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GENEVA, N. Y.



SOME TROUBLES OF NEW YORK PLANTS.

SUMMARIZED BY  
F. H. HALL,

FROM BULLETIN BY  
F. C. STEWART.

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POPULAR EDITION\*

OF

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SOME TROUBLES OF NEW YORK PLANTS.

F. H. HALL.

Station makes  
many minor  
investigations.

In order to do the greatest good to the largest number and to secure the maximum of efficiency, Station investigators must, as a general rule, confine their attentions quite closely to a few important problems and work these out with minute care. But, by correspondence and by visits in connection with the principal studies, the Station Botanist and his assistants have come in contact with many interesting plant diseases, malformations and physiological peculiarities which are of sufficient scientific or economic importance to merit some study and a permanent record, though not justifying or not permitting rigorous investigation. Of such troubles nearly one hundred are discussed in the original bulletin of which this is a review, on host plants varying in agricultural importance from apple to blackberry lily, from wheat to hepatica. Of these topics only about a dozen are of general economic interest, and these are here briefly discussed.

Apple  
troubles.

Crown gall of the apple has been often mentioned in recent years and by some has been considered an important trouble of the apple. An experiment made by the Station Botanist, however, and another, more extensive one, by a commercial nurseryman indicate that for New York State at least, this disease is, practically, a negligible factor. In the Station experiment twenty-two apple

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\*This is a brief review of a few topics of economic importance discussed in Bulletin No. 328 of this Station, on Notes on New York Plant Diseases, I, by F. C. Stewart. Those interested in the full discussion of these topics or in similar notes on about eighty other plant troubles or variations of less economic importance may secure the complete bulletin on application.

trees, typically affected with crown gall, were planted in 1901 and some of them dug up in 1903, in 1905 and in 1907. In no instance could any increase in the size of the galls be seen, nor was there any evidence that they had in any way injured the trees. In the nurseryman's test 500 Baldwin trees, all affected with crown gall, were planted in an experimental orchard, and after being set nine years "show as good a growth as trees planted the same time and free from crown gall. The bark is smooth, healthy in appearance, and the trees look thrifty and vigorous." Probably it would be well to reject young trees with large galls, but unaffected trees from the same lot may be planted without fear of bad results.

Most apple growers know the scab fungus when it appears on the fruit, but many of them think it a new disease when it finds conditions right for rapid development on young leaves. This was the case in orchards near Medina, in June, 1909, when a severe attack of scab, uncontrolled through omission of early spraying, affected a large percentage of the leaves. These leaves, with the cuticle broken by the fungus spots, were then sprayed with bordeaux mixture, arsenate of lead, arsenite of soda and added lime. Marked spray injury followed and much of the foliage turned brown and dried up. Observations made in 1910 near Webster showed injury from lime-sulphur spraying on similar scab-ruptured leaves. It is believed that some of the mysterious cases of lime-sulphur injury to foliage may be explained in this way.

Several cases of powdery mildew on apple have been observed, but the disease rarely does any injury except to nursery trees or very young orchards. The mildew first shows on the upper surface of the leaf where spots of lighter green appear on the dark green of the normal leaf. As the disease spreads, the affected leaves appear as if dusted with flour and, later, the young stems and petioles are marked by brown, felt-like patches which bear the fruiting bodies of the fungus. Growth is most luxuriant on the upper surfaces of the leaves. In one Geneva nursery trees of

many varieties were more or less affected, but Chenango and Black Ben Davis appeared most susceptible. The disease was noticed in June and in September the leaves at the tips of the shoots were dwarfed, whitened by the mildew and often curled and brown on the margins. Many of them had fallen prematurely. The twigs were also covered with white and brown patches. The growth of the trees had been checked and some were considerably injured. Nurserymen finding it necessary to combat powdery mildew are advised to try spraying with lime-sulphur diluted at the rate of 1 to 40.

