

A SUMMARY OF THE PLANT DISEASE SITUATION IN 1922 WITH RESPECT TO THE CROPS OF ILLINOIS

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Plant diseases are factors of extreme importance in crop production. Each year crop reductions are attributed to them which, if translated into terms of dollars, would appear amazingly large. All are not equally severe every year, but vary according to climatological conditions and the abundance of infectious materials. Observations of plant disease from year to year are useful in that they tend to indicate what may be expected under specific conditions subsequently, and their publication is justified as forming a concise and permanent record for future reference.

A year ago the writer prepared a statement of the purposes of a plant disease survey of the state, conducted as a part of the activities of the State Natural History Survey Division, and included a number of observations on plant disease conditions during 1921.

This paper proposes to summarize briefly the disease situation with respect to the crops of the state for the year 1922. In securing the material upon which the summary is based a force of four men was placed in the field from about the first of June until the last day of August. Their reports and observations are substantiated by representative specimens of disease deposited in the Survey Herbarium. A considerable amount of additional material has been obtained from other sources.

WEATHER CONDITIONS

The abundance and severity of plant infection is always influenced extensively by climatological conditions. As a whole these conditions were not conducive to the development of severe infections during 1922. The year was the warmest, with the exception of 1921, in the climatological history of Illinois. The precipitation was below normal throughout the state, while during the crop growing period the precipitation was 15 per cent less than normal for that period.

The rather warm winter of 1921-22 allowed certain of the rusts to overwinter and probably was helpful in providing an unusual amount of viable infectious material. Frequent showers with excessive precipitation during early spring was productive of certain early fruit disease infections and of rust epidemics. On late maturing crops, and on crops not planted until the wet period had passed, these diseases were held in check by the subsequent dry and hot weather.

CEREALS

Barley: Loose smut (*Ustilago nuda* (Jens.) K. & S.) was about the same in severity as in the average year. Our estimates indicate 0.2 per cent of the plants of the state affected, with a crop loss probably not large enough to be estimated.

Stem rust (*Puccinia graminis* Pers.) was generally prevalent in small amounts, and resulted in only very slight losses.

Corn: Bacterial wilt (*Pseudomonas stewarti* E. F. S.) was locally important, but was not an important factor in reducing the yield of the state.

Brown spot (*Physoderma zeae-maydis* Shaw) was less severe than usual. Reports and specimens collected through the state indicate that it has extended its range northward to Lee county.

Rosen's disease (*Pseudomonas dissolvens* Rosen), hitherto noted in two counties, made its appearance in Union County. Here a field of 10 acres showed 1 per cent of the stalks diseased. The characteristic twisting at the base of the stalk was present throughout the infected area. Later examination of material from the infected field by Dr. Rosen positively identified the disease.

Rust (*Puccinia sorghi* Schw.) appeared later, and was less abundant in the state, than usual. Undoubtedly, the dry hot weather during the usual infection period served to minimize the infection.

Smut (*Ustilago zeae* (Beckm.) Ung.) was apparent in about the same amount as during average years. A reduction in yield for the entire state of 2.5 per cent is estimated.

Oats: Blast (cause unknown) appeared throughout the state, but was met with most frequently in the east-central part. A loss of 5 per cent of the crop of the entire state is estimated.

Crown rust (*Puccinia coronata* Cda.) appeared in rather more than its usual abundance. A mild winter, through which a large quantity of severely infected volunteer oats lived, provided an abundance of infective material for the year's crop. A loss of 4 per cent is estimated.

Smut (*Ustilago avenae* (Pers.) Jens.) was common everywhere and is estimated to have reduced the crop by 5 per cent.

Stem rust (*Puccinia graminis*, Pers.) was rare in the southern part of the state, and only slightly more frequent in the north. Nowhere was it severe. The wet spring, with its consequent late seeding, was probably instrumental in reducing the early infections, and the dry hot periods that followed prevented further serious development.

Rye: Ergot (*Claviceps purpurea* (Fr.) Tul.) was not abundant. We have estimated that less than 0.2 per cent of the plants of the state were infected. Damage to the crop was so slight as to be incapable of estimation.

Smut (*Ustilago* sp.). An undetermined species of *Ustilago* was found in a rye field near Mitchell in Madison County by Dr. R. D. Rands.

Leaf rust (*Puccinia dispersa* Eriks.) was prevalent and is estimated to have reduced the crop of the state by 2 per cent.

Stem rust (*Puccinia graminis* Pers.) was common everywhere, but the total infection was slight indeed, and resulted in very little crop loss.

