

OUTSTANDING FEATURES OF THE PLANT DISEASE SITUATION IN ILLINOIS DURING 1924

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During the past four years the Botanists of the State Natural History Survey have kept under observation the progress of disease infection among crop plants. The present paper presents a summary of the observations made during 1924, and is the fourth in the series.

In 1924 crop-plant diseases were prevalent, as usual, in epidemic form, and caused considerable losses. The unusual weather conditions favored the development of certain diseases in the north while inhibiting them in the south; and for the same reason several diseases, usually mild, took on serious proportions.

WEATHER SUMMARY

Weather begins to influence crops, and crop diseases, in the fall of the previous season. Certain crops are planted then, to winter in the soil and bear fruit the following summer. These crops are susceptible to the attack of fungi or bacteria from the time they are planted; and these incipient infections may result in the death of disease-weakened plants during severe winter weather without the fungus manifesting itself in the usual way. The fungi are as susceptible to unfavorable weather as are their hosts, and the fall and winter weather may be depended upon to determine in a large degree the abundance of infective material at hand in the early spring months.

September, 1923, while nearly normal for precipitation and temperature, had a very low maximum temperature and a great number of cloudy days, and there was a frost on the 14th—very early in the season. October was a rather cool month with rainfall above normal, which delayed wheat seeding. November was a month of rather mild temperatures with less than the normal rainfall, though the lack was less than an inch generally. December was the warmest of its kind since 1889, with very little snowfall but the greatest rainfall since 1895, except north and west of the Illinois River. January, 1924,

marked a change from the preceding mildness, it being colder than any January since 1918, low temperatures ranging from -4 degrees in the south to -25 degrees in the north. Precipitation was slightly greater than normal. February, with a departure of 2.8 degrees above the normal, was a mild month with, however, frequent snows totalling 10 to 19 inches north and west of the Illinois river. March was cold, cloudy, and with frequent snows—snowfall averaging for the state $2\frac{1}{2}$ times the normal amount. Sunshine was only about half the usual. April was mild and dry, with a temperature 2.2 degrees above the normal and rainfall 1.23 inches less than the average. May was a very cold month—5.8 degrees below normal—but precipitation was nearly normal. June, while not cold, was 1.5 degrees cooler than normal, and very wet, having 2.97 inches of rain more than usual. July was 4 degrees colder than usual with 0.1 inch less of rain than usual. August was normally warm, and heavy local rains covered the north half of the state. September was another cold month—5.1 degrees below normal—although the latter half of the month warmed up as a prelude to the pleasant October which followed. There was a great deficiency of rainfall north and west of the Illinois River, but elsewhere it was near normal.

PREVALENCE OF DISEASE

The common diseases of most crops were more nearly normal in prevalence than in 1923, but in several instances minor diseases, favored by local conditions, assumed serious proportions.

DISEASES OF FRUIT

Among apple diseases, bitter-rot, widely prevalent and serious in the south in 1923, was still more serious than in ordinary years with special centers of intensity in the extreme south. Its appearance in Pike and Adams county marks an unusual northward advance. Scab, the most prevalent of the apple diseases, was prevalent throughout the northern two-thirds of the state. It made its first appearance May 6 in Johnson County, but did

not become general until May 16—two weeks later than usual. Blotch infection, because of a lack of soaking rains, did not become general until after June 15. Twig infection and considerable fruit infection were its outstanding manifestations. It was generally prevalent farther north than usual, and seems to be getting worse there. Black-rot was more prevalent than a year ago, and was of considerable importance as a fruit rot. It had invaded twigs blighted a year ago, and from these spread to the new leaves and the fruit. Fire-blight, though now as usual relatively unimportant on all except a few very susceptible apple varieties, continued more prevalent than in the past and was even more prevalent than last year. It appeared in damaging severity mostly as a late blight on fruit. In the south, Jonathans and Transparents were badly blighted, while in western counties Willow Twigs suffered generally from body-blight. Blister-canker was slightly more prevalent than usual, in spite of the wet season, upon Ben Davis trees. Rust also was more prevalent, but was not seen as far north as last year. Its infection was mostly on leaves, but there was some fruit injury. Powdery-mildew, never common, appeared in a limited territory in the central-west of the state. Brown-rot, usually rare on apples, was common in small northern orchards following codling moth injury after the middle of July. Fly-speck was more prevalent in small orchards but was not general in commercial regions. Sooty-blotch was much more prevalent than usual, being generally abundant in western counties from Mercer in the north to Calhoun and Jersey in the south, and in the southern tip of the state. It was the most general attack of this disease ever recorded in Illinois. Two leaf-spots, due to *Septoria* and *Coniothyrium* fungi, were prevalent in western counties. Jonathan Fruit-spot was rare, undoubtedly because of the small Jonathan crop. In spite of the severe winter and backward spring, there was little frost injury seen.