In May, 1910, an interesting disease of apple tree trunks was observed at Le Roy, which was due to the use of veneer tree protectors. These were placed about the trunks of the trees in the fall of 1906 to guard against mice and left in position until the spring of 1910. Of the 450 trees protected, 300 were on Wallbridge stock and of these about 20 per ct. showed disease in the form of rough bark with dead spots varying from pin head size to areas as large as a man's hand. On many of the larger spots the bark was dead all the way through and the sap wood was bluish black. Several of the trees were practically ruined and others seriously injured, but the trouble was confined entirely to the Wallbridge stocks, none of the Northern Spy trunks showing any trace of disease. The organism causing the trouble could not be determined positively, since canker fungus and oyster-shell scale insects were both present and some symptoms were those of fire blight. There was no evidence of the latter disease anywhere else in the orchard, however. The presence of the protectors for so long a time was evidently the predisposing cause; and the varietal susceptibility of Wallbridge stock to such injury allowed some unknown influence to do this considerable damage.

Beet leaf  
spot.

Were sugar beet culture to continue in this State, leaf spot would have to be reckoned with as it is usually a common, and often, a destructive disease. Practical abandonment of the industry, however, makes less important than it would

otherwise be, the discovery, on a Station plat, planted with several varieties, that an outbreak of the disease was, in its early stages, restricted to one variety. This indicates plainly that the disease was introduced on the seed. This source of infection has been suggested before; and seems very clearly proven in this case.

**Cherry rot  
and mildew.**

A case of serious blighting of cherry blossoms at Geneva in 1909 was found to be due to the growth, in the blossoms, of the fungus that causes brown rot of the fruit. The same fungus also destroyed large numbers of small twigs on English Morello trees at Highland and at Geneva in 1901. Another development of the same disease was the killing of a large percentage of the sweet cherries around Milton, while the fruits were still young and green — about the size of large peas.

Powdery mildew is a common and destructive disease of cherries in New York nurseries, and also attacks bearing trees in the autumn, showing a preference for leaves at the tips of succulent growing shoots. The Mahaleb cherry appears to be immune to this fungus, which is probably one reason why Mahaleb stocks are so popular with nurserymen, though not advisable from the standpoint of the cherry orchardist. Gov. Wood, a sweet cherry, also appears immune to mildew, and Hoy nearly so. English Morello, Early Richmond, Lambert and Montmorency are quite susceptible to this disease; while Baldwin, Bing, Black Tartarian, Dikeman, Napoleon Bigarreau, Windsor and Waterman suffer less from it, though not immune.

**Hop  
"mold."**

In 1909 a hop yard of about four acres, near Waterville, was so affected by a powdery mildew — mistakenly called "blue mold" by the grower — that the crop was entirely lost, and a few other yards in the vicinity were slightly injured. The fungus causing the trouble could not be identified with certainty in 1909, owing to the absence of fruiting bodies, but it was believed that the attack was only temporary and that the trouble might not reappear in 1910, as such behavior is quite characteristic of powdery mil-

