

INDIANA PLANT DISEASES, 1927.¹

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This is the ninth³ of a series of annual summaries of the plant disease situation in the state. No claim for completeness is made.

The weather during the 1927 season, as shown in the graphs in figure 1, was characterized by an early spring, a warm March and April, abnormally cool weather during May, June, July, and August,

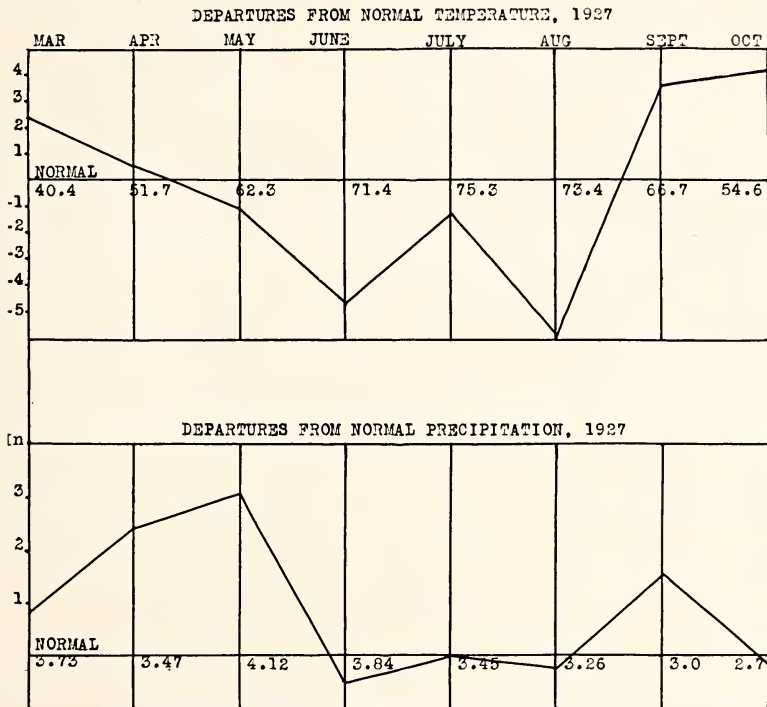


Fig. 1—Departures from normal temperature and precipitation based on monthly averages supplied by J. H. Armington in Climatological Data.

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² The writer wishes to acknowledge the co-operation of H. S. Jackson, E. B. Mains, G. N. Hoffer, J. B. Kendrick, F. C. Gaylord, W. E. Leer, C. T. Gregory, L. C. Cochran, F. P. Cullinan, J. F. Trost, K. E. Beeson, E. J. Kohl, B. A. Porter, Leslie Pierce and H. F. Dietz.

³ Proc. Ind. Acad. Sci. 1919:135-156. 1921; 1920:187-208, 1921; 1923:163-211, 1924; 1924:297-313, 1925; 1925:237-257, 1926; 1926:231-247, 1927; 1927:411-426. 1928.

"Proc. Ind. Acad. Sci., vol. 38, 1928 (1929)."

very warm weather in September and October, and high rainfall in the spring and fall. The frequent rains in the spring favored apple scab, blotch, and rust, peach leaf curl, cherry leaf spot, and wheat bunt, scab, and leaf rust. The summer was too cool for the *Fusarium* wilt diseases and apple bitter rot, and the rains were frequent enough to favor peach bacterial spot, anthracoses in general, powdery and downy mildews, and fungus leaf spots such as *Septoria* leaf spot of tomato.

DISEASES ARRANGED ALPHABETICALLY BY HOSTS.

Alfalfa. Leaf spot caused by *Pseudopeziza medicaginis* was more prevalent than usual. Van Hook⁴ reports it severe. Downy mildew (*Peronospora trifoliorum*) was found in Jackson County on April 19. A surface blackening of the stems of Grimm alfalfa caused by *Pseudomonas medicaginis* was found by M. O. Pence in Starke County, late in May. A pitting of the tap root of unknown cause and apparently identical with that described by Stewart, French, and Wilson⁵ in 1908 and Weimer⁶ in 1927, was brought in from Kosciusko County, in May.

Apple. Scab, caused by *Venturia inaequalis*, was exceedingly severe this year because of the frequent and heavy rainfall during the infection period in April and May. McCown found foliage infection on Grimes at Lafayette as early as May 6 and severe foliage and fruit infection occurred on Grimes, Jonathan, Wealthy, and especially on Rome. Calyx-lobe and pedicel lesions, as well as fruit lesions, were found in abundance in late May and early June. At Paoli, fruit infection on Rome was abundant in trees not receiving the pink spray. Late season infection produced the smooth black lesions which develop in storage.

Blotch, caused by *Phyllosticta solitaria*, was much worse than it has been since 1922, owing to the frequent rains of April and May. Kohl⁷ found by the use of potted trees that the first infection at Mitchell in southern Indiana occurred 5 days and the last infection 8 weeks after petal fall (Apr. 25) and that infection occurred during 15 out of the 17 rains during this period. At Lafayette he found that the first infection occurred 3 days and the last infection 7 weeks after petal fall (May 7) and that infection occurred during 18 out of the 27 rains during this period. Cankers were found on Golden Winesap at Vincennes and on Hubbardston at Seymour, two varieties not previously listed as susceptible in Indiana. Cankers and light fruit infection were found on Delicious and leaf and fruit infection was found on Transparent. McCown found fruit infection on Oldenburg as early as June 1, near Vincennes. The degree of canker infection on Kansas-grown seedlings is shown by the fact that on one seedling examined in a nursery, 27 out of the 29 leaf scars were infected.

