

INDIANA PLANT DISEASES, 1926¹

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This is the eighth³ of a series of annual summaries of the plant disease situation in the state. No claim for completeness is made.

The weather during the 1926 season, as shown in the graphs in figure 1, was characterized by a cold March, April and June; by dry weather in May and June, and exceedingly high rainfall in late August, September, and October. The dry weather in the spring checked apple scab and rust and the cereal rusts, and the hot weather was not sufficiently prolonged to favor the *Fusarium* wilt diseases. The wet weather late in the season greatly favored apple bitter rot, *Phytophthora* and other rots of tomato fruit, late blight of potatoes, and black rot of sweet potatoes.

Apple.—Scab, caused by *Venturia inaequalis*, was very light this year, except in the northeast corner of the state, where Burkholder found it serious, especially on the Winter Banana and Kinnard varieties.

Blotch, caused by *Phyllosticta solitaria*, was worse than in 1925, but not as bad as in 1924. By exposing healthy, potted Oldenburg nursery trees under badly cankered old trees, and changing these nursery trees after each rain, Kohl⁴ found that infection at Mitchell occurred only during the rains of May 31 and June 11 and 12, 21 days and 32 days after petal-fall, although 14 rain periods were thus tested. At Lafayette, however, he found that infection occurred during 10 out of 24 rain periods tested. The dates when infection occurred ranged from five days to eight weeks after petal fall (May 18).

In blotch spray tests at Mitchell, both the Bordeaux and lime sulphur sprays at two, four, and six weeks after petal-fall proved effective. The effectiveness of early canker eradication and prevention in young orchards by cutting out the old cankers and spraying to prevent new ones was proved at Vincennes by the practical freedom from blotch of the fruit in two unsprayed blocks⁵ of Oldenburg trees, the same blocks left unsprayed last year. That the disease is carried far and wide on nursery stock was further proved by the discovery of cankers on young

¹ Contribution from the Botanical Department, Purdue University Agricultural Experiment Station, Lafayette, Indiana.

² The writer wishes to acknowledge the coöperation of H. S. Jackson, E. B. Mains, G. N. Hoffer, J. B. Kendrick, W. E. Leer, F. P. Cullinan, Monroe McCown, C. L. Burkholder, C. E. Baker, H. D. Brown, A. H. Watson, E. J. Kohl, C. L. Porter, D. C. Cooper, B. A. Porter, Leslie Pierce, and H. F. Dietz.

³ Proc. Ind. Acad. Sci. 1919:135-156, 1921; 1920:187-208, 1921; 1923:163-201, 1924; 1923:202-211, 1924; 1924:297-313, 1925; 1925:237-257, 1926; and 1926:231-247, 1927.

⁴ Kohl, Edwin J. Details in the life-history of the apple blotch fungus. Abs. in Phytopath. 17:45-46. 1927.

⁵ Gardner, Max W. Apple blotch canker eradication. Phytopath. 17:185-188. 1927.

trees near Marquette, Michigan, and not far from Lake Superior. As far north as this, it is not at all probable that there will be any spread of infection.

There was an extremely destructive epiphytotic of fire blight due to *Bacillus amylovorus* in early June in the southern half of the state and particularly in the southwest portion. The disease was reported from 22 counties. Very severe infection occurred in the rather exten-

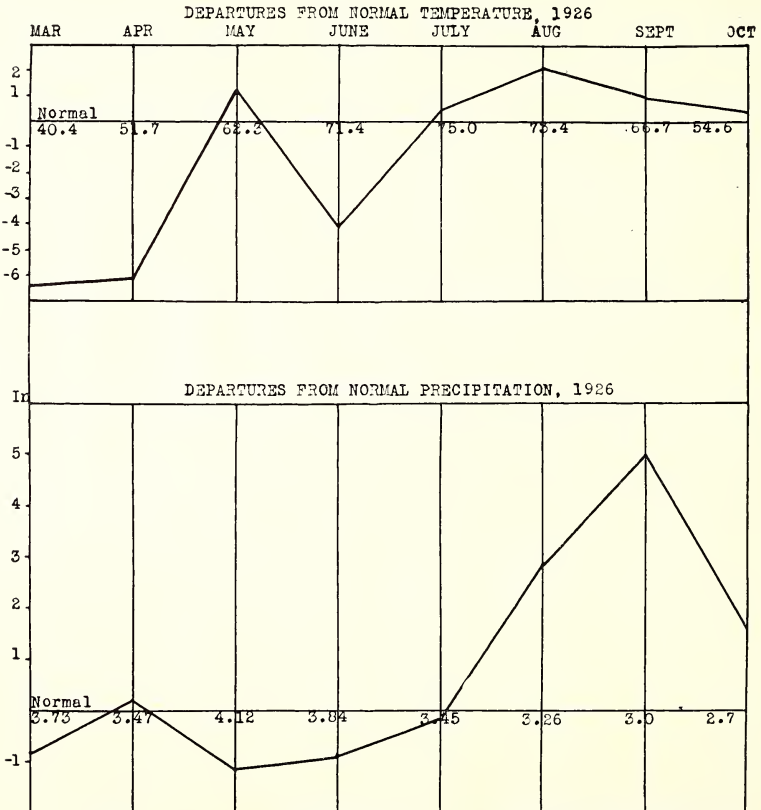


Fig. 1.—Departures from normal temperature and precipitation based on monthly averages supplied by J. H. Armington in Climatological Data.