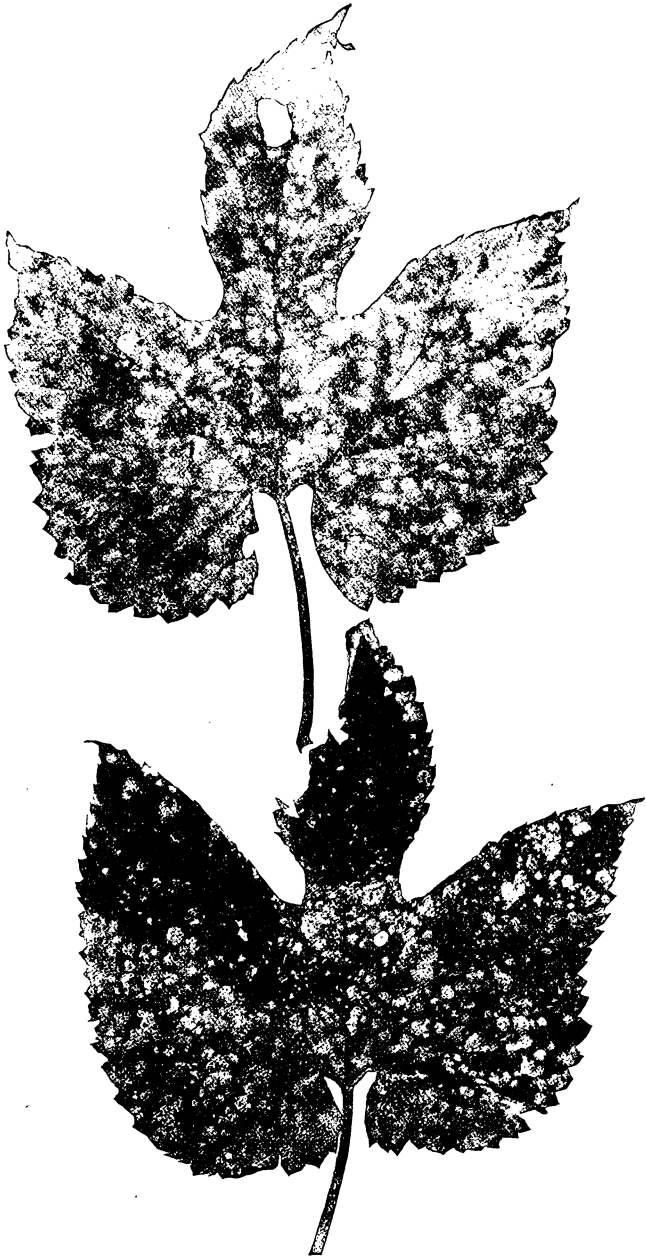


PLATE I.—HOP LEAVES ATTACKED BY POWDERY MILDEW,  
*Sphaerotheca humuli*.

dews. It did reappear, however, and did more damage than in 1909, while the same disease was general about Middleburgh, invading all the yards in the vicinity and affecting from 65 to 80 per ct. of the vines. Other outbreaks were reported from Sharon Springs and various places in Otsego county. These outbreaks, with the identification of the fungus, by Cornell Station investigators, as that of the destructive "hop mold" of England, caused considerable alarm among hop growers, but conditions in America have not, hitherto, seemed favorable to the development of the disease. Several other outbreaks have been previously recorded, one of them, at least, in this same section, in which the trouble very quickly disappeared. The fungus appears on leaves, stems and cones as a conspicuous, whitish mildew, a favorite point of attack being on the pedicel at the base of the cone. Usually the bracts of the cone were not mildewed except at the base, but the tips of the bracts were brown and shriveled, giving the cones a brown, scorched appearance; while they were also much dwarfed in size. On the leaves, the mildew appeared in conspicuous bluish-white spots and blotches, or frequently covered them completely.

Remedies used against the trouble in England are dusting the plants with flowers of sulphur on hot, sunshiny days, or spraying with potassium sulphide. Some recommend spraying followed by dusting. In bearing yards all parts of plants above ground should be burned as soon as the crop is gathered, leaving young plants, not yet in bearing, to continue growth until killed by frost and then burning them.

**Frost  
injury.**

The ragged appearance of horse chestnut leaves noticed about Geneva every spring for many years, and similar injury to Norway maple foliage, which is almost as common, are due to frost when the buds are unfolding, not to disease, to wind, or to insects. On the horse chestnut the injured leaflets show ragged comb-like edges, while on the maple, irregular spots and patches drop out from the interior of the leaves; yet both are due to the same cause, the difference in appearance being due to different arrange-

ment of the two kinds of leaves in the buds, which exposes the edges of the opening horse chestnut leaves to the frost and the centers of the unfolding maple leaves. At Geneva frosts occur between May 1 and May 15 almost every year, and at this time some trees are usually in the right condition to suffer injury. Different trees show marked individual variation in the time of leafing, for certain horse chestnut trees on the Station grounds open their buds fully a week before their neighbors of the same sort.

