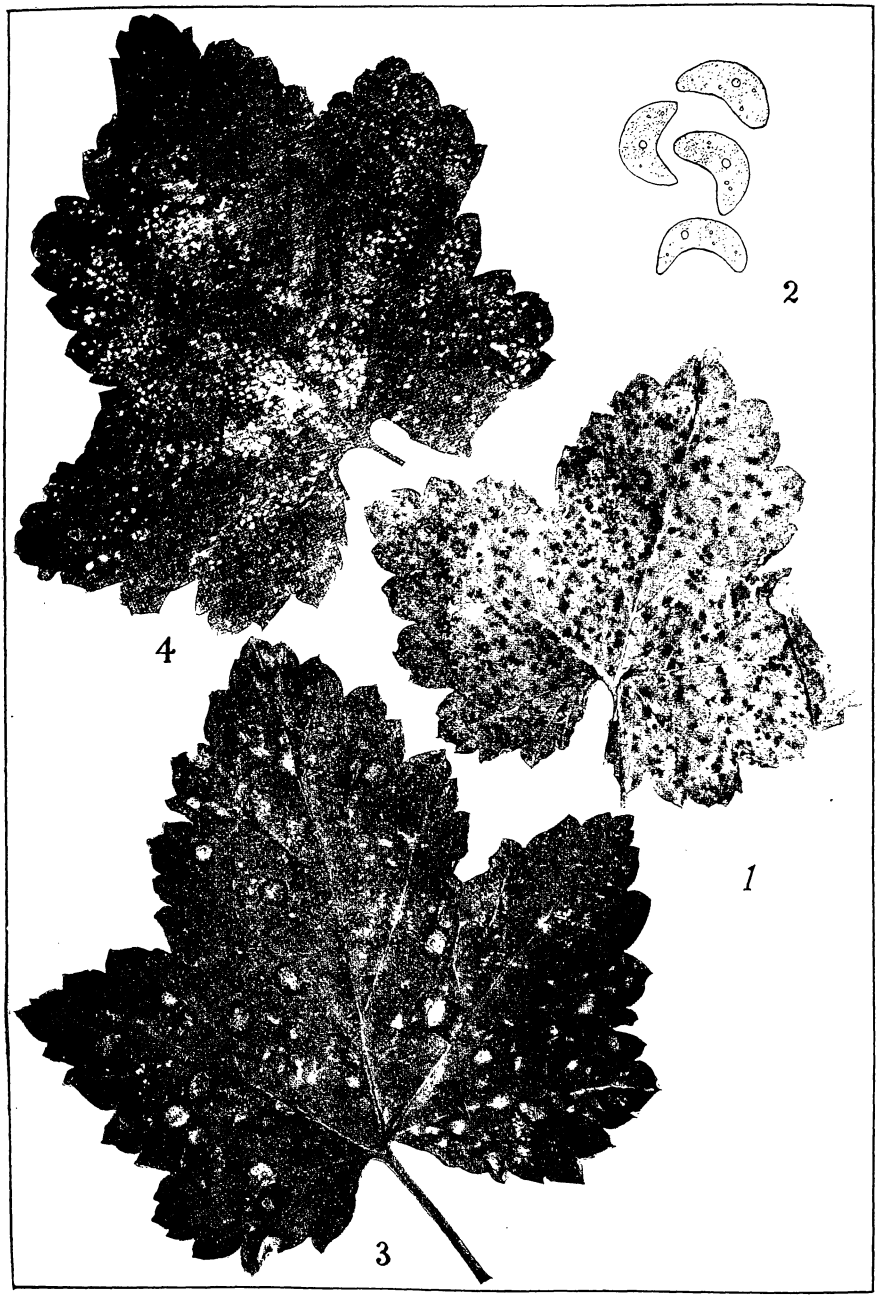

PLATE I.—COMMON LEAF DISEASES OF THE CURRANT.

the wood shows the probable wintering place of the anthracnose.