⁴ Van Hook, J. M. Indiana Fungi-X. Proc. Ind. Acad. Sci. 1927:365-371. 1928.

⁵ Stewart, F. C., French, G. T. and Wilson, J. K. Troubles of alfalfa in New York. N. Y. (Geneva) Agr. Exp. Sta. Bul. 305:172-243. 1908. (p. 233).

⁶ Weimer, J. L. Observations on some alfalfa root troubles. U. S. Dept. Agr. Dept. Cir. 425:1-9. 1927.

⁷ Kohl, Edwin J. The cycle of infection in apple blotch. Abs. in Phytopath. 18:145. 1927.

Frog-eye leaf spot, caused by the black rot fungus, *Physalospora malorum*, was also extremely prevalent early in the season. Heavy infection was noted on Grimes, Transparent, Jonathan, Wealthy, Oldenburg, and especially on Rome. The Bordeaux blotch sprays prevented frog-eye leaf spot in a young Oldenburg orchard in which the trees receiving only the scab sprays were badly infected.

Rust (*Gymnosporangium juniperi-virginianae*) was also favored by the spring rains, and abundant foliage infection occurred on Rome and Jonathan in southern Indiana. Light leaf infection was noted on Benoni, a variety not included in the list of susceptible varieties in the 1924 report, and fruit infection was found in the Rome variety. Telial spore horns were noted on cedar galls in Jackson County on April 19, when apples were in full bloom, and near Lafayette on May 8.

Bitter rot, caused by *Glomerella cingulata*, was reported to be serious in the orchard in Warrick County where it has occurred annually for many years.

Fire blight, caused by *Bacillus amylovorus*, was very mild this year. It was noted on Jonathan, Transparent, and Benoni in southern Indiana. Fruit infection occurred on Transparent. A serious outbreak occurred near Lafayette in old sweet apple trees near pear trees, and some infection also occurred in young Wealthy trees in another orchard. In an inoculation test on Grimes trees McCown⁸ found that a Bordeaux spray applied in the full bloom stage greatly decreased the amount of blossom blight.

Nailhead or blister canker, caused by *Nummularia discreta*, was found on Northwestern in Fountain County and on Transparent in Orange County. Sooty blotch (*Gloeodes pomigena*) was reported to be severe on the Golden Delicious variety in Knox County.

The fruit rot caused by *Phytophthora cactorum* was found early in the season (June 7) on many fallen fruits under Grimes trees in the same orchard near Lafayette in which the disease has been found nearly every season. One small green fruit on a lower limb was also infected. This disease was also found in October on Rome fruit from the same orchard. Cooper⁹ found that this fungus invades the fruit through the lenticels and that zoospores may cause infection.

A destructive outbreak of pink rot (caused by *Cephalothecium roseum*) apparently following surface bitter pit occurred at Lafayette in Grimes fruit picked late in September and held about two weeks in uncooled storage (fig. 2). In general the lesions were independent of scab spots and insect wounds. The lesions varied from 2 to 15 millimeters in diameter and were sunken and brown, usually with a light tan center and an irregularly circular or lobed margin. On green fruits each lesion was surrounded by a yellow halo. Forty-six lesions on 10 fruits were cultured and 20 yielded pure cultures of *C. roseum*, while the remainder, most of which were small lesions, remained sterile.

⁸ McCown, Monroe. Spraying for the control of fire blight in the apple. Trans. Ind. Hort. Soc. 1927:129-133. 1928.

⁹ Cooper, Delmer. Paragynous antheridia of *Phytophthora* spp. Abs. in Phytopath. 18:149-150. 1928.

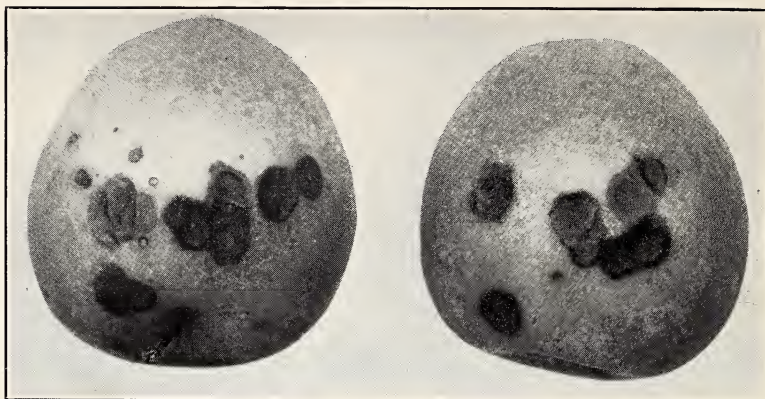


Fig. 2—Pink rot (*Cephalothecium roseum*) infection on Grimes fruit apparently following surface bitter pit and independent of scab spots.