sive plantings of the Jonathan variety about Vincennes, so severe, in fact, as to lead some growers to top work this variety to the more resistant Turley variety. The disease was also very serious on Transparent and on young trees of the Willow variety. Abundant exudate occurred on the twigs and petioles in many varieties. In numerous instances noted on June 11, the partially grown Transparent fruit was invaded, usually by way of the pedicel, from blighted blossoms in the same cluster, occasionally through wounds, and showed a conspicuous

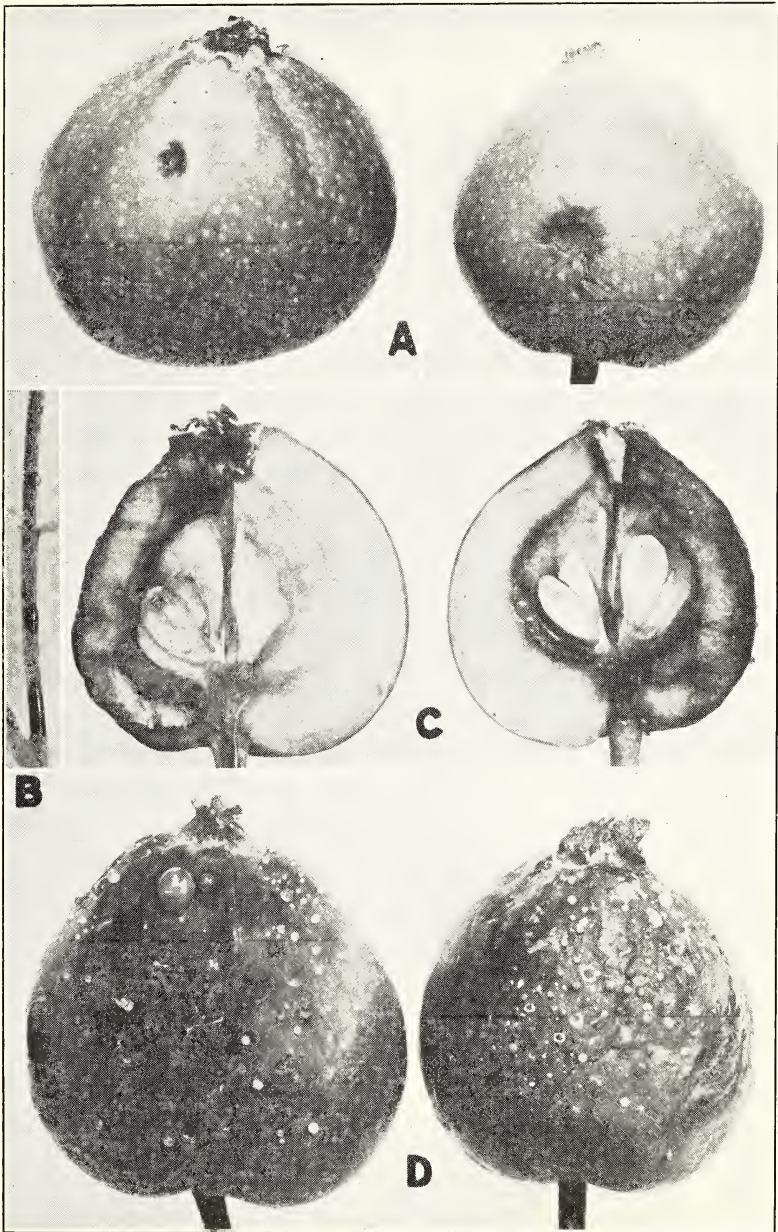


Fig. 2—Symptoms of apple fire blight on Transparent variety, Vincennes, June 11, 1926. A. Young apples showing small sunken fire blight lesions which were perhaps the result of infected wounds. B. Exudate on young tender twig. C. Young apples in longitudinal section showing internal effects of fire blight invasion. D. Fire blight exudate on young apples.

water-soaking of the tissues, with large, sticky drops of exudate on the skin (fig. 2). Some fruit infection was also found in the Jonathan variety. Mr. R. A. Simpson at Vincennes observed that much of the infection in the Jonathan variety occurred through a secondary late setting of blossoms and that bad cankers resulted from infection of the knife cut girdling wounds which had been made in young Transparent trees to stimulate earlier fruiting.

In connection with the fruit infection, it is of interest to note that laboratory inoculation tests made on mature Baldwin and Rome fruits showed that the fire blight bacteria will progress very rapidly throughout the vascular system of the fruit, without causing any discoloration of the flesh other than a faint browning of the veins.

Peculiar effects of fire blight infection were noted in a block of young Oldenburg trees in Knox County on July 22. Many half-grown fruits were shriveled, stunted and often prematurely colored due to spur cankers which had not killed the spur. Fire blight was very serious on the King variety near LaPorte, where very encouraging results were obtained by McCown in an attempt to control the disease by a weak Bordeaux spray applied at the time of full bloom.

