

## Notes on a few Common Fungus Diseases.

BY L. H. PAMMEL.

For a number of years the writer has made some observations on a disease of the plum and cherry which has received the common name of Scab. (*Cladosporium carpophilum* Von Thuemen). My attention was first attracted to this disease in the fall of 1889 when many varieties of *Prunus americana* suffered severely. It has been noted on this species every year since, with the exception of 1892 when the plum crop on the college grounds was a failure. In 1891 and 1892 it occurred on such varieties of *Prunus cerasus* as Cerise d'Ostheim, Spate Amarelle, Shadow Amarelle and Wagner. The assistant Mr. F. C. Stewart was detailed in 1892 to make observations, on different varieties and as a result of his work he reports that Schatten Amarelle, Shadow Amarelle, Spate Amarelle and Lutovka are affected. This list as is known consists chiefly of Russian varieties. As the orchards on the college consist entirely of this class of fruit it is hard to conjecture what other varieties would have done when grown in similar situations. I may state, however, that the Early Richmond growing not far from the college grounds has escaped this trouble entirely. Late and Early Richmond grown in the village of Ames as well as some Russian varieties were also exempt.

Of our native cultivated plums, the Americana type (*Prunus americana*) seems to be most subject to this trouble. DeSoto, Rollingstone, Chippeway, Black Hawk, Hen Plum, Cheney and Speer. The miner plum (*Prunus hortulana*, var. *mineri* Bailey) and Pottawattamie *Prunus angustifolia* Marshall) are occasionally affected. It is common every where in Iowa on our native Americana plums, and Prof. John Craig of Ottawa, Canada, reports it as common in Minnesota and Nebraska. He has also

seen it on plums of this species cultivated in Virginia. Prof. Craig writes me as follows concerning the disease in Canada "I send you by mail this morning a box containing a number of plums<sup>1</sup> affected with *Cladosporium*. All the American or native plums with the exception of De Soto have been destroyed with the disease despite in many cases persistent and persevering treatment with copper carbonate."

"I have not used Bordeaux mixture and am unable to speak of its efficacy, but certainly copper carbonate has failed this year. I may say that we have had an unusual amount of rain which often washed off the fungicide as soon as applied."

Prof. Green of the Minnesota Experiment Station reports it as occurring on the Weaver but not bad.

During the past season it was especially common on all of the cultivated forms of *Prunus Americana* with the exception of the Wolf Plum (*Prunus Americana* var. *mollis*, Bailey).

This fungus also occurs on *Prunus americana* in Michigan, Prof. L. R. Taft has sent specimens to me, that show the fungus well developed.

It is a very common disease on the peach in many parts of the United States as Drs. Smith and Arthur, Profs. Galloway and Taft<sup>1</sup> have shown. I have seen it on many varieties grown in Michigan and New York. In Texas I have also seen it on many late varieties. It is apparently common in Austria where Von Thuemen found it, and gave the first description. Prof. L. R. Taft<sup>1</sup> has sent me an almond (*Prunus Armeniaca*) affected with it.

In order that the disease may be recognized I append a brief description. The disease appears in July and becomes conspicuous in August. On the half grown plums appear grayish or

<sup>1</sup>Journal of Mycology, Vol. V, p 32.

Bull. No. 9. Indiana Agrl. Experiment Station, 1889.

L. H. Pammel, Journal of Mycology, Vol. VII, No. 2, p 99.

In L. H. Bailey's paper, Bull. No. 38, Cornell University Agrl. Experiment Station, June 1892, The cultivated native plums and cherries, p 54. Meeting Iowa Academy of Sciences, Sept. 5, 1890.

Also in Dominion of Canada, Reports, Experimental Farms 1892, p 101.

Appendix to the report of the Minister of Agrl. A destructive disease affecting native plums, by John Craig. See also Ottawa Naturalist November 1892.

olive brown spots, which spread radially from the starting point giving the plum the appearance it has in the figure. These spots

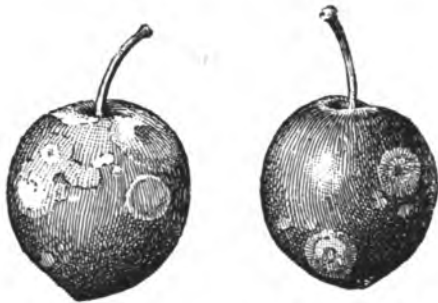


FIGURE I. *Prunus americana*. Showing scab. I am indebted to Cornell University for this cut.

are very numerous and give the plum or cherry a peculiar olive brown color. When the spots are numerous as in the plum or cherry the fruit becomes shrivelled and it is useless for commercial purposes. The spots are larger when only a few occur. When the plum is ripe or nearly so, a crack

extends across it and in this way is an easy prey for Plum Rot.