**Troubles  
of pear.**

A most peculiar and, as yet, unexplainable physiological trouble with pear trees stored in a nursery cellar, came to the attention of the Station in March, 1910. On investigation, at request of the nursery company, there was found, on the trunk around the bases of the branches, around scars due to recent removal of branches and even around the graft unions, a growth of loose-celled greenish white tissue which caused the bark to loosen and crack. In packing the trees, the loosened bark often rubbed off and the blister-like, thin-walled cells of the exposed tissues collapsed and turned black on exposure to the air. This gave the trees a very bad appearance when the packing boxes were opened by the planter. Tests made by the Station of some of the affected trees, however, proved that the injury was largely superficial and did not interfere to any considerable extent with the growth of the trees when planted. Similar growths have been known, but they are of rare occurrence, as only three of the twenty-six nurserymen consulted had met with the trouble. These men ascribed the outbreaks in their cellars to undue warmth and moisture, or to rapid growth in nursery, but these causes did not, apparently, apply in this case. Temperature and humidity records of the storage cellar showed only slight variations from those of previous years when no trouble had occurred. Other nurserymen growing pear trees in the same localities had no trouble, so climatic conditions affecting growth could hardly be held responsible, and the affected trees came from three different places, thus excluding any soil influence as a causal



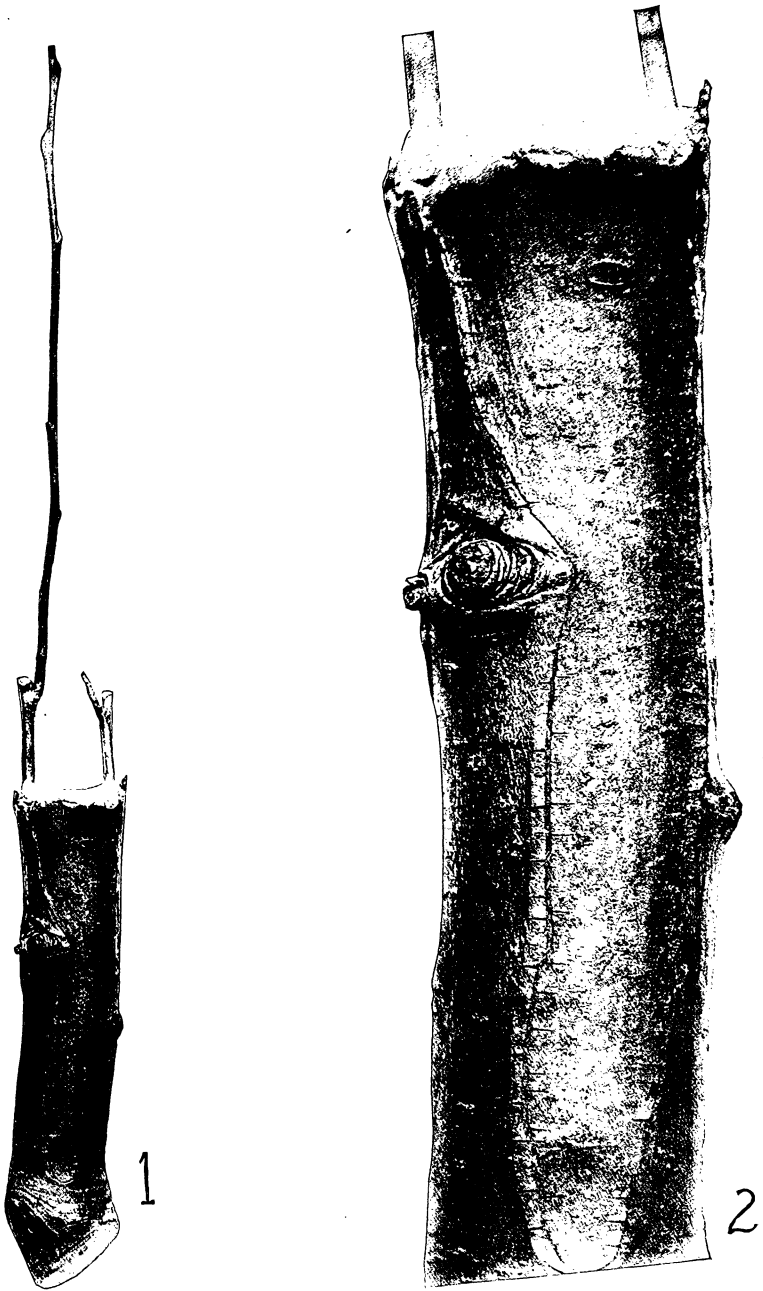


PLATE II.—SHELDON PEAR STOCK WITH YEARLING SECKEL CIONS.  
One cion failed because of canker on that side of the stock.  
(1. One-third natural size; 2. Same stock, natural size.)

factor. No special difference could be noted between different varieties. No organism could be connected with the outbreak, fungus, bacterium or insect, so it must be classed with the physiological, non-contagious condition known as œdema. This trouble sometimes occurs in growing plants, especially in forcing houses, and is usually attributed to wet soil, high temperature with high humidity, and insufficient light.