Anthracnose, not leaf spot.

Growers call this disease "leaf spot," but it would be better to use the scientists' name, for the name leaf spot properly belongs to another disease in which the spots are much larger. The distinction will be evident by comparing Figs. 1 and 3 of Plate I. Fig. 1 represents a leaf affected with anthracnose *Glœosporium ribis*, and Fig. 3, one affected with the true leaf spot, *Septoria ribis*. Fig. 4 might be mistaken for an anthracnosed leaf, as the spots are of about the same size; but this appearance is due to the work of an insect, the four-lined leaf-bug, which has pierced the leaf with its mouth parts at each of the spots and drawn out part of the leaf juices. This causes spots which are at first, somewhat dark and water logged, but later whitish or translucent; while anthracnose spots are darker than the surroundings tissues.

Damage, outlook, remedy.

The damage from the disease, in this outbreak, was confined almost entirely to red and white currants, though the fungus attacks black currants, wild currants and even gooseberries. Considerable difference was noted in the resistance of different varieties of red currants, though extensive observations along this line were not made. Prince Albert and Pres. Wilder were practically free from the disease in a plantation where Victoria had lost one-third, and Fay's Prolific two-thirds, of their foliage. The disease occurred in various parts of the State, but except in the Hudson Valley, damage was slight. Here, as already stated, it was prevalent throughout the entire currant district. In one 18-acre plantation it lowered the yield from 50,000 quarts of fruit in 1900, to 26,000 quarts in 1901, and in a 5-acre plantation it is estimated that two-thirds of the crop was lost. It is also probable that the yield of next year will be lessened, because the early defoliation must have prevented proper maturing of new wood and of the buds upon which the next crop depends. This loss seems inevitable, even if the disease itself returns to the comparatively harmless position it has held most of the time. It is probable that such will be the course of the disease, and that no outbreak will again

occur until favorable conditions arise as they did last spring. On the other hand, as with cucumber downy mildew and asparagus rust, the present outbreak may be but the beginning of a series of years of increasing prevalence of the disease, so that only constant watchfulness and vigorous repressive measures will insure good crops.

Since the outbreak was not expected, no planned experiments with preventive treatments could be made. Success in fighting fungous troubles requires that treatments be made before the disease reveals itself, as no treatment can cure. Some accidental tests, however, and knowledge of the action of Bordeaux mixture upon anthracnoses of other plants, warrant the conclusion that spraying with this standard fungicide will be effective against the trouble.

Treatment recommended.

Spray thoroughly with Bordeaux mixture, commencing before the leaves appear, repeat just as they are unfolding, and thereafter at intervals of 10 to 14 days until the fruit is two-thirds grown. In wet seasons make one or two applications after the fruit is gathered. When worms appear, add Paris green or green arsenoid to the Bordeaux. This fungicide will prevent not only anthracnose but the true leaf spot disease and others of similar character which do some harm every year; will check cane blight, which is a threatening disease; and in combination with an arsenical poison, is the most effective remedy for the ever-present currant worms.

A Nurseryman Surprised.

Cellar trouble.

A Rochester nurseryman noticed, early in March, that some serious mishap had befallen a lot of about 25,000 three-year old pear trees in his nursery cellar. The trees had been placed in bundles, stood upright upon the cellar floor in rows and secured in place by sand piled upon the roots; and were awaiting spring shipment. Contrary to this nurseryman's usual custom, no fire was made in the cellar during the winter and the sand about the roots of the trees froze quite solid. On February 25, 1200 of the trees were dug for shipment, when all appeared in good con-

dition. Much difficulty was met with in handling these trees, however, owing to the frozen sand, so on February 27, a fire was built in the corner of the cellar where these trees had been removed, with the intention of thawing out the sand.

Blister, not blight.