Consequently, it seems likely that the pink rot had resulted from secondary invasion of a surface type of the non-parasitic bitter pit. This type of bitter pit was also found on Rome fruit from the same orchard and these lesions, when cultured, proved to be sterile.

The fruit spot and rot caused by *Sporotrichum malorum*¹⁰, first described in the 1925 report as a surface spotting of Grimes, was found causing heavy losses in a storage house at Seymour. Out of 200 bushels of Ben Davis, 45 had been culled out as a total loss due to this disease, some of which was also found in Gano and Winesap. Brown bark spot or measles, a non-parasitic trouble, was found in Clark and Lawrence counties.

Apricot. Canker, caused apparently by *Nectria cinnabarina*, was sent in from Montgomery County.

Bean. Bacterial blight, caused by *Bacterium phaseoli*, was less destructive than usual, due to the cold weather. Mosaic was widespread as usual. Anthracnose, caused by *Colletotrichum lindemuthianum*, occurred in the home gardens late in the fall. Rust (*Uromyces appendiculatus*) was found killing the older leaves in a market garden planting of Kentucky Wonder pole beans in Marion County late in September.

Angular leaf spot, caused by *Isariopsis griseola*, was found by L. E. Compton on the Burpee's Stringless Greenpod variety in a garden at Lafayette late in September. The fungus was sporulating profusely on the under surface of each leaf lesion (fig. 3) and was readily isolated in pure culture. Pod lesions were also found (figure 3). These differed from anthracnose in being a uniform dark grayish brown in color with a diffuse margin and a center only slightly sunken. In the center of each lesion were conspicuous, black, projecting fascicles of sporophores.

¹⁰ Gardner, Max W. *Sporotrichum* fruit spot of apple. Abs. in Phytopath. 18:145. 1928.

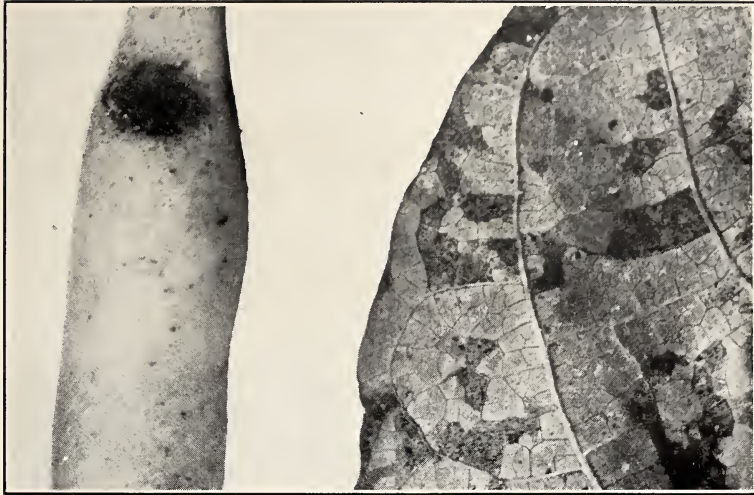


Fig. 3—Leaf and pod lesions of bean angular leaf spot caused by *Isariopsis griseola* (Enlarged x 2).

Beet. Leaf spot caused by *Cercospora beticola* was found in market gardens.

Blackberry. Anthracnose, caused by *Plectodiscella veneta*, was very severe. Specimens received from Johnson and Lawrence counties showed heavy infection on young canes, fruiting spurs, and leaves; so severe, in fact on leaf petioles, petiolules and veins as to blight leaflets outright. Young fruiting spurs were likewise being killed. Orange rust (*Gym-novonia peckiana*) was sent in from Montgomery County and mosaic from Elkhart County.

Brussels Sprouts. Leaf spot, caused by *Alternaria brassicae*, was found near Lafayette in November.

Cabbage. Yellows, caused by *Fusarium conglutinans*, was much less severe than usual, owing to the cool weather. Black rot, caused by *Bacterium campestre*, and black leaf spot, caused by *Alternaria brassicae*, were found on young plants in June. On Chinese cabbage, gray leaf spot, caused by *Alternaria herculea*, was found in Steuben County in October.

Cantaloupe. Leaf blight, caused by *Macrosporium cucumerinum*, was found by Trost in Marion County, but was much less destructive than it is in hot seasons.

Carrot. Leaf spot, caused by *Cercospora apii carotae*, was found in Marion County in September and near Lafayette in November.

Celery. Early blight, caused by *Cercospora apii*, occurred in Boone County. Late blight, caused by *Septoria apii*, was extremely destructive

on the late crop in Noble and Steuben counties. In a field visited late in October the exposed leaves of the banked celery were generally blighted and the pycnidia were so abundant that the lesions were conspicuously blackened.

Cherry. Owing to the spring rains, leaf spot caused by *Coccomyces hiemalis* was more severe than it has been during the last nine years and caused complete defoliation of many trees before the fruit was harvested and a noticeable loss of flavor in the fruit. The disease was statewide, and was definitely recorded from nine counties. The disease was found very destructive in a nursery on sweet cherry stock, despite Bordeaux sprays, and on Mahaleb seedlings from France planted at a distance from other cherry nursery stock. Specimens sent in from an orchard in Lawrence County in May showed that the young fruits were being killed by numerous pedicel lesions, in which spores were found.

