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DISEASES OF PLANTS AT AMES, 1894.

BY L. H. PAMMEL.

To fully discuss the fungus diseases of plants we should consider all matters that have a bearing on the question. One of the most essential conditions is the character of the weather. The relative humidity and precipitation are very important factors in the development of fungi. The germination of spores depends largely on the humidity of the atmosphere.

Dr. Erwin F. Smith has shown how important climatic conditions are in production and spread of *Exoascus deformans* (Berk.) Fuckel* and Dr. Byron D. Halsted has shown how important a factor moisture plays in the distribution of the Downy Mildews†. Professors B. T. Galloway, H. L. Bolley, the writer and numerous others have called attention to the prevalence of wheat rust during certain seasons; and it is a well known fact that climatic and meteorological conditions are very important factors in the production of these diseases‡.

The writer has published several papers giving the occurrence of fungi for certain seasons. Dr. Halsted has done a similar piece of work for New Jersey and several European writers have likewise given lists of fungi for certain years.§

BACTERIACEAE.

Bacillus amylovorus (Burrill) Trev. Blight has been unusually severe this year, occurring on Oldenburg, which seldom

* Journal Mycology, vol. VI, p. 107.

† Iowa Peronosporæ and a Dry Season, Botanical Gazette, vol. XIII, pp. 52-59. Peronosporæ and Rainfall, Journal of Mycology, vol. V, p. 6. Notes upon the Peronosporæ for 1886, Bulletin Department of Botany Iowa Agricultural College, 1886, p. 53.

‡ Journal of Mycology, vol. VII, p. 195. Indiana Agricultural Experiment Station, Bulletin No. 26.

§ L. H. Pammel, Journal of Mycology, vol. VII, p. 95. Agricultural Science, vol. VII, p. 20. Botanical Gazette, vol. XVIII, p. 26. Iowa Agricultural Experiment Station Bulletin No. 12, p. 183. Byron D. Halsted, Notes upon Peronosporæ for 1892 Report Botanical Department of New Jersey Experiment Station for 1892, p. 276. P. Magnus, Verzeichniss der vom 11 August bis September in Bayern gesammelten meist parasitischen Pilze Separat. Berichte d. Bayrischen Bot. Gesellsch. zur Erforschung der heimischen Flora.

blights, and many other varieties growing in this vicinity. I am inclined to think that the dry season during the flowering period this year has had much to do with the spread of the disease. Blight has also been general this year in many parts of the state. My observations made here for several years show that blight usually occurs on the young twigs, affecting not only *Pyrus communis* but *P. coronaris*, *P. malus* and *P. prunifolia*. This year it affected more especially *P. malus*, especially blossom blight. M. B. Waite* has shown that insects are important in carrying the disease from one flower to another. The disease entirely disappeared during July and August and trees have been unusually free during the latter part of the season.

Bacillus sorghi Burrill. This organism, so abundant every year, has not been so common the past season as during previous ones.

Bacillus cleaceae Jordan. Has not been observed by me the past season on the College grounds, although some years it is extremely abundant.

Bacillus campestris (Pammel). The rutabaga and turnip rot so common the past three or four years has not made its appearance on the cultivated rutabagas or turnips on the College grounds.

PERONOSPORACEAE.

The members of this group have been on the whole very scarce during the past season. Early in May and the latter part of April some of the species occurred on our weedy plants but our cultivated plants have been nearly free from these mildews.

Peronospora parisitica (Pers.), De Bary. This fungus occurred in April and May abundantly on the leaves of *Lepidium intermedium*, completely infesting the whole plant, giving them a yellow appearance and stunted in growth. It also occurred on *Capsella bursa-pastoria*, but less abundantly. Very little of this fungus was seen during the rest of the season on any of the other crucifers.

Peronospora potentillae De Bary. This species was only found once in a shaded place near a house on the leaves of *Potentilla norvegica*.

Sclerospora graminicola (Sacc.), Schröter. This fungus has been abundant at times in past years on *Setaria viridis*; occurred

* Proceedings Am. Assn. Agv. of Science. Washington Meeting, 1891, p. 315.

less frequently during the past season. During the month of May some patches here and there were seen, but not so common as it was in 1892. That year it took away whole patches of this miserable weed. After the fall rains in August the fungus slightly increased somewhat.