Wheat: Bunt (*Tilletia laevis* Kuhn) was especially important in some northern counties. One county estimates a cash dockage at the mill or elevator of not less than \$2000. The reduction in yield for the entire state is estimated at 2 per cent.

Flag smut (*Urocystis tritici* Koern). A special survey made during April, May and June increased the area of known infection from 75 square miles in Madison and St.

Clair counties to an area of about 500 square miles including parts of two additional counties, Jersey on the north, and Monroe on the south. A few fields located within the original infested area showed spots where the infection ran as high as 30 per cent.

Foot rot, rosette, etc. (*Helminthosporium* spp.) was of local occurrence and of local importance only.

Leaf rust (*Puccinia triticina* Eriks.) appeared southward in epidemic form. Probably every field of winter wheat in the state was infected. The most serious losses occurred in the spring wheat region in southwestern Illinois where twelve counties report an average crop reduction of 1.51 bushels per acre or a total loss of 1,233,400 bushels from an approximate acreage of 822,000. A total reduction of 10 per cent of the winter wheat crop of the state appears to be a conservative estimate.

Loose smut (*Ustilago tritici* (Pers.) Rostr.) appeared in its usual abundance throughout the state, but the losses sustained appear to have been much more severe northward. It is estimated that this disease is responsible for a 4 per cent reduction in the yield of the state.

Stem rust (*Puccinia graminis* Pers.) was prevalent throughout the state, but the infection was slight and the loss not estimable. It is noteworthy that no instance has yet been found where the presence of the common barberry has been responsible for epidemics of any considerable extent or importance.

FORAGE CROPS

Alfalfa: Leaf spot (*Pseudopeziza medicaginis* (Lib.) Sacc.) was of common occurrence but was not responsible for important losses except locally.

Rust (*Uromyces striatus* Schr.) was found in one field in Edgar county. This is the first known occurrence of this disease in Illinois.

Wilt (*Fusarium* sp.) made its appearance in Randolph county during April. This disease seems not to have been described in pathological literature. Young plants only appear to be attacked, the disease showing first as a wilt on the lower leaves. The crown of the plant and the stems arising from it are cankered and blackened, and

covered with a pinkish cushion of mycelium which bears the spores in abundance.

Clover: Powdery mildew (*Erysiphe polygoni* DC.) appeared over the entire state in great abundance. Probably the mild winter allowed a considerable quantity of infectious material to live over from the epidemic of the previous fall, and certainly the spring weather was conducive to its early and general development. Although considerable apprehension was apparent among farmers lest the presence of the mildew might materially damage the crop or impair its value for feeding purposes, there was little loss to be attributed to the disease.

Rust (*Uromyces trifolii* (Hedw.) Lev.) was not of frequent occurrence. It was observed chiefly in the northern half of the state, and caused no appreciable loss.

Cow Pea: Leaf spot (*Cercospora cruenta* Sacc.) was found in the state for the first time, near Makanda in Jackson county. The increased planting of cow peas, soy beans and other leguminosaeous crops within the state furnishes an economic importance for many diseases hitherto regarded as important merely from a mycological standpoint.

Sweet Clover: Anthracnose (*Colletotrichum trifolii* Bain) was reported generally from the northern part of the state, but appears to have been serious only locally. No appreciable loss can be attributed to it.

Anthracnose (*Gloeosporium caulivorum* Kirch.) was reported from Kankakee county, but was not severe.

FRUIT CROPS

Apple: Bitter rot (*Glomerella cingulata* (Stonem.) S. & v. S.) was of little importance. It was found once in Saline, once in Massac, and once in Pulaski county. The earliest date of appearance reported was at Stonefort, July 22.

Black rot (*Physalospora cydoniae*, Arn.) was somewhat less abundant than usual. A crop reduction of 2 per cent may be attributed to it.

Blister canker (*Nummularia discreta* Tul.) appears to be increasing in abundance and occurs throughout the

state. It is estimated to have caused damage to trees equivalent to a crop loss of 1 per cent.

Blotch (*Phyllosticta solitaria* E. & E.) appears commonly as far north as Champaign county. Year by year it is migrating northward. A crop reduction of at least 5 per cent is attributed to it.

Brown rot (*Sclerotinia cinerea* (Bon.) Schroet.) was found July 13, near Francis, in Saline county, and was found later in Jackson, Monroe and Randolph counties. It occurred only sparingly, and caused little if any reduction of the crop.

Rust (*Gymnosporangium juniperi-virginianae* Schw.) was less abundant than usual, and appeared chiefly on the leaves. It occurred throughout the southern half of the state. It was reported to be severe on the Mississippi bluffs in Whiteside county, and near Martinsville in Clark county. The crop reduction is estimated as 1.5 per cent. There appears to be a general correlation between the range of cedar infection in the state and the range of the rust on the apple.