Clover. Sooty spot, caused by *Polythrincium trifolii*, was found on white clover near Lafayette early in May. Powdery mildew was generally present on red clover. Mains found anthracnose very destructive and reports that *Gloeosporium caulivorum* causes the more destructive anthracnose in southern Indiana while *Colletotrichum trifolii* is the cause of the form more serious in northern Indiana. Mains¹¹ has published a detailed account of the Indiana clover diseases and the varietal susceptibility to these including anthracnose, powdery mildew, bacterial spot, *Macrosporium* leaf spot, rust, and mosaic.

Corn. Hoffer, Trost, and St. John estimated the loss due to *Fusarium* root and stalk rots at 3 per cent, *Fusarium* ear rot, 0.5 per cent, and *Diplodia* ear rot, 2.5 per cent. Duddleston reported smut (*Ustilago zaeae*) less prevalent than usual and Mains reported the same for rust (*Puccinia sorghi*). Bacterial wilt, caused by *Bacterium stewartii*, was found on sweet corn in Jackson County and at Lafayette. Trost found foot rot, caused by *Ophiobolus heterostrophus*, at Lafayette late in June.

Cowpea. Mosaic occurred in experimental plots at Lafayette.

Cucumber. Powdery mildew (*Erysiphe cichoracearum*), angular leaf spot, caused by *Bacterium lachrymans*, and mosaic were noted in greenhouses in Marion County in May. Bacterial wilt was noted in Madison County in September.

Currant. Anthracnose, caused by *Pseudopeziza ribis*, caused severe defoliation in June in commercial plantings. In a planting at Lafayette containing a number of varieties, the variety London Market showed marked resistance to anthracnose. In this planting, leaf spot, caused by *Mycosphaerella grossulariae*, was less destructive than anthracnose.

Dewberry. Leaf spot, caused by *Mycosphaerella rubi*, was found in June near Lafayette.

Ginseng. Blight, caused by *Phytophthora cactorum*, was found in a garden at Lafayette in June.

¹¹ Mains, E. B. Observations concerning clover diseases. Proc. Ind. Acad. Sci. 1927:355-364. 1928.

Gooseberry. Anthracnose (*Pseudopeziza ribis*) caused serious defoliation early in June at Lafayette, and leaf spot, caused by *Mycosphaerella grossulariae*, was worse on this host than on currants.

Grape. Downy mildew (*Plasmopara viticola*) was found at Lafayette in June and on wild grapes in October.

Horseradish. Leaf spot, caused by *Cercospora armoracae*, was found at Lafayette in November.

Lettuce. Downy mildew (*Bremia lactucae*), Botrytis rot, drop caused by *Sclerotinia libertiana*, and Rhizoctonia stem rot were observed in Marion County greenhouses in April.

Oats. Mains estimated the loss due to crown rust (*Puccinia coronata*) at 5 per cent and reported the presence of scab, caused by *Gibberella saubinetii*.

Onion. Smut (*Urocystis cepulae*) has occurred commonly in the small crop grown for sets and this year the first evidence was obtained of its occurrence in the important commercial bulb crop when it was found in a bundle of seedlings sent in from Steuben County on June 2.

A survey of the onion crop in northeastern Indiana was made late in October when the onions were being put in storage. Yellow onions, which constitute the bulk of the crop, and red onions were free from neck rot and smudge, and were subject to reduction in quality only from sunscald that occurred during hot weather after digging and to a limited extent from blemishes of the outer scale such as silver spot, caused by a *Penicillium*, blotch (cause unknown), and a non-parasitic black stain. These blemishes were most objectionable on onions that had been in wet soil because the discolored outer scales or fragments of these adhered to the underlying bright scales and such onions could not be easily cleaned. There was also some sun greening on yellow onions.

The disease situation in white onions, which are grown to a less extent than the colored varieties, was found to be entirely different. Smudge, caused by *Colletotrichum circinans*, was very prevalent, and the three Botrytis neck rots recently differentiated by Walker¹² were found causing heavy losses on the grading tables. Most conspicuous and prevalent among these was the small sclerotial neck rot (fig. 4, B), caused by *Botrytis squamosa*, which, curiously enough, was generally termed "smut" by the growers. The flattened black sclerotia showing through the outer scale were indeed suggestive of smut symptoms. Mycelial neck rot (fig. 4, A.), caused by *Botrytis byssoidea*, and gray mold neck rot, caused by *Botrytis allii*, were also very abundant and, in their effects, more deep-seated and destructive than the small sclerotial type. There was also some blue mold rot. Rather large pink blotches with which a *Fusarium* was associated were found on the outer scales rather commonly. Sun scald was not as prevalent as in the colored varieties, but sun greening was very common. Sun scald lesions in all varieties were frequently invaded by various fungi.

¹² Walker, J. C. Botrytis neck rots of onions. Jour. Agr. Res. 33:893-928. 1926.



Fig. 4.—Neck rots of white onions. A. Mycelial neck rot caused by *Botrytis byssoides*. B. Small sclerotial neck rot caused by *Botrytis squamosa*.

Parsnip. Leaf spot caused by *Cercospora pastinaceae* was found in November at Lafayette.