Pear diseases were in general as bad, or worse, than a year ago. Blight occurred throughout the state, as usual, and was very serious even upon less susceptible varieties such as Garber and Kiefer. The Leaf-spot was prevalent through the central counties causing severe leaf-

spotting and some defoliation. Kiefer is apparently resistant to it. Scab, although of its usual slight importance, was more prevalent than usual, appearing especially in northeastern counties. Leaf-blight was less common than usual, and was seen only in Macon County. Here it appeared on pear fruit—a very unusual thing in Illinois. Black-rot was about as prevalent as usual on pears, causing, however, serious Fruit-rot in a small two acre orchard in Alexander County—the only record of serious fruit injury we have in the state. Rust on Pears was seen only in Hancock County. In Putnam County Scab injury was followed by Pink-rot while the fruit was still on the tree. The severely cold winter temperatures killed about half of the blossoms.

The Quince, which is not widely grown in the state, suffered chiefly from blight, which was on twigs, in Champaign County and in southwestern counties. The Leaf-spot was seen only in St. Clair County.

The Peach crop was seriously injured north of Carbondale by severe winter temperatures. Still, the diseases were generally more prevalent and severe than usual. The Bacterial Shot-hole was very much more prevalent than usual and occurred throughout the southern two-thirds of the state. It attacked the fruit and leaves of all varieties, but the Jasper and Newton trees were relatively free of it. Brown-rot was much less abundant than usual. It appeared early as a twig-and-blossom-blight and later as fruit-rot, but the small Peach crop prevented the usual serious injury. Leaf-curl was much less prevalent than last year, but was present in about the usual amount throughout the state and especially in a belt of counties just south of the center. Scab was less than usual, being limited to the extreme southern counties, where it resulted in the cracking and marring of fruit. Die-back was prevalent upon twigs weakened or injured by the cold.

The Cherry crop, which was not injured by the severe temperatures of January, suffered very seriously from the attack of Brown-rot throughout the northern half of the state. Compiled notes taken on the prevalence of this disease indicate 16 per cent of diseased fruit in commer-

cial orchards. Yet the crop was so abundant that the disease was of little significance. The Cherry Leaf-spot began to appear in southern counties about June 10, and before the summer was over became very prevalent in the north.

Plums did not suffer to any extent from the severe colds of January. Brown-rot, always a common malady, was especially prevalent north and west of the Illinois River. The Shot-hole was very much less common than in the year previous and caused little damage. The Bacterial Shot-hole, as on Peaches, was much more prevalent and next to Brown-rot in importance. It occurred throughout the state, but was most serious north and west of the Illinois River. Black-knot was as prevalent as usual, with a region of severe attack in a few central counties. The Leaf-curl of Hortulana Plums, caused by *Exoascus mirabilis* Atk., was common in eastern counties, and was found in McDonough County—the first record of its occurrence in western Illinois.

The Grape crop suffered some from early frosts, but the great reduction in fruit setting was due to successive rains during the blossoming period. Black-rot became prevalent after the first of July, causing considerable fruit-rot; but it was unusually rare as a Leaf-spot. Downy-mildew was the most important disease, greatly injuring leaves throughout the state after the middle of July. Powdery-mildew was more prevalent throughout the central counties than last year, but was not serious. Anthracnose was prevalent and often severe in Madison County; and a Chlorosis, apparently associated with root worm injury, was seen in Cass County.

On the Blackberry and Dewberry the Orange Rust was slightly more prevalent than usual and extremely important locally, while Anthracnose was prevalent as usual, though apparently a little less serious.

Among the Raspberry diseases Anthracnose appeared more prevalent than usual and was the most serious of these diseases. The Leaf-spot was especially abundant in northwestern counties, and Cane-blight was common in some large plantations in the same district. Powdery-mildew, while rather more prevalent than usual in the

north half of the state, was of slight importance. Virus diseases such as Mosaic and Leaf-curl were widely prevalent, and the important Bramble-streak was found in all berry-growing sections.

Gooseberry Anthracnose was no more prevalent than usual but was serious locally north of the Illinois River. The Leaf-spot was abundant this season in the northwest, while in 1923 it was abundant in the southern tip.

The Currant Leaf-spot was prevalent, but not severe, in the north central counties.