The fungus causing this trouble is closely related to Apple Scab (*Fusicladium dendriticum*). It consists of a mycelium which creeps over the surface and this in more mature specimens vegetates between the cuticle and the remainder of the cell-wall, in old and decaying plums a dense stroma of short hyphæ is formed. The mycelium sends up erect hyphæ (conidiophores) which bear one or two celled lateral or terminal spores.

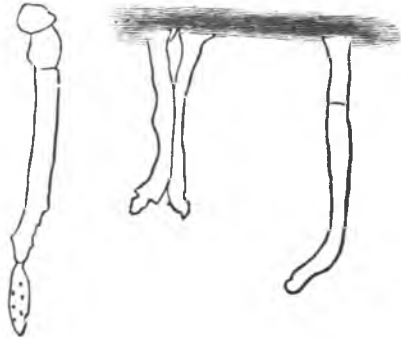


FIGURE II. Conidiophores, in right hand one, a spore attached at the end. Cut kindly loaned by Prof. John Craig.

*Treatment.*—As indicated in Prof. John Craig's letter, copper carbonate has failed to hold the disease in check, no doubt largely due to frequent rains. I think there can be little doubt that Bordeaux mixture will be more efficacious, especially so if there is added to it a small amount of syrup or soap as indicated in Bull. No. 20 of this Experiment Station.<sup>2</sup> Begin

<sup>2</sup>Osborn and Pammel, Machinery and Methods of Spraying, Bull. No. 20 p. 706.

to apply when the plums are well set and make at least four applications, modifying treatment according to season. It may be well to destroy old scabby plums, and only choose such varieties as the Wolf which are nearly free.

APPLE POWDERY MILDEW. (*Sphaerotheca mali*, (Duby) Burrill.)

In some parts of the United States apple seedlings are seriously affected with this disease. It rarely affects old trees, but is especially common on "suckers" coming up around large trees in the orchard and nursery. Prof. Galloway writing about the injury of this disease near Washington, D. C. says: "On the 13th of May we visited the nurseries and found that the disease had already made considerable headway in a block of budded stocks containing something over 200,000 trees. These were budded last summer but owing to the mildew only about two-thirds of them took. Where the buds did not take, the stocks were left standing, and at the time of our visit were about 2 feet high, while the buds had grown all the way from 6 inches to a foot."<sup>3</sup>

It has also appeared at times in the nursery in Iowa. It is common according to Galloway<sup>4</sup> throughout the region east of the Mississippi river.

The fungus recorded by Prof. Galloway is the same as that found on the cherry (*Podosphaera oxyacanthae* Duby), but what we have in Iowa is (*Sphaerotheca mali* (Duby) Burrill<sup>5</sup>). The fungus was so well developed and abundant this fall that there can be no question as to the identity of the species. The affected plants appear as though dusted with a white powdery substance, but the older leaves and especially the stems soon assume a grey felted appearance owing to the numerous hairs on the young twigs and the brown appendages of the perithecia. The perithecia develop as small yellowish bodies which soon become brown and are readily made out with the naked eye.

The perithecia contain one or more very long, dark, straight and jointed appendages. On the lower side of the perithecia

<sup>3</sup>Experiments in the Treatment of Pear Leaf-Blight and the Apple Powdery Mildew.

<sup>4</sup>Report of the Chief of the Section of Vegetable Pathology, 1889, p. 414.

<sup>5</sup>Burrill. The Erysiphææ, in Ellis and Everharh. The North American Pyrenomycetes. p. 6.

are found short, colorless and floccose rudimentary appendages. Each perithecium contains a single large sac (ascus) which usually contains 6 spores (ascospores). The colorless mycelium creeping over the surface sends small rounded suckers (haustoria) into the epidermal cells, and produces numerous colorless erect hyphae (conidiophores) that bear the spores (conidia) in chains. The conidia germinate in a short time by producing a short thread. They may often be found germinating on the plant. These spores serve to propagate the fungus during the summer while the spores found in the brown perithecia tide the fungus over to the following spring. As a result of the attacks of this fungus the leaves become dry and so far as their function is concerned that of assimilating plant food, are entirely worthless. As stated in the quotation from Prof. Galloway they are unfit for budding.