Peach. Leaf curl, caused by *Exoascus deformans*, was somewhat worse than usual, presumably because there was a warm period late in February and in many cases the spray was applied too late. Leaf curl was first observed by Pierce on April 6, in Knox County. Fruit lesions were found at Evansville. Fruit infection of scab, caused by *Cladosporium carpophilum*, was noted in Knox County. Bacterial spot, caused by *Bacterium pruni*, was worse than it has been since 1923 and caused heavy defoliation in May and June. Considerable fruit infection also occurred. Pierce¹³ at Vincennes has found the Hale variety more susceptible to fruit infection than Elberta.

Because of the frequent rains and the hail wounds and growth cracks, brown rot, caused by *Sclerotinia fructicola*, was very serious this year in Posey County according to Gaylord and caused the rejection of several carloads. Pierce (l. c.) reported brown rot of the fruit much worse at Vincennes than in 1925 or 1926. Late in May he found infection on young green fruits of the Hale, Elberta, and Redbird varieties and found twig cankers a rather common result of blossom blight. Dietz found the same type of twig infection in Lawrence County. Pierce also found old cankers where mummies from the 1926 crop had been attached. The first apothecia were found by Pierce under a seedling tree on March 22 and in one orchard he counted 96 clusters of apothecia under one seedling tree. Pierce found die-back, caused by *Valsa leucostoma*, following old brown rot cankers.

¹³ Pierce, Leslie. Brown rot and shot-hole. Trans. Ill. State Hort. Soc. 61 (1927): 405-418. 1928.

Pear. In a five-year-old orchard in Putnam County, a bad infection, probably of 1926 origin, of fire blight, caused by *Bacillus amylovorus*, was confined to a small area along one side of the orchard not far from a wooded gully in which an old seedling apple tree containing blight cankers was found. The orchard consisted mostly of Bartlett trees and all of the fire blight was in this variety. In this orchard, the non-parasitic disease known as measles or brown bark spot was found prevalent on young twigs of Flemish Beauty trees, of which there were three rows. None was noted on the Bartlett, Anjou, or Clapp's Favorite varieties.

Pepper. Mosaic was common in market gardens in Marion County.

Plum. Plum pckets or bladder plum, caused by *Exoascus pruni*, was sent in from Daviess County, black knot, caused by *Plowrightia morbosa*, from Boone and Bartholomew counties, and brown rot, caused by *Sclerotinia fructicola*, from Marion County.

Potato. Late blight (*Phytophthora infestans*) tuber infection occurred in DeKalb, Tipton, and Montgomery counties and for the first time in at least nine years caused considerable loss. Early blight, caused by *Alternaria solani*, was noted in Clinton County. Scab, caused by *Actinomyces scabies*, and black scurf (*Rhizoctonia solani*) were of general occurrence. Black leg, caused by *Bacillus phytophthorus*, occurred in the early crop in Marion and Bartholomew counties. Silver scurf, caused by *Spondylocladium atrovirens*, was found on Irish Cobblers. Leaf roll was, as usual, the most important disease in the late crop, and mosaic was of less importance. In the common Indiana varieties, mosaic¹⁴ spreads much less rapidly than leaf roll.

Radish. Black-root, caused by *Aphanomyces raphani*, occurred in May at Lafayette.

Raspberry. Anthracnose, caused by *Plectodiscella veneta*, was worse than usual, because of the frequent spring rains, and was recorded from 11 counties. Red as well as black varieties were severely affected. On black varieties infection occurred on leaves, fruit spurs, and even on the fruit. Late in June, new lesions were abundant on the tips of the shoots, a circumstance which indicated that new infection had occurred much later in the season than is usual. Abundant infection was found in a new planting well isolated from old patches, even though the old stubs on the transplants had been cut off below the surface of the soil. In a badly diseased plantation near Lafayette, the variety Plum Farmer showed good resistance as judged by the vigor of the old canes and the freedom from current season infection. Leaf spot, caused by *Mycosphaerella rubina*, was prevalent at Lafayette. Crown gall (caused by *Bacterium tumefaciens*) rather high up on the stems was found at Lafayette and in Parke County. Leaf curl was found in black varieties at Lafayette, and mosaic was found on both red and black varieties at

¹⁴ Gardner, Max W. and Kendrick, James B. Potato mosaic and leaf roll: Spread and effect on yield. Trans. Ind. Hort. Soc. 1927:158-168. 1928.

Lafayette and by Dietz in Johnson County. In the Lafayette planting mosaic was severe only on the Honeysweet variety of blacks.

Rye. Mains estimated that leaf rust (*Puccinia dispersa*) caused a loss of five per cent, and reported ergot more prevalent than usual.

Salsify. A rather heavy infection of white rust (*Albugo tragopogonis*) occurred in a garden at Lafayette late in the fall.

Sorghum. Rust (*Puccinia purpurea*) was found on sragrain sorghum in Tippecanoe County on October 19. The seed had been obtained in Texas.