CEREALS

Corn was subject, as usual, to severe Root-rot injury, which was increased considerably by the unusual abundance of the Southern Corn-root Worm. The Black-bundle disease was the most important of the identifiable Corn diseases, occurring throughout the state and being especially severe in the central counties. The Diplodia Ear-rot became prevalent late in the season and was an important contributor to the poor seed harvest. Smut was especially a disease of the ears, representative counts over 1385 acres showing 4.6 per cent of the ears smutted. Brown-spot, though more prevalent than usual, was still a minor disease with only rare instances of damage. Rust was much more extensive in its distribution than hitherto known in the state but was probably of little consequence.

Among Wheat diseases Leaf-rust was, as usual, the most important, although slightly less prevalent than usual. Stem-rust, though more abundant than usual, was decidedly less prevalent than in 1923, appearing later, and doing very little damage. Stinking-smut was apparently much reduced in importance from a year ago, although it was still sufficiently abundant in the harvested crop to result in a considerable dockage. Loose-smut was more widely prevalent than usual, but the infection was noticeably smaller than usual. Flag-smut was prevalent in the districts where it had previously been found. Scab did considerable damage in many localities, particularly in the northern half of the state. Anthracnose was especially prevalent in west central counties. Speckled Leaf-blotch was prevalent throughout the state, except in a

few extreme northern counties. Powdery-mildew, rarely seen in Illinois, was severe locally in Lake and DuPage counties; and Ergot, also rarely seen on Wheat in Illinois, was generally prevalent in the second tier of counties south of the northern border. Wheat plants were found parasitised by a tiny mushroom, *Marasmius scorodonium*, in Knox County. Two physiological troubles were prevalent. A Strip disease was very prevalent in southwestern counties, affecting leaves from about June 5, to harvest; and a blast, similar to oak blast, was observed in Carroll County.

Oats suffered most severely from Smut, the infection reaching as high as 55 per cent in some shocks, with an average for all cases observed of 5.7 per cent. Crown-rust was of very little importance, although the attack was quite general in northern counties. Stem-rust, of little significance on wheat, became unusually prevalent in Oats, and 10 per cent infections were not unusual in the north half of the state. Scab, though more than usually abundant, was of little significance except in a few counties in the upper Illinois valley. Halo-blight, not hitherto common in Illinois, was found in 12 widely separated counties reaching from Union county in the south to Carroll county in the north. Blast, a physiological disease of considerable significance every year, was especially prevalent in the extreme north where it seriously curtailed the yield. Anthracnose was of slight importance generally although prevalent northward. Leaf-spots due to *Helminthosporium* were prevalent in 3 southern counties, while another Leaf-spot, caused by *Scolecotrichum graminis*, not hitherto known to occur in Illinois, was found in Jasper county.

Rye, which is widely though not extensively grown in the state, did not suffer seriously from any one disease, but the total effect of the disease was considerable. Leaf-rust was prevalent throughout the state, and Stem-rust was common in a few northern counties. Smut was unusually light, and occurred farther north than in 1923, while Ergot was generally prevalent north and west of the Illinois river. Scab and Anthracnose were both prevalent in the northwest, and Powdery-mildew

was found in DuPage county. The mushroom, found attacking wheat, was also found on Rye in Carroll county.

Barley, which is grown intensively only in the northern third of the state, suffered rather more than usual from most diseases. Loose-smut was prevalent throughout the barley region, causing appreciable losses in almost every field. Covered-smut, usually rare in Illinois, was seen several times and one instance of a 7 per cent infection was recorded. Scab was much more prevalent than usual throughout the northern counties as was Stripe, the Stripe diseases being second only to Loose-smut in importance. Leaf-rust, though slightly more prevalent than usual, was not serious; and Stem-rust, though much more prevalent than usual, seemed less severe even than the Leaf-rust. Anthracnose attack was not so general as the other diseases, being largely limited to the north eastern counties. Ergot was prevalent over a wider area than heretofore, but the individual infections were much less serious. Spot-blotch, not often seen in Illinois, was found in three northern and one southern county. Infections of Powdery-mildew were found for the first time on barley in the state, the disease being prevalent in the north eastern corner. The mushroom mentioned in connection with wheat and rye was found on Barley in DuPage County.

A Leaf-spot, due to *Piricularia grisea*, was found generally on Millet in the southern half of the state; and Scab, Anthracnose, and an *Helminthosporium* Leaf-spot were seen on Spelt in Will County.

FORAGE CROPS

Timothy was subject to but three diseases of any importance. Stripe-smut was found only in Jasper County; Stem-rust was prevalent throughout the north half of the state; and a Leaf-spot, caused by *Scolecotrichum graminis* Fekl., was prevalent and injurious north and west of the Illinois River.

Alfalfa diseases were unusually numerous. Yellows was prevalent everywhere but was especially abundant in the north. The *Pyrenopeziza* Leaf-spot was found in

the state for the first time, causing slight damage in Will County. Three other Leaf-spots, each of considerable importance, were found in serious quantities, and are discussed especially in a separate paper.