Soon after this a condition of the trees developed which alarmed the owner so that he sent to the Station for advice. The tops of the trees throughout the whole cellar turned black and the twigs and smaller branches above three and one-half feet from the floor were evidently dead. The appearance was very similar to that of pear blight and the owner feared that a most malignant outbreak of this dread disease had occurred. However, on investigation, it was seen that trees of many different varieties in the cellar were equally affected, which would not be the case with pear blight; trees of the same planting as those in the cellar, still standing in the nursery rows, appeared perfectly healthy; and no report came of anything wrong with the 1200 trees already shipped. These conditions all denied the assumption of disease and pointed to cellar injury occurring after the early shipment. The fire in the cellar being the only unusual feature, it was evident that this caused the damage; and further investigation made it certain that such was the case.

Too quick thawing.

The uniformity in height of the line marking the lower limit of injury was striking evidence that heat was the destructive factor; for below that line no trees were injured. Even tender Bartlett trees, too short to extend above this line, were unaffected. Upon questioning the man who built the fire it was found that it had been made a little larger than the usual "cold spell" fire, though it was not hot enough to scorch trees standing near. The air had been warmed quickly, had risen to the ceiling, about seven feet, and had spread over the whole cellar top in a layer which became cooler as it approached the floor. This thawed out the tops of the trunks and the upper branches and twigs too rapidly, and killed them. The lower limbs, the bottoms of the trunks and the roots thawed gradually, in the cooler air near the floor, and escaped injury.

Had the usual fire been kept in the cellar to prevent freezing during the cold snaps, or had the trees been allowed to thaw out gradually, no serious harm would have been done. As it was, the trees were not really affected except in parts which would

probably have been removed in planting; but since they were in the hands of a wholesale dealer, who could not dispose of them to retailers, the loss was almost complete. About half of the stock, disposed of for a nominal price, was planted with a loss of only two per ct. of the trees.

LITTLE PEACHES NOT ALWAYS "LITTLE PEACH" DISEASE.

New disease misunderstood.

Though the "little peach" disease has been much discussed in horticultural papers and elsewhere, its characteristics are so little understood by New York orchardists that other troubles are often mistaken for it. Knowing that the disease exists in the State, any general occurrence of small peaches in an orchard leads the owner to fear an outbreak of this dreaded disease.

But small peaches, even though they may occur quite generally throughout an orchard, and may destroy all chance of profit for the year, do not alone indicate "little peach." They may be due to overbearing of the previous year, to unsuitable soil, to lack of available plant food, to unfavorable climatic conditions, and to other causes. The trees should not be destroyed until the owner knows surely that the trouble is "little peach," for from these other conditions the chances of recovery are good. If convinced that the trouble is the true disease, however, no time should be lost in taking out the trees, for "little peach" ranks with yellows in destructiveness and apparant communicability. Trees affected with it never recover.

Imperfect fertilization.

An orchard near Penn Yan, consisting of 150 ten-year-old trees of Globe peaches bore only one-sixth or one-eighth of a crop of full sized peaches last year, the remaining fruits of a full setting being too small for market. The owner thought the trouble "little peach," but it was due to improper fertilization of the flowers at setting time.

The little, unfertilized or imperfectly fertilized fruits, instead of falling at the "June drop" hung on the trees until fall. Some of them made considerable growth, but on cutting open the smaller ones they were found to contain soft, imperfect pits with small or no kernels. This showed that they were not properly fertilized. Why they were not, or why they hung on in spite of lack of fertilization, could not be determined. The orchard seemed to be healthy, the trees had borne good loads the previous year, but not excessive ones as the fruits were thinned; soil and atmospheric conditions appeared favorable; and trees of other varieties in the same orchard were unaffected, except Elberta, which showed traces of the same disease.