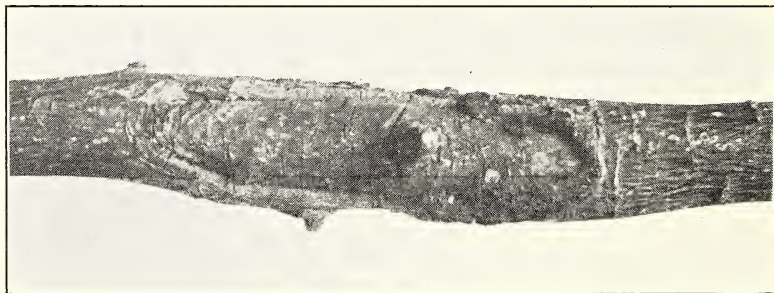


Fig. 3—The original apple bitter rot canker found by R. A. Simpson in southern Illinois in 1902 and reported to Dr. T. J. Burrill. (Burrill and Blair. Bitter rot of apples. Ill. Agr. Exp. Sta. Bul. 77:351-366. 1902. p. 355). Apparently it was an old fire blight canker secondarily invaded by the bitter rot fungus, spores of which are still present on it.

Reports from growers and observation of varietal susceptibility in commercial orchards and in the experimental orchard at Mitchell, where many varieties are represented, led to the following conclusions: The most susceptible varieties were Jonathan, King, Transparent, Willow, York, Maiden Blush, Esopus, Indian, and Detroit Red; the next less susceptible group would include Westfield, Northwestern, Northern Spy, and Wealthy. A still less susceptible or somewhat resistant group would include Baldwin, Stayman, King David, Golden Delicious, Benoni, Oldenburg, Genet, and Missouri Pippin. A group of resistant varieties, that is, those showing only slight infection, includes Rhode Island Greening, Red June, McIntosh, Tulpehocken, Thaler, Tetofsky, Akin, Grimes, Rome, Red Delicious, Winter Banana, Winesap, Clayton, Stark, Ortley, Carson,

and Williams Early Red. No infection was noted on Gano, Arkansas, Wolf River, Minkler, Salome, McMahon, Lawver, Kinnard, and Red Astrachan.

Bitter rot, caused by *Glomerella cingulata*, was very serious in September on the Grimes and Jonathan varieties in an orchard in Orange County where Bordeaux had not been used with the late codling moth sprays. Several hundred bushels of rotted fruit were hauled out of this orchard. The disease was first noted the last week of July in an orchard in Warrick County, where it has occurred annually with great severity. The high rainfall of August and September greatly favored this disease and late Bordeaux sprays proved very profitable in commercial orchards in the bitter rot region.

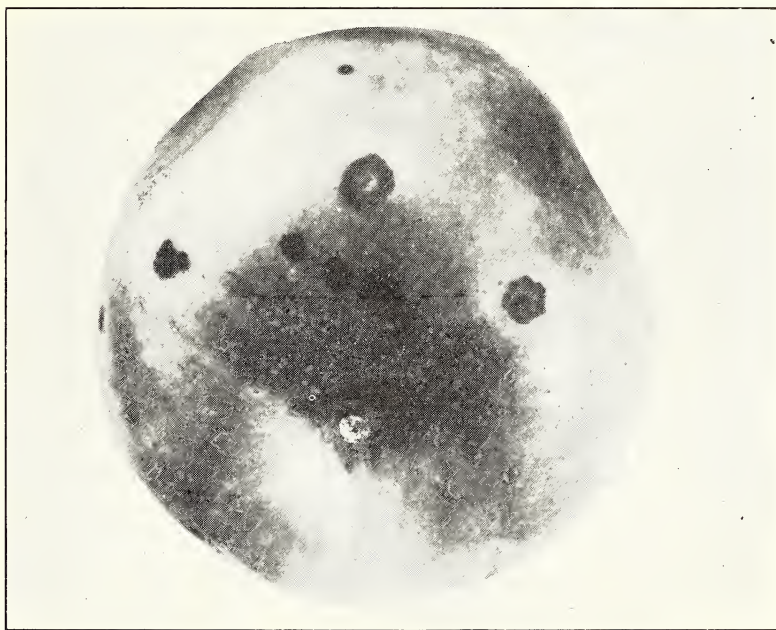


Fig. 4—Non-parasitic spotting of King David apple.

Rust (*Gymnosporangium juniperi-virginianae*) was rather abundant on the foliage of Jonathan and Rome in Orange County and a few calyx-end fruit lesions were found in the Oldenburg variety.

Black rot and frog-eye leaf spot, due to *Phylospora malorum*, were about as prevalent as usual. A few cases of calyx-end fruit infection were noted.

The rot caused by *Phytophthora cactorum* was found, September 14, on Grimes drops under the same trees at Lafayette where it occurred in previous years, and on September 22 some was found on Grimes drops in an orchard in Orange County.

The owner of an orchard in Marion County reports blister canker due to *Nummularia discreta* serious on Ben Davis, Maiden Blush, White Pippin, and Genet, present on Stark, Rome, Mammoth Black Twig, Jonathan, Clayton, and Transparent, and absent on York, Wolf River, Indian, Arkansas Black, and Winesap.

The wet weather was very favorable to sooty blotch (*Phyllachora pomigena*), which was rather abundant on Grimes in the orchard in Orange County where Bordeaux was not used in the late codling moth spray.

The non-parasitic stippen or bitter pit was found to a slight extent on Grimes and Rome fruit in Orange County, and a statewide outbreak of what appears to be a surface type of the same trouble occurred on King David fruit (fig. 4). Specimens of the latter were received from Knox, White, and DeKalb counties and cultural tests showed that no fungus was associated with the lesions. A similar spotting on this variety was noted in 1921. Measles, or brown bark spot, was found on Delicious and Winesap nursery stock in a nursery in Perry County, and was also found on Delicious in an orchard in Knox County. In Orange County a Grimes tree was apparently being killed by this disease. Much winter injury showed up in young plantings this spring.