Plasmospora halstedii (Farlow), Berlet DeTon. Not observed, but a few years ago it was so abundant as to completely cover the plants of *Helianthus annuus*, *H. tuberosus* and other weeds of the *Compositae*.

Plasmospora viticola (Berk et Curt.), Berl et DeTon. This fungus was so abundant in 1892-93 as to seriously threaten and injure cultivated grapes. It did not appear either on the wild grapes or cultivated, although a diligent search was made for it.

Bremia lactuce Regel. Although abundant in 1893 on several wild species of *Lactuca*, in 1894 it was not found.

Albugo candida (Pers.), Kuntze. On *Raphanus sativa* was abundant, as it was also on *Capsella bursa-pastoris*, oospores abundant in inflorescence of radish.

A. portulacae (D. C.) C. Kuntze. Was abundant during the entire season on *Portulaca oleracea*.

USTILAGINEÆ.

Smuts on some cultivated plants have been very abundant this year.

Tilletia striæformis (West), Magnus. Occurred in places on *Phleum pratense* but not so abundantly as a few years ago.

Tilletia foetans (B. & C.), Trelease. On wheat was not observed.

Urocystis agropyri (Preuss), Schroeter. On *Elymus canadensis* was quite abundant in places.

Ustilago tritici (Pers.), Jensen. Occurred to a considerable extent on both winter and spring wheats.

Ustilago hordei (Pers.), Kellermann & Swingle. Also occurred on barley.

Ustilago nuda (Jensen), Kellerman & Swingle. More common than *Ustilago hordei*.

Ustilago segetum (Bull), Dittm. The usual amount occurred on *Arrhenatherum avenaceum*.

Ustilago avenæ (Pers.), Jensen. Abundant on oats.

Ustilago hypodytes (Schl.), Fr. Found on several occasions on *Stipa spartea* by Mr. Weaver, but not so abundant as reported by Mr. Stewart a few years ago.

Ustilago Rabenhorstiana Kühn. On *Panicum sanguinale* was extremely common everywhere during the latter part of September and early October. Solid blocks of diseased plants were found. Mr. Combs collected a peculiar form in which only a part of the inflorescence was involved. Thus far I had only observed such forms in which the whole inflorescence was involved and the masses covered over with a white membrane.

Ustilago maydis (D. C.), Corda. Corn smut has been unusually severe in many parts of the state this year. Numerous complaints were made showing the devastation and destructive nature of this fungus throughout the state. I have seen it especially abundant here at Ames, Onawa, Turin and Mason City and it is reported as common at Des Moines, Bedford and elsewhere.

Ustilago neglecta Neissl. On *Setaria glauca*. We have had an unusual amount of this fungus again.

Sorosporium syntherisma (Schw.), Farlow=*S. ellisii* Winter. Dr. Farlow writes me that the smut on *Panicum sanguinale* and *P. capillare* after a careful examination from wide range is a *Sorosporium*, and that it is the original *Cæoma syntherisma* of Schweinitz. On *Cenchrus tribuloides* it was very abundant in the western part of the state and also at Ames. As a rule the whole inflorescence is involved as in the form on twitch grass, but this year I found in the western part of the state an abundance of smut on the sandbur in which some of the spikelets only produced long horns which gave the plants a very striking appearance. The same fungus on *Panicum capillare* was not so abundant.

From all these observations it certainly appears that dry weather is not conducive to the checking of smut. F. Lamson, Scribner and Seymour state that in Illinois and Texas they have seen much corn smut during dry seasons.

EXOASCEÆ.

The *Exoasceæ* on the whole were not so abundant this year. I could not find any of the *Exoascus aurea* which in 1892 was very abundant on several species of *Populus*. The *Exoascus deformans* (Berk), (Fuckel), so abundant on peach in 1892, could not be found. The *Exoasci* on various cultivated plums in this state were *Exoascus mirabilis* Atkinson* on *Prunus angustifolia*, Chickasaw county, *Exoascus communis* Sadebeck on *Prunus*

*Cornell University Experiment Station Bulletin No. 73, p. 334.