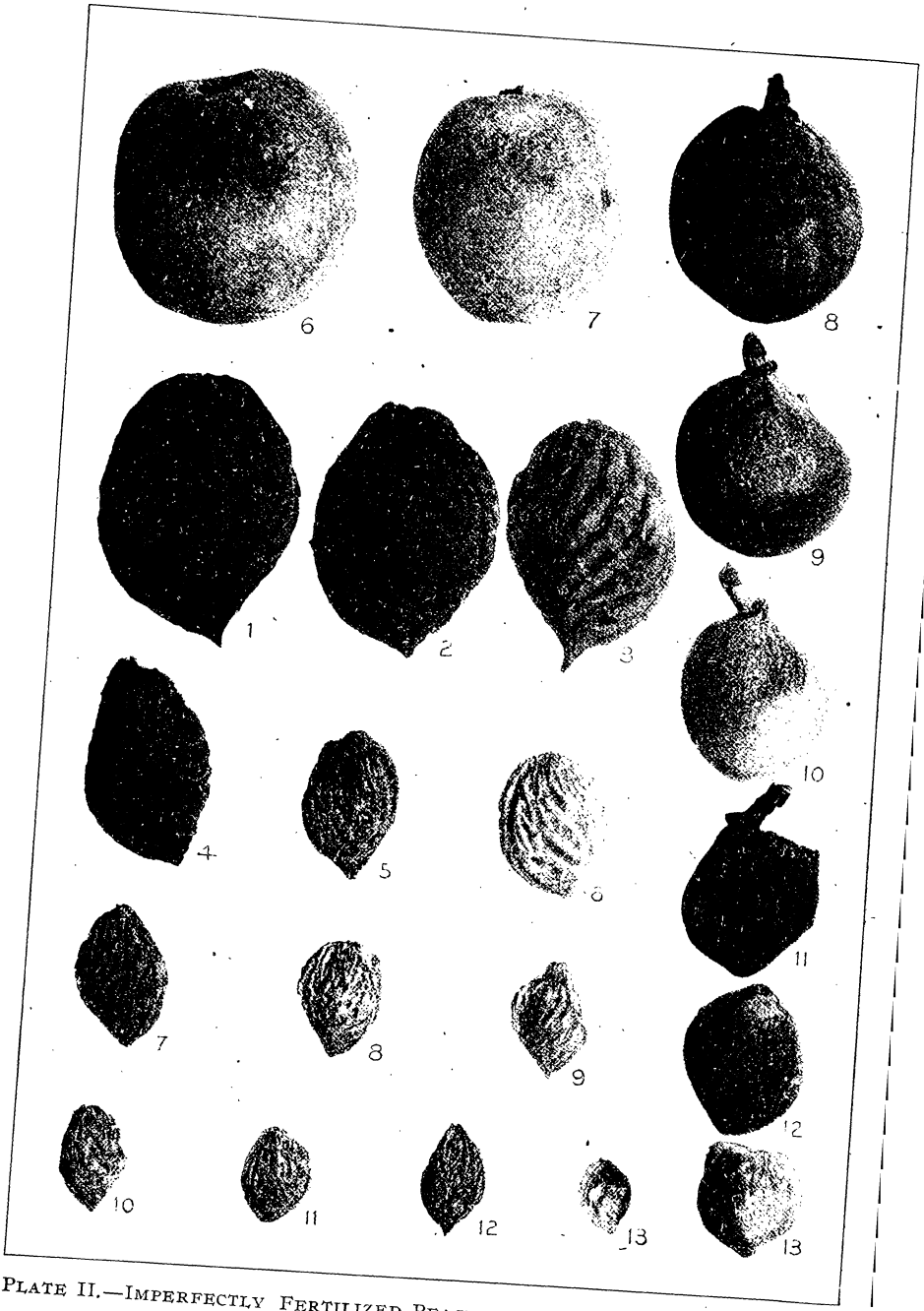

PLATE II.—IMPERFECTLY FERTILIZED PEACHES; WITH PITS FROM PERFECT AND IMPERFECT FERTILIZATION.

How distinguish from little peach.