Barley.—Mains found a very slight amount of ergot (*Claviceps purpurea*) and of leaf rust (*Puccinia simplex*). Leer made a special search for stem rust, but was unable to find any.

Bean.—Anthracnose, caused by *Colletotrichum lindemuthianum*, occurred to a limited extent in home gardens because of the abundant rain late in the season, but Kendrick found none in the canning crop in Grant County in August. He did find bacterial blight, caused by *Bacterium phaseoli*, very serious, and it was also serious in the canning crop in Hamilton County in August. The pod infection is very objectionable to the canners of such beans. Kendrick found, however, that mosaic was the limiting factor in the canning crop in Grant County and had caused a stunting of plants and a greatly reduced yield of pods. A few cases of Fusarium wilt were found in Marion and Grant counties.

Bacterial spot of Lima bean, caused by *Bact. vignae*, was noted in Marion County on July 16.

Beet.—Leaf spot, caused by *Cercospora beticola*, was serious in gardens.

Blackberry.—Leaf spot, caused by *Mycosphaerella rubi*, and orange rust (*Gymnoconia interstitialis*) were prevalent.

Buckwheat.—The leaf mold caused by *Ramularia anomala* occurred in experimental plots in October.

Cabbage.—Yellows, caused by *Fusarium conglutinans*, was not as serious as usual. Black rot, caused by *Bacterium campestre*, was found in Indianapolis market gardens in July.

Cantaloupe.—Bacterial wilt, caused by *Bacillus tracheiphilus*, and the mosaic disease were very prevalent in Vigo and Knox counties in July. Mosaic was also severe in Indianapolis market gardens. Leaf blight, caused by *Macrosporium cucumerinum*, was much less destructive than usual.

Celery.—The Goshen celery marshes were examined by Kendrick on Aug. 18. Early blight, caused by *Cercospora apii*, was present only to a limited extent, and no *Fusarium* yellows was noted. Late blight, caused by *Septoria apii*, was found very serious and was killing many of the leaves of the crop being harvested at that time. This disease was also serious near Lafayette in the fall.

Cherry.—Leaf spot, caused by *Coccomyces hiemalis*, was not nearly as destructive as usual. Powdery mildew (*Podosphaera oxycanthae*) was sent in from Newton County.

Clover.—Powdery mildew (*Erysiphe polygoni*) was rather general. Mains found it worst on native strains in his test plots at Lafayette. He found anthracnose, caused by *Gloeosporium caulivorum*, and bacterial spot, caused by *Bact. trifoliorum*, very serious in these plots, which contained strains of red clover from many sources. Anthracnose he found worst on French strains, somewhat less severe on the Altaswede and Italian strains, and least destructive on North American strains. The bacterial spot he found worst on foreign strains, and entirely absent on Alsike clover. Mosaic, accompanied by its necrotic effects, was very destructive in his plots. Rust (*Uromyces trifolii*) was found on Alsike clover in Hancock County.

Corn.—Trost reports the occurrence of bacterial wilt due to *Aplanobacter stewartii* and estimates a loss of 6 per cent due to Gibberella and *Fusarium* root and stalk rots, of 3.5 per cent due to *Diplodia* ear rot, and of 0.5 per cent due to smut (*Ustilago zaeae*). Mains estimates a 0.5 per cent loss due to rust (*Puccinia sorghi*).

Cowpea.—Bacterial spot, caused by *Bacterium vignae*, was found serious in Knox County in June, but only a trace occurred in experimental plots at Lafayette. Single plant selections of seed from healthy and mosaic plants of a number of varieties (Early Red, Early Black, Whip-poorwill, Iron, Red Ripper, Arlington, Clay, Conch, Columbia, Groit, and the related species, Catjang) were planted on June 3. On June 21, Kendrick examined the seedlings and found all healthy except for five mosaic plants among the progeny of 34 from a mosaic plant of the Progressive White variety. On July 8, 21 of these 34 plants showed the disease and none was noted elsewhere. Later, however, the disease became epiphytotic and attacked practically all of the plants of all varieties and of the related species, Catjang. The typical symptoms were the conspicuous mottling and malformation of the leaves, but peculiar symptoms were exhibited in certain varieties. Necrotic mottling of the pods occurred as a mosaic symptom in Catjang and in the Arlington variety, and petiole twisting and necrosis in the Red Ripper variety.

Cucumber.—Mosaic was very destructive near Lafayette in July, and Kendrick found it serious in a field in Kosciusko County. Bacterial wilt, caused by *Bacillus tracheiphilus*, occurred rather commonly.

Currant.—Anthracnose (*Pseudopeziza ribis*) was noted at Lafayette in July.

Grape.—Downy mildew (*Plasmopara viticola*) was found in the northern part of the state and crown gall was sent in from Morgan County.

Kohlrabi.—Yellows, caused by *Fusarium conglutinans*, was found at Lafayette (fig. 5).



Fig. 5—*Fusarium* yellows of kohlrabi. One sided yellowing and curvature of the leaf and bare stalk from which leaves have dropped.

Oats.—Stem rust (*Puccinia graminis*) caused a loss, according to Leer, of about one per cent, and crown rust (*P. coronata*) was reported serious in Starke County. Halo blight, caused by *Bact. coronafaciens*, was found in Hancock and Tippecanoe counties.