Clover was covered, as it has been for three seasons, with Powdery-mildew; and a *Cercospora* Leaf-spot was prevalent in the central counties.

Soy Beans, especially in the central part of the state, suffered from Bacterial injury, and Cow Peas were often lightly infected with Leaf-spot.

TRUCK CROPS

Potatoes suffered from the usual diseases. Scab was prevalent throughout the state and especially abundant in northern counties. Early-blight was the most important Leaf disease, being very prevalent north and west of the Illinois River. Black-leg was unusually common in the southwestern potato district. Late-blight, very rarely seen in Illinois, was serious in McHenry County, and the *Rhizocotonia* disease was also prevalent and serious northward.

Tomatoes suffered generally from Mosaic and from a Wilt, the cause of which is not known. Early-blight was especially prevalent northward, and the Leaf-spot, the commonest disease in the state, was especially severe in the northwest.

The Egg Plant suffered considerably in the Peoria and Chicago districts from the *Phomopsis* Leaf-spot and Fruit-rot.

Cabbage Yellows was not reported once during the season although it must have been prevalent; but Black-rot was very common and very severe in the north half of the state. Club-root was present in Kane and Cook counties and a Leaf-spot, caused by *Cercospora bloxami*, was seen occasionally in the northwest. Cauliflower suffered somewhat from Black-rot in LaSalle, Will, and Cook counties.

Beans had four serious diseases. Anthracnose was of considerable importance in counties along the Illinois River, while Rust was prevalent in the south half of the state. Bacterial Blight was widely distributed, causing

leaf spotting throughout the northern counties and serious pod injury in Massac County. A *Cercospora* Leaf-spot was seen in Shelby County.

Peas appeared to suffer from diseases in the north half of the state especially. The *Septoria* Leaf-spot was prevalent in the extreme north, and the *Mycosphaerella* Pod-spot was generally serious in northern counties. Powdery-mildew attack was seen only in DuPage County.

Two diseases of Lettuce were reported. *Septoria* Leaf-spot was prevalent especially in northeastern counties, and Downy-mildew was found in Stephenson and Lee counties.

Beet and Swiss Chard were generally subject to the effects of the *Cercospora* Leaf-spot, although the disease appears to be generally less abundant on the latter. The *Phoma* Leaf-spot was present in scattered areas in Cook County.

Asparagus Rust was prevalent in the usual amount throughout the state; but there was an increase in the amount of Anthracnose; and a Pink Mold, caused by *Botrytis*, appeared in severe quantities in Alexander, Union, and Adams counties.

Okra was subject to a Leaf-spot, caused by *Phyllosticta hibisci*, in Jackson and Alexander counties.

The *Ramularia* Leaf-spot of Horseradish was seen in Cook County and the *Cercospora* Leaf-spot was prevalent in the west. White Rust was seen in Adams County.

Parsnips were generally affected by the *Cercospora* Leaf-spot in the north; Carrots suffered especially from the bacterial Soft-rot, and Celery from the *Cercospora* Leaf-spot in Peoria County.

Onions in Rock Island County were affected with the *Cleistothecopsis* Black-spot. Peppers in Alexander County were affected, though slightly, with an *Alternaria* Fruit-rot.

Diseases of Cucurbits were prevalent and often severe in all commercial districts. Watermelon Wilt is estimated to have caused a loss of 15 per cent of the crop, yet it was less abundant than usual. Anthracnose was most severe on Watermelons, occurring in all parts of the state and doing considerable leaf and fruit injury;

on Cantaloupe it was equally prevalent but less serious in its effect; and on Cucumbers it was serious locally in the southern tip of the state. Bacterial Wilt was very severe in all but the most northern counties on Cantaloupes, Cucumbers, and Pumpkins, causing great losses in many fields. The Angular Leaf-spot was also much more prevalent, though not extremely injurious, in a few northern counties. Mosaic was extremely prevalent on Cucumbers, but less so on Cantaloupes.

OTHER CROPS

The recent development of cotton culture in southern counties calls attention to possible cotton diseases. The Bacterial Leaf-spot and Boll-rot is already present and prevalent, and constitutes the most important of the diseases thus far observed. It was found in Saline, Union, Alexander, Pulaski, and Massac county fields during mid-season as a Leaf-spot and later as a Boll-rot. Two other Leaf-spots were observed to be prevalent, one due to a *Cercospora* and the other to a *Phyllosticta*.

Sunflowers, though not generally grown, have a local importance. Rust was found attacking them in three southern counties, and a *Septoria* Leaf-spot was prevalent also in the extreme south.