Crown gall (*Pseudomonas tumefaciens* E. F. S.) was reported from Williamson county.

Fire blight (*Bacillus amylovorus* (Burr.) Trev.) occurred in every county in the state. It was more abundant than last season, but occurred chiefly as leaf and twig blight. The crop reduction is estimated to have been not more than 1 per cent.

Fly speck (*Leptothyrium pomi* (Mont. & Fr.) Sacc.) was generally distributed. A few instances of severe infection with consequent serious defacement of the fruit appeared in the extreme south.

Leaf spot (*Septoria pyricola* Desm.) was found in Jackson, Saline, Union and Pulaski counties. Two reports show 100 per cent and 40 per cent respectively of infected leaves on the trees. So far as we can determine, this appears to be the first report of the occurrence of this disease in Illinois.

Powdery mildew (*Podosphaera leucotricha* (E. & E.) Salm.) was not abundant and caused very little damage.

Scab (*Venturia inaequalis* (Cke.) Wint.) was severe locally and was present in its usual abundance through-

out the entire state. It is estimated to have caused a reduction in the crop of 4 per cent.

Sooty blotch (*Gloeodes pomigena* (Schw.) Colby) was practically coexistent with fly speck, and caused no damage.

Apricot: Leaf blight (*Pseudomonas pruni* E. F. S.) was found twice in southern Illinois. One collection is from Massac county and one from Saline county. This is the first report of occurrence on this host in Illinois.

Cherry: Bacterial shot hole (*Pseudomonas pruni* E. F. S.) was reported from Galatia, Saline county, July 13. Subsequent reports came in from scattered localities throughout the state. The infection was slight in all cases. This is the first report of occurrence on this host in Illinois.

Brown rot (*Sclerotinia cinerea* (Bon.) Schroet). Two collections were made, one in Jackson and one in Edwards county. Neither was severe.

Powdery mildew (*Podosphaera oxycanthae* (Fr.) deBary) was abundant over the state, and in most cases appeared to be rather severe. A crop reduction of 1.5 per cent has been attributed to it. The earliest collection was made near Whittington, in Franklin county, June 24.

Shot hole (*Coccomyces hiemalis* Higg.) was slightly more severe than usual. It occurred uniformly over the state and was the cause of some slight reduction in the crop.

Peach: Bacterial shot hole (*Pseudomonas pruni* E. F. S.) appeared in its usual abundance. There was considerable leaf injury with serious defoliation locally. It is estimated that 90 per cent of the peach trees of the state suffer from the attack of this disease annually. The probable crop reduction for 1922 is estimated at 2 per cent.

Brown rot (*Sclerotinia cinerea* (Bon.) Schroet.) appeared generally over the state. The moist spring weather gave opportunity for an early development of blossom and twig blight which was first reported early in April from Madison county. Extremely dry and hot weather later in the season held the fruit infection in check. The first fruit rot was reported June 26 from

Hoodville, Hamilton county. A crop reduction of 1 per cent probably occurred.

Leaf curl (*Exoascus deformans* (Berk.) Fckl.) was slightly more abundant than usual and occurred throughout the state. It is estimated to have had an injurious effect equivalent to a 2.5 per cent crop reduction.

Scab (*Cladosporium carpophilum* Thuem.) was responsible for a slight injury to the crop. Our first report came from Jefferson county where it was found June 22.

Pear: Black rot (*Physalospora cydoniae* Arn.) was found only in Randolph and Jackson counties. The first report came from DeSoto, August 19.

Fire blight (*Bacillus amylovorus* (Burr.) Trev.) was somewhat less severe than usual. A reduction of 5 per cent in the yield of the state is estimated.

Leaf blight (*Fabraea maculata* (Lev.) Atk.) was severe locally but did not materially affect the crop. Our first report came from near McLeansboro in Hamilton county June 26. It was reported as far north as Morrison in Whiteside county.

Leaf spot (*Mycosphaerella sentina* (Fr.) Schr.) was not commonly found. The first report was from Coles county, August 29.

Scab (*Venturia pyrina* Aderh.) was found in Jackson, Coles and Edgar counties. The earliest collection was made near Makanda, July 19.

Plum: Bacterial shot-hole (*Pseudomonas pruni* E. F. S.) appeared throughout the state and resulted in a slight crop reduction.

Black knot (*Plowrightia morbosa* (Schw.) Sacc.) appears to be common only in the eastern and southern part of the state.

Brown rot (*Sclerotinia cinerea* (Bon.) Schroet.) was rather less severe than usual. It probably caused a crop reduction of 5 per cent.