Americana, Baldwin and Cheney varieties. The Cheney plums and some forms of *Prunus angustifolia* were badly affected. I have never seen any indication of *Eroascus Pruni* on the cultivated *Prunus domestica* here at Ames.

DOTHIDIACEÆ.

Othia morbosa (Schw.), Ellis & Everhart. There has been the usual amount of this fungus. As yet it has not made its appearance on the cultivated *Prunus Americana* or *Prunus angustifolia* nor *Prunus Cerasus*. It has, however, been very destructive to cultivated varieties of *Prunus domestica*. In fact there were but a few varieties which were not affected. I have also seen it on Japan plums here at Ames. It also occurred on *Prunus serotina* and *Prunus Americana* when growing in the woods.

Phyllachora Graminis (Pers.), Fuckel. There has been very little of this fungus on the usual hosts, *Elymus canadensis*, *Panicotomum*.

Phyllachera Trifolii (Pers.), Fuckel, has been quite abundant this fall during the months of September and October after the rains. Red clover (*Trifolium pratense*) was especially affected.

UREDINEÆ.

*I have elsewhere in a paper indicated the scarcity of rusts in general this year, especially grain rusts, *Puccinia Graminis* (Pers.), *P. rubigo-vera* (D. C.), Winter, and *P. coronata* (Cda.) *P. graminis* appeared in considerable quantity on fall sown oats in September and October, beginning after the August rains. It may be interesting to note that the leaves were abundantly affected with *P. graminis* instead of *P. coronata* as is the usual case. Cockle-bur rust (*Puccinia Xanthii* Schw.) occurred in considerable quantity. *Puccinia compositarum* (N. A. F. 2252) was only found once on *Iva xanthiifolia* in the western part of the state. Corn rust (*Puccinia Sorghii*) on *Zea mays* has not been as abundant as heretofore.

Puccinia andropogonis on *Andropogon scoparaius* and *A. furcatus* has not been abundant.

Puccinia tanacetii (D. C.). Occurred in considerable quantities on the cultivated sunflower (*Helianthus annuus*), and the cultivated *Helianthus tuberosus*, also on the wild forms of *Helianthus annuus*, *H. tuberosus* and *H. grosse-serras*.

*Agricultural Science, vol. 8, p. 287.

Uromyces trifolii (A. & S.), Wint. Occurred on *Trifolium pratense* during the month of September in certain places; more abundant during the month of October.

Aecidium grossulariæ (D. C.). Has been abundant on several members of the genus *Ribes*, especially *Ribes grossulariæ*, *R. gracile* and *R. rotundifolium*, except for Aecidia on the barberry, gooseberry, composites and *Oenothera* early in the season. The cluster cup fungi were not abundant.

Roestelia pyrata Thaxter. On *Pyrus Iowensis* was not as abundant as in 1890.

In the spring we found considerable quantities of the *Cæoma interstitiale* Schlechtendal on the blackberry (*Rubus villosus*). Whole bushes over considerable areas in places were affected. If this is connected with *Puccinia Peckiana* it is strange that this rust should be so extremely rare. It has not been found here, although Mr. E. W. D. Holway writes me that he has found it at Decorah.

Melampsora Populina (Jacq.), Lev. Occurred as usual on the cottonwood *Populus monilifera*. Some trees are more affected than others.

Melampsora Salicina Lev. Occurred in some quantities on some of the wild species of *Salix*.

Coleosporium Sonchi-arvensis (Pers.), Lev. Was not common except that Mr. G. W. Carver found a quantity of it growing on asters in the vicinity of Mud Lake, where there was considerable moisture.

Entomosporium maculatum Lev. Only a few specimens here and there on *Pyrus communis*.

HYPHOMYCETES.

Cercospora angulata Wint. Has occurred on *Ribes rubrum* but not severe. In 1893 it was very destructive everywhere in Iowa on this species.