Soybean. Mosaic was noted near Lafayette in September. Leaf spot caused by *Septoria glycines* was found in Hendricks and Tippecanoe counties in the fall, and pod lesions caused by the same fungus were also found. The pod and stem blight, caused by *Diaporthe sojae*, was found very prevalent on October 19 in fields of the Manchu variety near Odell. Most of the plants were dead or dying and the relation of the blight fungus to this condition is not known. There was much wrinkling of the seed coat and many darkened or moldy beans.

The purple seed stain caused by *Cercospora* (or *Cercosporina*) *kikuchii* was found in the varieties Manchu, Dunfield, Midwest, Mansoy, and Ito San. It was found in seed samples from 17 counties and in 53 of the 54 samples examined. The percentage of infection was small, varying from 0.1 to 5, but the presence of even a few discolored seeds is very objectionable from the standpoint of the producer of pure seed. In October the disease was found in the field and indefinite darkened areas on the dying pods were found associated with purple lesions on the underlying seeds. The fungus was cultured from the pod tissues. Much, but not all, of the seed infection appears to emanate from the hilum.

Spinach. Mosaic was noted in Marion County in April and near Lafayette in November.

Strawberry. Leaf spot caused by *Mycosphaerella fragariae* and leaf blotch, caused by *Diplocarpon earliana*, were noted near Lafayette late in June, the latter being more serious in the Sample variety than in the Premier variety. Petiole and peduncle lesions of leaf blotch were very serious in their effects. Dietz reported mosaic, or yellows, serious in Clinton County in June and it was also reported from Miami County in May.

Sunflower. Rust (*Puccinia helianthi*) was found rather prevalent on the older leaves in a field of sunflowers in Hancock County on August 15.

Sweet Potato. Black rot caused by (*Ceratostomella fimbriatum*) stem lesions were found killing slips in Knox County on June 6. Gregory reported serious losses from this disease in Gibson County in October, and also found considerable Fusarium wilt. He found surface dry rot, caused by *Fusarium oxysporum*, in Vigo County in October.

Swiss Chard. Leaf spot, caused by *Cercospora beticola*, was found near Lafayette in November.

Tomato. *Septoria* leaf spot was the worst disease in the canning crop and unquestionable evidence of its introduction on southern grown plants was obtained. In an experimental field at Pendleton set with plants from Texas, badly diseased plants were found scattered through the field on July 22. The main shoot of each of these plants had usually been killed by large chalky white stem lesions and had been replaced by laterals (fig. 5, A). The infection on these plants was of long standing and other evidence also indicated that these plants had been diseased when they were set out. From these plants as centers considerable spread of infection had occurred and the field was soon generally diseased. A survey revealed a similar severity of *Septoria* leaf spot in all the localities where plants from the same source had been used, while in other near-by localities the disease was of much less importance.

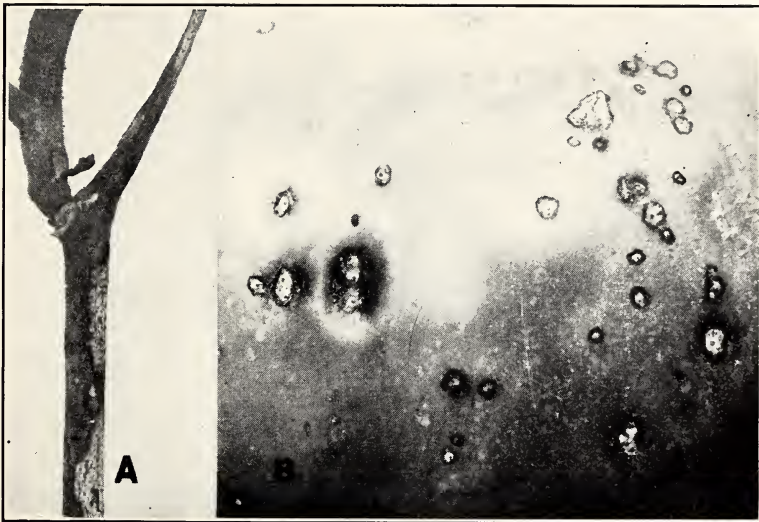


Fig. 5—A. Stem of southern-grown tomato plant showing main shoot (right hand branch at the fork) killed by *Septoria* infection and being replaced by a lateral shoot. B. Lesions of *Septoria lycopersici* on tomato fruit (enlarged).

The first instance of *Septoria* infection of the fruit to come to our notice was found on a few plants in one area in this field on September 10 by L. C. Cochran. The lesions were 2 to 3 mm. in diameter, shallow and irregularly circular, with a black border and a white center bearing black pycnidia (fig. 5, B). These pycnidia contained typical *Septoria* spores. The fungus was isolated and its pathogenicity to young tomato plants was proved by inoculation tests in the greenhouse.

Early blight, caused by *Alternaria solani*, was found by Kendrick on June 1 on plants shipped from Arkansas and heeled-in to await proper weather and soil conditions for planting. The disease was also noted on occasional plants in a greenhouse near Indianapolis on June 28. In an experimental field in Orange County, early blight was first noticed on

July 20 and in September this disease, along with Septoria leaf spot, caused bad defoliation. In a field near Marion visited on August 2 there were numerous cases of early blight collar rot which had resulted in a stunting and rosetting of the plants. Very slight foliage infection and one collar rot case was found in canning crop fields near Acton, Marion County, on August 15. Much stem-end rot, due probably to this fungus, was found in the experimental field in Orange County in September, and an abundance of this rot was noted in the loads of tomatoes being received at the canning factory at Pendleton. The smaller early blight fruit lesions which occur rather commonly late in the season were also abundant.