Onion.—Smudge (*Colletotrichum circinans*) was prevalent on white onions in Fulton and Whitley counties. In Marshall County, Kendrick found seed stalk lesions due apparently to *Macrosporium parasiticum*, which prevented the seed heads from maturing properly. Federal inspectors reported neck rot in cars from Marshall, Kosciusko, Whitley, Noble, and Steuben counties. Mr. Lyle, federal inspector at Warsaw, reported bacterial soft rot very prevalent owing to the wet fall weather.

Examination of yellow and red onions in a storage house in Kosciusko County in March, 1927, showed the presence of considerable basal

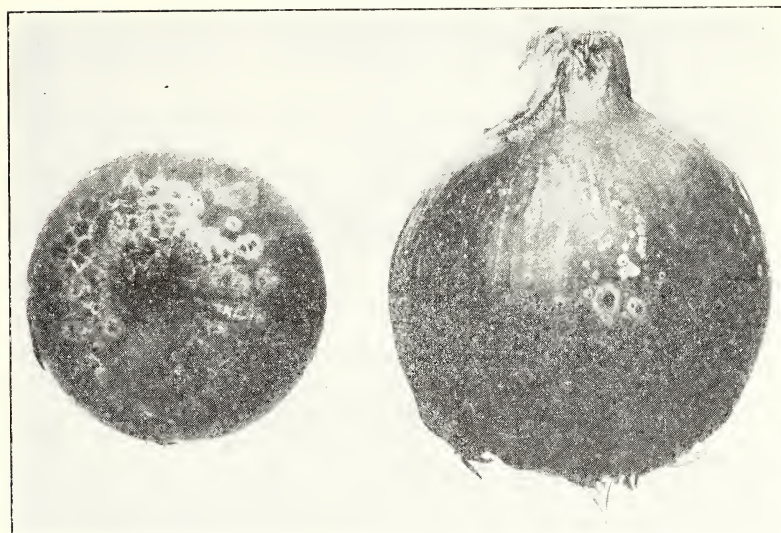


Fig. 6.—Silver spot on the dry outer scale of yellow onions, caused by a species of *Penicillium*.

end *Botrytis* rot, and of a bacterial soft rot of the outer scales. Also there was much of the blackened blotch lesions (cause unknown) and the bleached silver spot (*Penicillium*) on the dry outer scale (fig. 6), both of which render the onions unsightly and lower the sale price.

Pea.—In a survey of canning crop fields in Miami and Wabash counties on June 7, Kendrick found *Fusarium* wilt⁶ responsible for a loss estimated at five per cent. He also found a scattering infection of *Rhizoctonia* stem lesions and in one field a small area of bacterial spot (*Bact. pisi*) infection. On June 30, he found bacterial spot very destructive in the canning crop in Tipton County. Injury to the foliage was severe and the pods were very abundantly spotted (fig. 7). Pod spot caused by *Ascochyta pisi* was found in a garden at Lafayette.

⁶ Linford, Maurice B. A wilt disease of peas in Wisconsin. Abs. in Phytopath. 16:75. 1926.

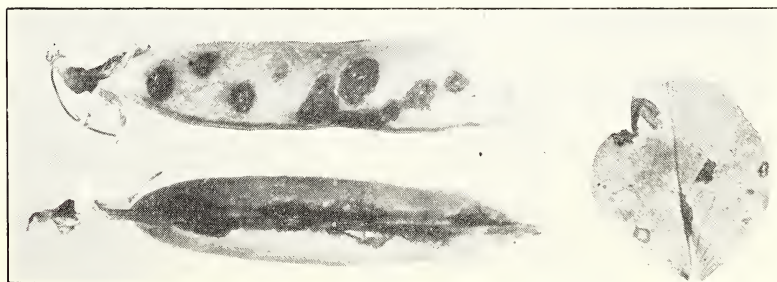


Fig. 7.—Bacterial spot of pea.

Peach.—In April, leaf curl, caused by *Exoascus deformans*, was very serious in Knox, Sullivan, and Greene counties in orchards not properly sprayed. In one orchard, the Eads and Elberta varieties were nearly defoliated, while the Krummel variety escaped infection. Burkholder and McCown found fruit infection in Sullivan County. Scab, caused by