Another pear trouble, probably due to an unusual manifestation of a familiar disease, was the failure of grafts. Of the grafts made in the spring of 1908 in an orchard near Kendaia, about one-half failed to grow because of this disease, and in 1909 many of the cions did not even start, while others made a fair growth and were alive in the spring of 1910, but were worthless because the ends of the stocks in which they stood were so cankered near the top that a good union could never be formed. Sometimes the cankered condition of the bark extended around the entire top of the cion, but usually a strip of dead bark, on one side or the other, ran down the cion, sharply separated from the normal bark by a narrow crack. The wood underneath the cankered area was of a brown color, the discoloration extending radially to the center, so that a cross section of the stock showed a V-shaped area, frequently bounded by a narrow black line.

Infection evidently occurs at grafting time and the disease runs its course quickly, though some of the cankers show evidence of two periods of activity. The cankers resemble, somewhat, those of fire blight, but the lack of other forms of this disease in the orchard for several years makes it improbable that the blight bacillus is the cause. More probably the trouble is due to *Sphæroopsis malorum*, the fungus causing black rot of the apple and pear and producing cankers on the trees of these fruits, as well as blighting of fruit spurs. Fruiting bodies of this fungus were plentiful on the dead bark and sometimes found on the dead cions. Yet it is somewhat strange, if this be the cause, that similar grafting trouble is not more common, for this fungus is very abundant. Whatever the cause, the best method of prevention would be to dis-

infect the end of the stock before putting on the grafting wax, using a sponge saturated with a 1 to 1000 solution of corrosive sublimate.

**Rhizoctonia  
on potato.**

In Colorado one destructive potato trouble and in Ohio another are attributed to a fungus of the species *Rhizoctonia*, but in New York State, though the fungus is very common, little, if any, damage is done by it. In 1904, two rows of *Rhizoctonia*-infected seed tubers were planted on the Station grounds, the seed for one row being first disinfected with formalin, that for the other row planted without treatment. The plants on both rows were healthy, none died prematurely and each row yielded 377 pounds of tubers, or at the rate of 314 bushels to the acre. Little *Rhizoctonia* appeared on either row. In 1910, potato plants were found on Long Island with their stems well covered with the fruiting form of the fungus. This was found mostly on stunted, unhealthy plants, but no intimate connection of the fungus growth with the poor condition of the plants could be traced, since the fungus threads were apparently all on the surface of the plants and could easily be washed off or rubbed off. On most of the plants no lesions could be found either on stems or underground parts, and the seed piece was still sound. The *Rhizoctonia* found on potatoes in New York is certainly different from the *Rhizoctonia* which kills alfalfa in Europe, so there need be no hesitation, in New York State at least, in sowing alfalfa after potatoes because of danger of *Rhizoctonia* infection.

**Raspberry  
cane blight.**

Many species of fungus are peculiar in that they may have two or more fruit-producing forms which are quite distinct, so that the same fungus, in different stages, may be placed in different botanical genera. This was believed to be true of the fungus producing raspberry cane-blight, since a fungus apparently distinct from the one causing the disease could almost invariably be found on the dead canes. That these two forms are merely stages of one fungus was, however, first definitely proved by the Station Botanist in

1903. By laboratory cultures made from isolated spores of *Leptosphaeria coniothyrium*, the fungus on the dead canes, growths of fungus were secured and kept under observation for some time, cultivating the minute plants on sterilized plugs of sugar beet. These growths finally fruited and produced spores identical with those from the disease-producing *Coniothyrium fuckelii* and quite unlike the spores from which the growths originated. The identity of the two forms is thus clearly established, since one developed from the other. Other tests proved that this *Leptosphaeria* form might remain alive on dead canes, exposed to all the vicissitudes of weather, for four years. This means that there would be danger in planting raspberries again on the same ground four years after a plantation had blighted unless all the dead wood had been burned.