*Treatment.*—Prof. Galloway has shown that ammoniacal carbonate of copper will effectually prevent the disease, and I may add that inasmuch as Bordeaux mixture has proved so effectual on the College grounds in holding in check the Powdery Mildew of the Cherry it may prove equally efficacious for this disease and we advise the use of this fungicide in preference to ammoniacal carbonate of copper.

#### NOTES ON A FEW OTHER MILDEWS.

Two mildews in this state are quite troublesome to cultivated grapes one is the Downy Mildew (*Plasmopara viticola*), the other is Powdery Mildew (*Uncinula necator*, (Schw.) Burrill)<sup>6</sup> During the past season the grape crop was an excellent one, but some varieties suffered severely from the attacks of the Downy Mildew and in some situations this fungus may have hastened ripening without great loss in quality as Dr. Farlow<sup>7</sup> thought might be the case in New England. With most varieties it is a very serious trouble. The Concord, Worden,

<sup>6</sup>Erysipheae, in Ellis and Everhart, North Am. Pyrenomycetes, p. 15.

This species is commonly known as *Uncinula spiralis*, Berk. or *Uampelopsidis*, Peck. Prof. Burrill however adopts the neglected name of Schweinitz.

<sup>7</sup>On the American Grape-vine Mildew. Bull. No. 22 of the Bussey Institution p. 422.

Moore's Early, Early Victor and Cottage are as a rule not so seriously affected. The following varieties are seriously affected Beauty, Jessica, Carlotta, Vergenes, Wilder, Lindley, Missouri, Rissling, Noah, Black Pearl and Etta. The fungus is confined chiefly to the leaves in such varieties as the Worden, Concord and Moore's Early. In Jessica, Noah and Missouri Rissling the berry, peduncles, stem and foliage is frequently covered with the fungus. So bad was the disease on Jessica and Noah the past season that the leaves were sear and brown during the latter part of August and the first variety was entirely worthless. The fungus spread most rapidly during the months of June, July and August, especially in July. The warm moist weather of June July and early August was favorable for the germination of the spores.

The Powdery Mildew on the other hand was common after the middle of August till frost, it was most abundant on the Roger hybrids like Agawam. We failed however to find a single leaf of that variety affected with the Downy Mildew. The Powdery Mildew was common on Concord, Worden and Moore's Early. Dr. Halsted<sup>8</sup> has in a paper on Mildews in a Dry Season, called attention to the scarcity of the Downey Mildews. It certainly is true that the perfect spores are produced more commonly during dry weather.

In making some observations on Powdery Mildews I was much interested to see that the Mildew of Honey Suckle (*Microsphaera alni* (D. C.) Burrill) was more abundant on the south and east side of the bushes, (sunny side,) than on the north (shady side). Mr. G. W. Carver called my attention to the Powdery Oak Mildew, (*Microsphaera quercina* (Shw) Burrill) which only occurred on the north side of the Red Oak.

I do not wish to give the impression that these mildews are universally found in this way, but it is worthy of note that such is the case in some instances. I have collected some evidence to show that that these mildews are more abundant in Iowa during dry weather.

Powdery Mildew of the Rose (*Sphaerotheca pannosa*, (Wall) Burrill). This fungus is common on many wild roses of the

<sup>8</sup>Bulletin, Dept. of Botany 1888, Iowa Agricultural College, p, 95.

country from New England to California, and occasions much trouble in green houses when exposed to outside currents of air. The Hardy Asiatic rose (*Rosa rugosa*) has so far as I know been uniformly free from this disease. It is interesting to note that among a lot of successful hybrids obtained by Prof. Hansen in 1892 there appeared in some cases an abundance of mildew. The hybrids badly affected with mildew were as follows:

*Rosa rugosa* X General Jacqueminot.

*Rosa rugosa* X Duchesse du Brabant.

*Rosa arkansana* X General Jacqueminot.

Not all of these hybrids of *Rosa rugosa*, *Gen. Jacq.*, *Rosa arkansana*, *Gen. Jacq.* and *rugosa*, *Duchesse du Brabant* were affected with this mildew. It would be interesting to trace out the relation of this mildew and the prepotent influence of the male. In some seedlings no doubt the *Rosa rugosa* had a stronger prepotent influence and hence was not subject to this disease.