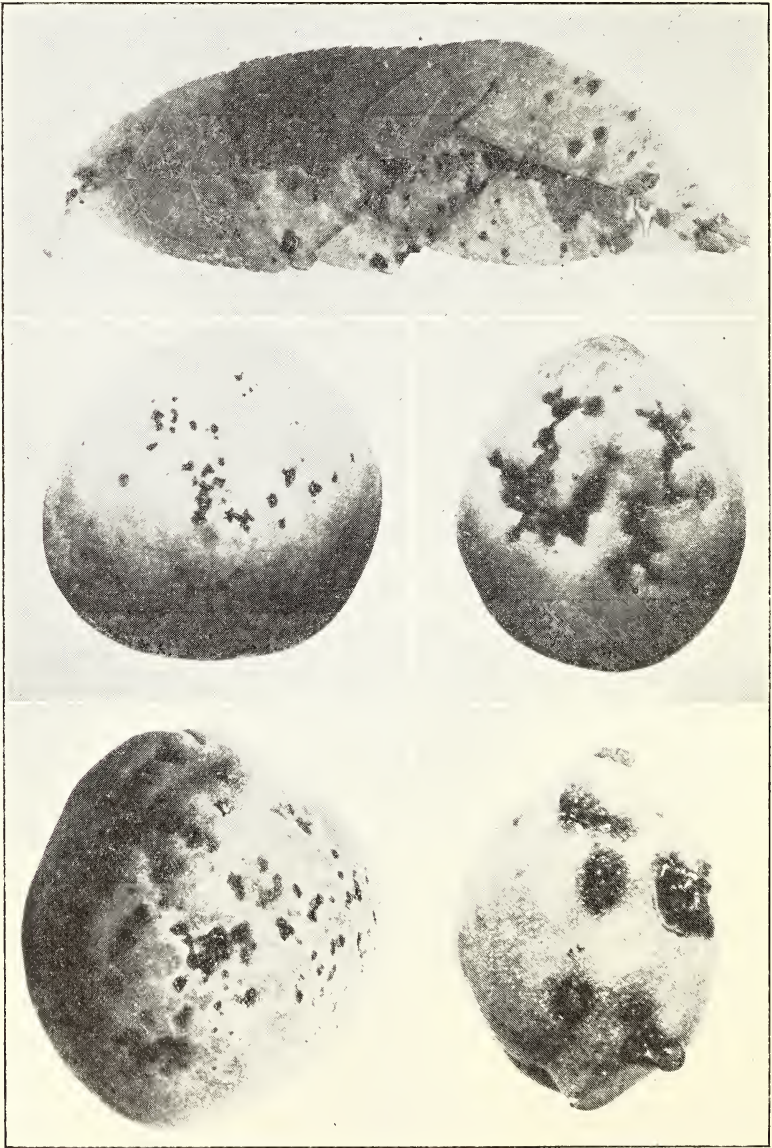


Fig. 8.—Bacterial spot of peach, caused by *Bacterium pruni*.

Cladosporium carpophilum, was reported from five counties and fruit infection occurred in Fayette County. Bacterial spot (fig. 8) caused by *Bacterium pruni* was not destructive until late in the season when it not only caused much defoliation but also blemished the fruit. Burkholder found leaf infection as early as June 3 in Knox, Daviess, and Martin counties, and B. A. Porter found fruit lesions in Knox County on June 12. Crown gall was sent in from Monroe County.

Pierce found discharging apothecia of the brown rot fungus (*Sclerotinia fructicola*) under the seedling trees in an orchard in Knox County, on April 21. None were found under the other trees, a circumstance which further strengthens the case against the seedling peach tree as a brown rot menace. Heavy rains in August favored brown rot and considerable losses resulted, especially in late varieties. Burkholder found much brown rot in the Redbird variety in Jackson County, and following hail injury to the fruit in Sullivan and Greene counties. Rhizopus rot was reported in five cars from Knox and Posey counties by the federal inspection service.

Pear.—Fire blight was very serious. Leaf spot caused by *Mycosphaerella sentina*, the rot caused by *Phytophthora cactorum*, and sooty blotch (*Phyllachora pomigena*) occurred near Lafayette in the fall.

Pepper.—Mosaic occurred very generally in market gardens.

Plum.—Black knot was sent in from Huntington County and brown rot was reported from Marion County.

Potato.—Leaf roll remains the most serious disease in the late crop (Rurals) and mosaic is common in the early crop. Field plots planted with seed tubers previously tested for disease in the greenhouse showed that leaf roll spreads much more generally than mosaic. Fusarium wilt occurred in Jasper County, and scab was widespread in its occurrence. Following the heavy rains in August and September, bacterial soft rot was destructive in Marion County and considerable tuber infection of late blight, caused by *Phytophthora infestans*, occurred in LaPorte County. This is the first authentic record for this disease in the state since this series of disease survey reports was begun (1919).

Pumpkin.—Downy mildew (*Peronosporopara cubensis*), powdery mildew (*Erysiphe cichoracearum*), and a Cercospora leaf spot were found on field pumpkins near Lafayette in October.

Radish.—White rust (*Cystopus candidus*) and black root, caused by *Aphanomyces raphani*,¹ were found at Lafayette.

Rape.—Leaf infection by the black rot organism, *Bact. campestre*, was found in Hancock County in June.

Raspberry.—Anthracnose (*Plectodiscella veneta*) was serious, as usual, and was reported from six counties. Leaf spot caused by

¹ Kendrick, James B. Radish black-root caused by *Aphanomyces raphani* n. sp. Abs. in Phytopath. 17:43. 1927. Also: The black-root disease of radish. Purdue Univ. Agr. Exp. Sta. Bul. 311:1-32. 1927.

Mycosphaerella rubina was found at Lafayette. Crown gall was sent in from Wabash County and was found by Dietz in Elkhart County. Leaf curl and mild mosaic were noted on black raspberry near Lafayette.

Rye.—Mains noted anthracnose (*Colletotrichum cereale*), ergot, scab caused by *Gibberella saubinetii*, powdery mildew and leaf rust. Leer made a special search for stem rust and found none.

Sorghum.—Kendrick found bacterial spot,⁸ caused by *Bact. holci*, on sorghum and sudan grass in experimental plots at Lafayette.

Soybean.—Prof. F. E. Robbins found mosaic rather serious in a field of the Midwest variety in Hamilton County. Bacterial blight caused by *Bact. glycineum* was noted or reported in Fulton, Montgomery, Parke, and Warrick counties. Brown spot,⁹ caused by *Septoria glycines*, was found in Montgomery and Parke counties.