Because of the cool weather, Fusarium wilt was of very little importance. In greenhouses, a few cases were noted on May 16 and much was noted in the Bonny Best variety on June 28, but none in the Marglobe variety. A few cases were noted in the experimental field near Pendleton on July 22, but the disease never became serious. In a field at Kempton where the plants were inoculated at planting time by placing straw bearing the fungus in pure culture about the roots, no conspicuous cases occurred and only a few were detected by cutting the stems.

In a survey of Indianapolis greenhouses made April 18, when the tomato plants were one to two feet high, much mosaic was found, especially where aphids had been present. The impression was obtained that the inception of mosaic was favored by the presence of weeds and various ornamental plants such as geraniums to harbor aphids, by faulty fumigation, and by unnecessary handling of the tomato plants in tying them up, when the plants, crowded by lettuce, have grown too tall and spindling. The greenhouses were inspected again on May 16 and mosaic was found much more prevalent, as were also the aphids. By June 28 there was practically a 100 per cent infection of mosaic in the greenhouses. The canning crop fields about Acton and Marion were surprisingly free from mosaic in August while abundant mosaic of early inception was found in fields at Kempton, Pendleton, and Greenfield. There was evidence of the disease being introduced with the Texas plants. A few plants affected with streak or double-virus mosaic were found in the experimental field at Pendleton on August 15 and Gregory found streak in a mosaic crop in a greenhouse at Vincennes in May restricted to the vicinity of two volunteer potato plants.

Leaf mold (*Cladosporium fulvum*) was not found in the greenhouses until June 28 when it had become destructive. Gregory found it a limiting factor in many houses. Bacterial spot, caused by *Bacterium vesicatorium*, was found sparingly in the fruit being unloaded at the factory in Pendleton, and anthracnose, caused by *Gloeosporium phomoides*, was prevalent in certain loads. Kendrick found stem rot caused by *Sclerotium rolfsii* on June 1 in transplants grown in Arkansas.

Blossom-end rot was reported severe in a greenhouse in Gibson County in May. The stem-end yellowing, which is very objectionable to the canners, was due to the prevention of red pigment formation by the hot sun because the normal red color was often present in the narrow strip shaded by the pedicel. Besides this type of sun injury, actual

sunscauld also occurred rather commonly during the very hot weather in September. Cyanide injury, characterized by crinkling and downward curling of the leaves and small white papery lesions, was found in greenhouses on the leaves that were young when the fumigation occurred. A. H. Watson found definite and distinct potash hunger symptoms on the older leaves on the dark loam soils of north central Indiana.

Turnip. Powdery mildew (*Erysiphe polygoni*), gray leaf spot caused by *Alternaria herculca*, and mosaic were found in a garden near Lafayette in November.

Wheat. Stem rust (*Puccinia graminis*) was too late to cause loss according to Leer, although he found barberry infection as early as May 1. Leaf rust (*P. triticea*) was very severe and caused a loss estimated by Mains at more than 10 per cent. Leaf rust was found abundant in a field in Jackson County as early as May 4. Loose smut (*Ustilago tritici*) was of usual prevalence.

There was a very serious epiphytotic of bunt (*Tilletia laevis*) which caused widespread concern among the growers and a very considerable loss, not only in yield, but in quality. Numerous complaints and inquiries were received. Leer, who saw wheat fields in all parts of the state, reported this disease fully twice as destructive as he had ever seen before. In a survey of seven farms in Clinton County, Cochran found that the percentage of smut balls in the grain varied from 0.5 to 7.5 and that the grain from three of these farms was docked 2 to 5 cents per bushel, while the grain containing 7.5 per cent of smut balls was unsalable. He estimated that about half of the farmers in that section failed to treat the seed for this crop.

Scab, caused by *Gibberella saubinetii*, was more serious than it has been since 1919. Septoria leaf spot was very prevalent early in the season and Septoria glume blotch was noted by Mains. Anthracnose, caused by *Colletotrichum cereale*, was found by Beeson in Jackson County early in June, and Mains found this disease very serious. Mains also observed Helminthosporium blight, powdery mildew, and ergot.

Trees. Chestnut blight, caused by *Endothia parasitica*, was found by Dietz in a forest planting in Posey County made in 1908, and in forest plantings in Clark and Wayne counties by Prof. B. N. Prentice. It has been possible to explain the previously recorded occurrences of this disease in Indiana by nursery stock importation but Prentice states that the Wayne County planting, above mentioned, was from seed.

A rust (*Gymnosporangium germinale*) on hawthorn fruits was sent in from Marion County. Anthracnose of shagbark hickory, caused by *Gnomonia caryae*, was noted in White County, on October 8, as was also powdery mildew (*Microsphaera alni*) on hornbeam, ironwood, white oak, and black oak. Powdery mildew (*Uncinula circinata*) was noted on silver maple and black maple in October. In June, anthracnose, caused by *Gnomonia veneta*, was very prevalent on white oak, but black oak seemed to be free from it. Leaf blister, caused by *Taphrina coerulescens*, was prevalent on black oak.