Leaf blight (*Coccomyces prunophorae* Higg.) appeared to be slightly more abundant than usual throughout the state, although no appreciable damage can be attributed to it.

Leaf curl (*Exoascus mirabilis* atk.) was more abundant than last year, especially southward. The continual

blighting and killing of terminal buds that occur each year justify an estimate of damage done equivalent to a yearly crop reduction of at least 1 per cent.

Quince: Fire blight (*Bacillus amylovorus* (Burr.) Trev.) occurred occasionally on twigs and fruit but was not generally important.

Leaf blight (*Fabraea maculata* (Lev.) Atk.) was as common as usual and resulted generally in slight defoliation. It was collected in seven counties, the earliest collection being made July 5 at Mt. Carmel.

Powdery mildew (*Podosphaera oxyacanthae* (D. C.) deBary) was found in Coles and Edgar counties. The date of collection was August 29. This is the first report of the presence of this disease on this host in Illinois.

SMALL FRUITS

Blackberry: Anthracnose (*Plectodiscella veneta* Burk.) is the most important blackberry disease in the state. It occurs throughout the state, and is especially abundant northward. We have estimated a crop loss from this source of at least 3 per cent.

Cane blight (*Leptosphaeria coniothyrium* (Fckl.) Sacc.) occurs throughout the state. It is probably more severe southward.

Leaf spot (*Septoria rubi* West) was abundant everywhere and is believed to have been responsible for a crop reduction of at least 1 per cent.

Leaf spot (*Cercospora bliti* Tharp) was found twice in southern Illinois. This disease is reported to be severe in Texas. This is the first report of its presence in Illinois.

Orange rust (*Gymnoconia interstitialis* (Schlecht.) Lagerh.) was locally abundant and severe.

Gooseberry: Anthracnose (*Pseudopeziza ribis* Kleb.) caused serious defoliation locally, and occurred as a mild infection generally over the state.

Leaf spot (*Septoria ribis* Desm.) was common throughout the state, and was sufficiently injurious to be estimated as equivalent to a 1 per cent crop reduction.

Powdery mildew (*Sphaerotheca mors-uvae* (Schw.) B. & C.) was collected near Ridgway in Gallatin county July 15.

Grape: Black rot (*Guignardia bidwellii* (Ell.) V. & R.) appeared to be rather more severe than usual. An estimated loss of 5 per cent of the crop was not so evident, although really larger in proportion, to the grape grower on account of the unusually favorable weather conditions and a consequent excellence and abundance of crop.

Downey mildew (*Plasmopara viticola* (B. & C.) B. & deT.) was slightly less severe than usual and occurred throughout the state. A loss of 1 per cent is estimated. It was first reported June 9 near Lebanon in St. Clair county.

Powdery mildew (*Uncinula necator* (Schw.) Burr.) was probably as abundant as usual. The earliest collection was from Alexander county, August 17.

Strawberry: Leaf blight (*Dendrophoma obscurans* (E. & E.) Anderson) was noted to be more abundant than heretofore.

Leaf spot (*Mycosphaerella fragariae* (Schw.) Lind.) was very abundant and is estimated to have taken its usual 10 per cent toll of the crop of the state.

TRUCK AND GARDEN CROPS

Asparagus: Rust (*Puccinia asparagi* DC.) was common throughout the state. The first collection was made near Geff in Wayne county, July 1.

Anthrachnose (*Colletotrichum* sp.) was collected August 26, near Polo in Ogle county. It was collected later in Champaign county. This is the first report of this disease in Illinois.

Bean: Anthrachnose (*Colletotrichum lindemuthianum* (S. & M.) B. & C.) was generally distributed, but less severe than usual. The first collection was made in Jackson county, August 19.

Bacterial blight (*Pseudomonas phaseoli* E. F. S.) was of slight importance although of general occurrence. The first collection was made June 22 in Jefferson county.

Rust (*Uromyces appendiculatus* (Pers.) Lev.) was more abundant than usual, and was reported to be severe in some localities in the south. The first collection was made July 27 near Parker in Johnson county.

Beet: Leaf spot (*Cercospora beticola* Sacc.) occurred in almost every garden in the state. There was no apparent loss.

Cabbage: Black rot (*Pseudomonas campestris* (Pam.) E. F. S.) was serious in some localities and is estimated to have reduced the crop of the state by 1 per cent.

Yellows (*Fusarium conglutinans* Woll.) still continues to be the limiting factor in cabbage production. It is estimated to have caused a crop reduction of 5 per cent. Seed of resistant varieties is not commonly used. The chief method of control now practiced consists in a systematic change of crops on infected soil.