Spinach.—Brown found downy mildew (*Peronospora effusa*) at Lafayette in May.

Squash.—Mosaic and a bacterial leaf spot were found near Terre Haute Aug. 9.

Strawberry.—Leaf spot caused by *Mycosphaerella fragariae* was generally prevalent and the virus disease (mosaic or yellows) was reported from Knox and Greene counties.

Sweet potato.—There was an unprecedented epiphytotic of the Fusarium stem rot in Vigo, Knox, and Gibson counties in June, and the losses were such as to cause much concern among the growers. Black rot, caused by *Ceratostomella fimbriata*, was found in storage houses in Gibson County, causing very heavy losses.

Tobacco.—Angular leaf spot, caused by *Bact. angulatum*, was found in Orange County.

Tomato.—Septoria leaf spot was not as destructive as in 1925 despite the frequent and heavy rains. In general the disease appeared too late in the season to cause heavy losses. Kendrick found it serious in certain fields near Marion on Aug. 10, and on Aug. 16 it was found serious in one field near Indianapolis used for tomatoes the preceding year. Late in the season the disease was found, usually in small areas, in fields in Madison, Marion and Hancock counties. It was found in July in a greenhouse crop and a staked garden plot where overhead irrigation was being employed. There was one badly infected field in the Paoli district and on Aug. 12, examination of this field, which was planted in part with homegrown plants, showed that the disease was much worse in the part of the field set with the home-grown plants and that it was also present in the plant-bed from which these

⁸ Kendrick, James B. Holcus bacterial spot of *Zea mays* and *Holcus* species. Iowa Agr. Exp. Sta. Res. Bul. 100:303-331. 1926.

⁹ Wolf, Frederick A. and Lehman, S. G. Brown spot disease of soybean. Jour. Agr. Res. 33:365-374. 1926.

plants were taken. This plant-bed, which, incidentally, had been used for tomatoes the previous year, was without doubt responsible for the field epiphytotic, since the transplants used in the other part of the field were taken from the canning company plant-beds which were proved to be free from this disease by its failure to appear in an experimental field set with plants from these beds.

Early blight, caused by *Alternaria solani*, was the most serious foliage disease of the season. It was found in nearly all fields examined late in the season and caused much defoliation. In an experimental field at Paoli which was under frequent observation early blight was first observed on July 26, on the older leaves and in the form of a collar rot of a few scattered plants. By Aug. 12 the disease was prevalent throughout the field and by the end of the month had caused very severe premature defoliation. There was also some spotting of the fruit due to this fungus. Dusting tests¹⁰ in this field showed that a copper lime dust containing 25 per cent dehydrated copper sulphate visibly retarded the progress of early blight and increased the yield by three to four tons per acre. Since early blight was the only serious foliage disease in this field, it seems safe to assume that the increase in yield in the dusted plots was due to the partial control of this disease. Similar results were obtained in tests at Greenfield.

Fusarium wilt was of major importance early in the season and was recorded from 12 counties. Badly diseased fields were found in Marion and Vigo counties. The serious cases could usually be traced to the use of southern-grown plants, or soil infestation resulting therefrom, but cases occurred in which a few diseased plants were scattered through a field in districts, such as the region around Paoli, where, as far as is known, no southern-grown plants have been used.

Mosaic occurred rather generally in the canning crop late in the season, and the double-virus or streak type was not uncommon in the field. On Aug. 25, Kendrick found the double-virus mosaic rather severe in the acreage around French Lick and a month later much of it was found in our experimental field at Paoli. The double-virus mosaic ruined a crop in a new greenhouse near Indianapolis which had been built over an old potato patch and in which volunteer potato plants had repeatedly pushed up among the tomatoes.¹¹

Field surveys in nine counties showed that bacterial spot, caused by *Bact. vesicatorium*, was more prevalent than it had been since 1919. It was observed the middle of July in southern and central Indiana and was conspicuous for about a month. Thus the peak of the epiphytotic occurred rather early in the season and the first fruits set were badly spotted. There was an abundance of peduncle, pedicel and calyx spotting (fig. 9) as well as foliage infection. The infection on peduncles and pedicels seemed to be much heavier on the upper surfaces. The rather large calyx lesions were distinguishable from the smaller, more numerous, non-parasitic, necrotic spots, crowded toward the apical end

¹⁰ Gardner, Max W., Kendrick, James B., and Cochran, L. C. Dusting tests for the control of tomato diseases, 1926. Trans. Ind. State Hort. Soc. 1926:75-83. 1927.

¹¹ Gardner, Max W. and Kendrick, James B. Potatoes, a virus disease menace to tomatoes. Hoosier Hort. 9:5-8. 1927.

of each calyx lobe. The circular, whitish, "birds-eye" type of fruit lesion was found very generally and, in early stages, these lesions yielded a bacterial exudate in water mounts. Considerable infection occurred in the two fields where dusting tests were in progress and there was evidence that the copper lime dusts afforded some measure of control.

Leaf mold, caused by *Cladosporium fulvum*, was serious in greenhouses. Gregory found cases in which growers failed to control the disease by spraying with soda Bordeaux. One grower at Logansport has tried dusting with copper lime with very satisfactory results.



Fig. 9—Tomato bacterial spot lesions. A. Stem. B. Peduncle and pedicels, enlarged X2.