Canker, caused by *Dothichiza populea*, occurred on Lombardy poplars, and leaf spot, caused by *Marssonía populi*, was found on nursery stock in Marion County. Leaf spot of red bud, caused by *Cercospora chionea*, was prevalent. Powdery mildew (*Microsphaera alni*) was common on the leaves of young sycamore trees in October in White County. Anthracnose of sycamore, caused by *Gnomonia veneta*, was extremely serious in the spring, owing to the rains, and completely defoliated older trees as much by its attack on the twigs as on the leaves. Younger trees did not suffer so badly and made a quicker recovery.

Ornamentals. Aster yellows was not as prevalent as usual. Dietz found bacterial spot of carnation, caused by *Bacterium woodsii*. A mosaic disease of coneflower was noted. Powdery mildew (*Erysiphe cichoracearum*) on dahlia was sent in from Jefferson County. Bacterial spot of delphinium, caused by *Bacterium delphinii*, was found at Lafayette, as was also the gladiolus rot caused by *Penicillium gladioli*. The hollyhock leaf spot caused by *Cercospora althaeina* was noted. Bacterial soft rot and dry rot, caused by *Sclerotium delphinii*, were the most serious iris diseases. Dietz reported leaf spot, caused by *Didymellina iridis*, to be especially abundant. Bacterial spot of the kudzu vine, caused by *Bacterium puerariae*, was found in June. A Botrytis leaf spot of Madonna lily was found in a greenhouse. A Colletotrichum leaf spot of pansy occurred in Tipton County in October.

A serious outbreak of Phytophthora blight of peonies occurred near Vincennes late in April. Pierce inspected the plantation and reported the disease worst on the varieties, Felix Crouse and Festiva Maxima. The fungus causing this disease was found by Cooper and Porter¹⁵ to be an undescribed species which they named *Phytophthora paeoniae*. Dietz reported black spot of rose, caused by *Diplocarpon rosae*, very serious in greenhouses and also out-of-doors. He also reported powdery mildew (*Sphaerotheca pannosa*) worst on Dorothy Perkins and Crimson Rambler out-of-doors and on Premier and Double White Killarney in greenhouses. A fasciation of sweet peas occurred in two greenhouses, and Gregory found root rot, caused by *Thielavia basicola*, in a greenhouse in Floyd County. Damping-off of oriental poppy plants, caused by Rhizoctonia, occurred in a greenhouse at Lafayette. Mains¹⁶ has reported a number of other diseases.

Weeds and Wild Plants. *Peronospora potentillae* and *Ramularia arvensis* were found on cinquefoil, *Cercospora physalidis* on *Physalis pubescens*, *Plasmopara halstedii* on Helianthus sp., *Cercospora monoica* on hog peanut, *Sphaerotheca humuli* var. *fuliginea* on *Lactuca villosa*, *Plasmopara viticola* on wild grape, and *Septoria polygonorum* on smartweed. Additional records may be found in Van Hook's article (l. c.).

¹⁵ Cooper, Delmer C. and Porter, C. L. Phytophthora blight of peony. Phytopathology 18:881-899. 1928.

¹⁶ Mains, E. B. Plant diseases in a home garden. Proc. Ind. Acad. Sci. 1927:341-353. 1928.

SUMMARY.

The diseases of outstanding importance were as follows: apple scab and blotch, celery Septoria blight, cherry leaf spot, clover anthracnose, currant and gooseberry anthracnose, crown rust of oats, onion neck rots, peach bacterial spot and brown rot, raspberry anthracnose, sweet potato black rot, tomato Septoria leaf spot and early blight, wheat leaf rust and bunt, sycamore and oak anthracnose, and Phytophthora blight of peonies.

The diseases or parasitic organisms not previously reported for the state, at least in this series, include: alfalfa stem blight caused by *Pseudomonas medicaginis*; *Nectria cinnabarina* on apricot; bean angular leaf spot caused by *Isariopsis griseola*; *Alternaria brassicae* on Brussels sprouts; leaf spot on Chinese cabbage caused by *Alternaria herculea*; bacterial spot of carnation; coneflower mosaic; corn foot rot caused by *Ophiobolus heterostrophus*; bacterial spot of delphinium; gladiolus corm rot caused by *Penicillium gladioli*; *Bacterium puerariae* on kudzu vine; onion mycelial neck rot caused by *Botrytis byssoidea*, small sclerotial neck rot caused by *Botrytis squamosa*, and Fusarium pink stain; pear brown bark spot or measles; sorghum rust (*Puccinia purpurea*); Thielavia root rot of sweet peas; tomato stem rot caused by *Sclerotium rolfsii*; and gray leaf spot of turnip caused by *Alternaria herculea*.

Other observations of interest were the occurrence of Phytophthora rot on young green apples, a fall outbreak of apple pink rot in Grimes probably following surface bitter pit, *Isariopsis griseola* on bean pods, resistance of London Market currant to anthracnose, sunscald of onions, resistance of Plum Farmer black raspberry to anthracnose, importation of tomato Septoria on southern grown plants, and Septoria lesions on tomato fruit.