In "little peach," all the fruits on the affected limb or side of the tree are small and of quite uniform size; in this trouble full sized perfect fruits were found side by side with others varying from two-thirds normal size down to the size of a hickory nut, as shown on the title page. In little peach the pits are of full size with well developed kernels, even though the fruits are small, while in the imperfectly fertilized peaches the size of the pits varies with the size of the fruits, as shown in Plate II. The pits in this plate show the gradation from one in a full sized Globe peach down to the tiny fruit at Fig. 13. Only part of the series of peaches is shown, but enough to make plain the connection between size of fruit and size of pit which characterizes improper fertilization.

Had injury of such extent been really due to "little peach," the entire orchard would have been worthless and a source of danger to any orchards near by; as it is, the trees are quite likely to bear a full crop next year, and there is no liability that the trouble will spread.

Snapdragon Anthracnose on Yellow Toad-Flax.

A new host.

In Bulletin No. 179 there was described a disease of the cultivated snapdragon, known as Antirrhinum anthracnose. In that account it was said that no other plant was known to be affected by the same fungus; and that point was counted of importance in treatment of the disease, as affected cuttings seemed to be the only medium of introduction of the disease into uninfected houses or beds.

Now, however, it has been found that a fungus, similar and in all probability identical with snapdragon anthracnose attacks the common weed Yellow Toad-Flax, Butter-and-Eggs or Ramsted.

Florists must thus guard their houses and beds from infection through this weed. The disease offers no hope for eradication of the weed, however.

Shot-Hole Fungus in New Rôle.

Fruit pedicels diseased.

An interesting and probably hitherto unobserved modification of shot-hole fungus on cherry was noticed during the past season. This fungus in its ordinary form, as a defoliator, does much harm, particularly to English Morello Cherries; and in seriously affected plantations at Milton and Highland it was found that it also attacked the fruit pedicels, producing brown spots and areas, which frequently covered almost the whole pedicel. This partial or complete girdling of the fruit

stems, aided probably by the loss of leaves resulting from the usual action of the fungus, caused the cherries to ripen unevenly and in severe cases to dwarf or to wither. The spots on the pedicels contained white spots or rifts in which were borne spores of the fungus, thus identifying the trouble.

Accompanying this spotting of the pedicels was a spotting of the green fruits; but these spots disappeared as the fruit ripened and none of them produced spores, so the trouble could not be identified with the shot-hole fungus.

Clogging Fungi.

In tile drain. During the year two cases of stoppage of drains were brought to the Botanist's attention. One of these was the clogging of a line of drain tile leading from a vinegar-maker's cellar. The Station connection with this was of interest mainly from the scientific side as the remedy for the condition was found and the drain cleared before the Botanist knew of the case.

At the first outbreak, the owner of the cellar had a few tiles taken up at intervals and the stoppage remedied by poking out the clogging material. This appeared to be mainly a fungus growth similar to mother-of-vinegar; so when a second stoppage occurred a fungicide, copper sulphate, was employed. Crystals of this chemical, better known as blue vitriol, were dropped in the upper end of the drain and destroyed the fungus so effectively that large quantities of the growth were washed out and the drain cleared. A third stoppage was remedied in the same way, about four ounces of copper sulphate crystals being used.

The Botanist secured some of the accumulation for study and found it to consist principally of the interlaced threads of a fungus, which was afterward identified.

The practical point is the efficiency of the copper sulphate in clearing out the fungus growth.

In refrigerators. Stoppage frequently occurs in refrigerator drain pipes, ascribed by the manufacturers to "slime from the ice." Such a clogging occurred in a refrigerator belonging to a member of the Station Staff; and the trouble was found due in this case also to fungus growth; though the fungus was not the same as that in the tile drain. The fungus undoubtedly came from germs in the ice, but the stoppage was not due simply to an accumulation of material from successive pieces of ice. A real growth took place within the pipe, the little plants probably being supported by drops of milk, juices from meat, particles of butter or other organic matter accidentally washed into the pipe.

Thorough washing of the refrigerator and pipe with hot water is the remedy for such conditions.