Cantaloupe: Bacterial wilt (*Bacillus trachiephillus* E. F. S.) was more serious than usual. In the Poag Station melon district in Madison county the infection was particularly bad.

Celery: Late blight (*Septoria apii* (Br. & Cav.) Chest.) was not common, but caused severe loss where the Skinner system of overhead irrigation was practiced.

Lettuce: Leaf spot (*Septoria lactucae* Pass.) was of some importance throughout the state. The earliest reported occurrence was June 30 in Wayne county.

Pea: Powdery mildew (*Erysiphe communis* Wallr.) was destructive on the late maturing varieties. Collections were made of this disease in five counties, the earliest of which was near Ryder in Jefferson county, June 23.

Pepper: Fruit rot (*Alternaria* sp.) was collected near Charleston in Coles county, August 28.

Potato: Early blight (*Alternaria solani* (E. & M.) J. & G.) was general and is estimated to have damaged the plants to an extent equivalent to a crop reduction of 1 per cent.

Rhizoctonia disease (*Corticium vagum* Burt.) was found once only. It was collected June 23 near Ryder in Jefferson county.

Scab (*Actinomyces scabies* (Thax.) Gussow) was common over the state.

Radish: Downey mildew (*Peronospora parasitica* (Pers.) deBary.) was collected once.

White rust (*Albugo candida* (Pers.) Rous.) occurred occasionally. The first collection was made July 10 near Carmi in White county.

Rhubarb: Crown and stalk rot (*Phytophthora* sp.) was still severe in Union county.

Leaf spot (*Phyllosticta* sp. and *Cercospora* (?) sp.) were common in all localities but caused little if any loss.

Sweet Potato: White rust (*Albugo ipomoeae-panduranae* (Schw.) Sw.) was generally distributed but less abundant than usual. The first collection was made July 31 in Hardin county.

Tomato: Blossom end rot (physiological) occurred throughout the state and is estimated to have reduced the crop by 1 per cent.

Early blight (*Macrosporium* sp.) was generally distributed over the state and was usually severe. It is estimated to have resulted in a crop reduction of 4 per cent.

Leaf spot (*Septoria lycopersici* Speg.) was prevalent, but reduced the crop less than 1 per cent.

Wilt (*Fusarium lycopersici* Sacc.) was abundant and severe generally. It is the most serious disease the commercial grower has to contend with. The crop reduction is estimated at 10 per cent.

Watermelon: Wilt (*Fusarium vasinfectum* Atk.) was unusually serious. Its distribution was general. Many fields were totally destroyed. The disease is estimated to have caused a crop reduction of not less than 25 per cent for the entire state.

ORNAMENTAL AND MISCELLANEOUS PLANTS

Carnation: Rust (*Uromyces caryophyllinus* (Schw.) Wint.) was generally distributed. The first collection was made at Belleville, June 10.

Evonymus: Powdery mildew (*Microsphaera alni* (Wallr.) Salm.) was common late in the season, but did not greatly injure the appearance of the shrub.

Impatiens: Rust (*Puccinia impatientis* Arth.) was found in White, Hamilton, Edwards and Jefferson counties. The first collection was made at Texico, June 21.

Lilac: Powdery mildew (*Microsphaera alni* (Wallr.) Salm.) resulted in some defoliation. The earliest collection was made June 24 at Whittington.

Rose: Leaf spot (*Diplocarpon rosae* Wolf.) was common throughout the state on cultivated plants.

Powdery mildew (*Sphaerotheca pannosa* (Wallr.) Lev.) was present over the southern half of the state on cultivated roses in epidemic form. Considerable defoliation resulted later in the season when the hot, dry weather appeared.

Symphoricarpos: Powdery mildew (*Microsphaera alni* (Wallr.) Salm.) was abundant everywhere. The earliest collection was made July 3, in Edwards county.

Virginia Creeper: Leaf spot (*Guignardia bidwellii* (Ell.) V. & R.) was abundant throughout the state.

Zinnia: Powdery mildew (*Erysiphe cichoracearum*, DC.) was collected August 31 at Chrisman. This is the first report of this fungus on this host for Illinois.

SUMMARY

The outstanding features of the year appear to have had a direct connection with climatological conditions. The greater number of diseases were either about the same as in an average year or caused less than the usual crop reduction. Noteworthy conditions included the early appearance of brown rot as a blossom and twig blight on peaches, the widespread epidemic of powdery mildew on clover and cultivated roses, the serious losses occasioned by leaf rust in the winter wheat area, the abundance of crown rust on oats, and the unusual and destructive outbreak of the wilt diseases of cantaloupe and watermelon.