Owing to the heavy rainfall late in the season, buckeye rot, caused by *Phytophthora terrestris*, occurred for the first time, to our knowledge, as a serious factor in canning crop fields. Kendrick found this disease late in August in 12 fields in Madison and Hancock counties and a month later in Orange County. The disease was not in any sense a ripe rot. The fungus attacked the green fruits of all ages and caused a total loss in the badly infested areas, which were usually in the low lying spots in the fields. In one field in Hancock County over 50 per cent of the fruits were found infected on Aug. 23 and a month later there were practically no fruits to be found. The disease had made a clean sweep. The copper lime dust did not check this disease in our experimental fields.

Rhizoctonia soil rot was found in Marion County on Aug. 16. Anthracnose (*Gloeosporium phomoides*) was found late in the season in Madison, Hancock and Marion counties. In a wet season such as this it was not surprising to find much rotting of the fruit due to growth-crack invasion by various organisms.

Blossom-end rot (non-parasitic) was found on Aug. 5 in Tipton, Howard, and Madison counties and was rather prevalent on the first

fruit set. On the black soil of Tipton and Howard counties, A. H. Watson found a non-parasitic necrotic spotting and blighting of the older leaves apparently associated with potash shortage in the soil.

Too heavy dusting of the young growing tips of the plants in the first sulphur applications in our dusting tests (*loc. cit.*) caused a peculiar injury to the tips as a result of which the young leaves became thickened, rolled, torn and greatly malformed, the apex ceased growth, and the plants were visibly stunted, though lateral shoots soon developed to replace the injured leader. There was no visible burning or necrosis of the injured leaves. This type of injury has been reproduced in greenhouse tests with pure sulphur.

Vetch.—On June 12, a circular leaf spot was found rather abundant in definite centers of infection in a vetch cover crop in an apple orchard in Knox County. No fungus fructification could be found on these lesions but tissue plantings yielded a fungus forming small black sclerotia in culture.

Watermelon.—*Fusarium* wilt was reported from four counties.

Wheat.—Stem rust was more prevalent than usual and Mains and Leer estimate the loss at 0.5 per cent. Mains estimates the loss due to leaf rust at 5 per cent. Gregory found less loose smut than usual, but found bunt (*Tilletia laevis*) more prevalent than usual and attributes to it a loss of 4 per cent.

Trees and Ornamentals.—The virus disease or yellows of aster was found serious in a commercial planting in Marion County. A mosaic disease was noted on *Digitalis* (Giant Shirley). Geranium bacterial spot was found by Dietz in greenhouses. The *Verticillium* wilt¹² of hard maples was found at Lafayette and is very prevalent on Norway maples in Elwood, where it has caused much concern among the citizens of that town. The causal fungus has been isolated from specimens sent in from Elwood. Anthracnose (*Gloeosporium apocryptum*) was found on hard maple near Lafayette on June 13. Iris leaf-spot caused by *Didymella iridis* was common in gardens. On June grass, smut (*Ustilago striaeformis*) and leaf spot, caused by *Scolecotrichum graminis*, were found in June. Mosaic was noted on *Nicotiana*. The canker caused by *Dothichiza populea* was found on Lombardy poplar. Powdery mildew (*Erysiphe cichoracearum*) occurred on Phlox. Dietz found snow mold (*Scorias spongiosa*) on white pine needles and twigs in Indianapolis. Fire blight occurred on quince, and black rot of the fruit, caused by *Physalospora malorum*, was sent in from Knox County. Leaf spot of red bud caused by *Cercospora chionca* was common near Lafayette in the fall. Powdery mildew (*Sphaerotheca pannosa*) occurred on roses and Dietz reported black spot, due to *Diplocarpon rosae*, severe in greenhouses. Anthracnose (*Gnomonia veneta*) was noted on sycamore. An angular leaf spot, due probably to *Cercospora atricincta*, was found on zinnia.

¹² Gravatt, G. F. Maple wilt. U. S. Dept. Agr. Cir. 382:1-13. 1926.

SUMMARY

The diseases of outstanding importance were as follows: apple fire blight and bitter rot; bean mosaic and bacterial blight; cantaloupe mosaic and bacterial wilt; clover mosaic; corn root, stalk, and ear rots; pea Fusarium wilt and bacterial spot; peach leaf curl, bacterial spot, and brown rot; potato virus diseases; sweet potato black rot and Fusarium stem rot; tomato bacterial spot, early blight, mosaic and streak, and buckeye rot; wheat leaf rust; maple wilt.

The diseases or parasitic organisms not previously reported for the state in the Academy Proceedings include: Verticillium wilt of maple; pea fusarium wilt; pear rot—*Phytophthora cactorum*; white pine snow mold—*Scorias spongiosa*; pumpkin—*Peronoplasmopara cubensis* and *Erysiphe cichoracearum*; rape black rot—*Bact. campestre*; sorghum and sudan grass—*Bact. holci*; soybean brown spot—*Septoria glycines*; vetch leaf spot; zinnia leaf spot—*Cercospora atricincta*.

Other observations of interest were vascular penetration of apple fruit tissue by fire blight bacteria in laboratory inoculation tests, varietal susceptibility of apples to fire blight, seed transmission of cowpea mosaic by the Progressive White variety, the seedling peach tree as a brown rot menace, occurrence of *Phytophthora infestans* in potato tubers, renewed prevalence of tomato bacterial spot and buckeye rot (*Phytophthora*) of green tomato fruits, and sulphur dust injury to tomatoes.