Cercospora baeticola Sacc. Occurred in September but not as destructive as in 1893. •

Monilia fructigena P. The total absence of this fungus during the early part of the season was very noticeable, whereas it was so abundant in 1891, 1892, and 1893 during the months of May, June and August. Later in the season, September and October, it was found on wild plums (*Prunus Americana*).

Cladosporium carpophilum Von Thümen. Although this fungus has been very destructive to *Prunus Americana*, and in some years also destructive to cherries, it has not appeared so far as I know on these hosts this year. Mr. Stewart called my attention to a *Cladosporium* on a species of *Crataegus*. Later the same was found on another tree by Mr. Carver, which produces similar spots frequently encircling the whole fruit at the blossom end. The mature spots have the characteristic olive brown color.

MELANCONIÆ.

Cylindrosporium padi Karst. The entire absence of this fungus is one of the peculiarities of the season. While in 1893 this fungus was very destructive to young cherry seedlings as well as older trees, it was at no time abundant on nursery stock the past season, and very few leaves could be found on other trees. The disease occurred, however, on *Prunus cerasus* and *P. avium*.

Helminthosporium graminum Rabh. This fungus, which for several years past has been very destructive, appeared on some plants, but much less severe than heretofore.

Cladosporium herbarum (Pers.) Link. *This fungus has been reported by several observers as parasitic. I have on several occasions seen spikelets covered with this fungus apparently parasitic. It is indeed hard to say, however, since this fungus so commonly occurs on plants in a dying condition, and in fact everywhere on dead plants, it may be questionable whether this species is parasitic. Dr. Cobb finds it a serious trouble in New South Wales.

TUBERCULARIÆ.

Fusarium culmorum W. G. Smith. A serious enemy to wheat. Some years very abundant. It was only seen and reported a few times this year.

PERISPORIACEÆ.

The mildews have been more noticeable this year than other fungi, although they were less abundant than during the latter part of 1893.

Sphaerotheca mali (Daby) Burrill. This fungus appeared in considerable quantity on young suckers in nursery in June, July, and continued, with some interruption in August, till well into October.

*Frank, Krankheiten der Pflanzen, p. 580.
N. A. Cobb, Plant Diseases and How to Prevent Them, separate p. 10 from Agricultural Gazette, N. S. Wales, December, 1892.

Podosphaera oxyacanthæ (D. C.) DeBary. I have never seen this fungus absent on the cultivated cherry, and this season is no exception to the rule. It began to appear on the cultivated cherry in July and continued till October, although older trees were less affected than young trees in nursery. It was very abundant on young trees of *Prunus pumila* in the nursery. It also occurred to a limited extent on *Prunus Americana*.

Microsphaera Alni (D. C.), Wint. Although occurring on *Syringa vulgaris* and *S. persica*, it did not disfigure the shrubs as usual. The same fungus also appeared on *Lonicera*, though less troublesome than in 1893.

Microsphaera quercinia (Schw.), Burrill. Appeared on the English oak, *Quercus robor*, in September, though not as abundant as in 1893.

Uncinula necator (Schwh.), Burrill. Appeared to a limited extent on Roger hybrids late in September.

Erysiphecommunis (Wallr.), Schl. Appeared in considerable quantities on *Ranunculus abortivus* and *R. lacustris* at Mud Lake, Iowa, where Mr. Carver found the plants covered.

Erisyphë cichoracearum D. C. Was very abundant on *Helianthus annuus*, *H. tuberosus* both cultivated and wild. Also on *Ambrosia artemisiifolia* and *A. trifida*. It was less abundant on *Verbena stricta*, *V. hastata* and *V. Urticifolia* than in 1893.

COINCIDENCE OF PRESENT AND PREGLACIAL- DRAINAGE SYSTEM IN EXTREME SOUTH- EASTERN IOWA.

BY FRANCIS M. FULTZ.

[Abstract.]

The drainage system in southeastern Iowa is believed to be practically the same today that it was in preglacial times. By southeastern Iowa reference is made to the counties of Louisa, Des Moines, Lee, and the eastern part of Henry. Present evidence shows that every stream of any importance is now occupying a preglacial bed. This applies to the Mississippi river