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THE  
PLANT DISEASE REPORTER  
ISSUED BY  
THE OFFICE OF MYCOLOGY AND DISEASE SURVEY

Supplement 70

Diseases of Fruit and Nut Crops

In the United States in 1928

June 1, 1929



BUREAU OF  
PLANT INDUSTRY

UNITED STATES DEPARTMENT OF AGRICULTURE

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## DISEASES OF FRUIT AND NUT CROPS IN THE UNITED STATES IN 1928

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Plant Disease Reporter  
 Supplement 70

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I N T R O D U C T I O N

In this summary, an attempt has been made to present as true a picture of the fruit disease situation in 1928 as the information received by the Plant Disease Survey will permit. Naturally, accuracy in the reproduction of such a picture depends not only on the summarizer but on the quantity and quality of information available. In the case of several of the more important diseases of common crops sufficient data are available to warrant some general conclusions with regard to their prevalence, but in many cases, the information is inadequate for such generalities and only fragments of what is considered the more important matter can be presented. Brevity and the reduction of the length of the report have been borne in mind.

This summary is based principally on reports from the following sources: collaborators of the Plant Disease Survey; other plant specialists working for the States or the Federal government in the States, and articles in the literature of the year.

The persons mentioned in the following list have furnished practically all of the original data for this particular summary on fruit diseases. Names with an asterisk (\*) are of those who do not hold official appointments as collaborators.

Collaborators and Cooperators

179

Maine

D. Folsom

New Hampshire

O. Butler

Massachusetts

W. H. Davis

\*W. H. Thies

W. L. Doran

\*H. J. Franklin

Connecticut

G. P. Clinton

\*F. A. McCormick

E. M. Stoddard

New York

W. H. Rankin

C. Chupp

\*W. D. Mills

H. E. Thomas

\*A. B. Burrill

New Jersey

W. H. Martin

Pennsylvania

G. L. Zundel

R. S. Kirby

W. A. McCubbin

Delaware

J. F. Adams

Maryland

R. A. Jehle

Virginia

S. A. Wingard

F. J. Schneiderhan

F. C. McWhorter

West Virginia

\*W. Archer

E. C. Sherwood

Kentucky

W. D. Valleau

W. D. Magill

Tennessee

C. D. Sherbakoff

J. A. Andes

J. A. McClintock

North Carolina

R. F. Poole

G. W. Fant

Georgia

O. C. Boyd

\*C. H. Alden

\*B. B. Higgins

\*J. B. Demaree

Florida

G. F. Weber

\*E. F. Debusk

Erdman West

A. N. Brooks

\*R. E. Nolan

Mississippi

L. E. Miles

H. H. Wedgworth

\*D. C. Neal

Louisiana

C. W. Edgerton

E. D. Tims

A. G. Plakidas

Texas

J. J. Taubenhaus

B. F. Dana

W. J. Bach

P. Lusk

Arkansas

V. H. Young

H. R. Rosen

Ohio

H. C. Young

\*O. T. Wilson

\*E. W. Mendenhall

Indiana

M. W. Gardner

\*Monroe McCown

\*Leslie Pierce

Illinois

H. W. Anderson

Michigan

Ray Nelson

C. W. Bennett

Wisconsin

R. E. Vaughan

Minnesota

\*Section of Pl.Path.

Iowa

R. H. Porter

\*D. E. Bliss

Missouri

I. T. Scott

North Dakota

\*W. E. Brentzel

Nebraska

\*Dept. Plant Path.

Kansas

O. H. Elmer

Montana

P. A. Young

Colorado

\*E. L. LeClerg

New Mexico

R. F. Crawford

Arizona

\*R. B. Streets

Utah

E. L. Richards

Washington

F. D. Heald

\*D. F. Fisher

Oregon

H. P. Barss

S. M. Zeller

\*F. C. Reimer

California

\*D. G. Milbrath

FRUIT DISEASES OF 1928DISEASES OF POME FRUITSAPPLESCAB, *VENTURIA INAEQUALIS* (CKE.) ADERH.

Scab was considerably more prevalent and destructive in the northeastern section of the country and in the Great Lakes Region than usual. In New England and the Hudson Valley it was very abundant and the cause of much loss. This was largely true of the other eastern sections although the commercial orchards in the Shenandoah Valley area around Winchester and Martinsburg seemed to be relatively free. Some of the following collaborators' reports will give an idea of the situation with regard to prevalence.

Massachusetts: Unusually prevalent on McIntosh during 1928 season. Only those orchardists who have used utmost precautions have secured good control. (W. H. Thies)

New York: Serious losses in both western New York and Hudson Valley. About same as 1927 in western New York, much more in Hudson Valley. (W. D. Mills)

New Jersey: A survey of 118 orchards in 17 counties showed an average of 5.2 per cent scab. Most of these orchards were sprayed under the general direction of the county agents. The amount of scab varied from 0.7 to 12.5 per cent in the various counties. Spore discharge took place earlier than 1927. This year the delayed dormant application was important in the control of the disease. (W. H. Martin)

Maryland: In all unsprayed orchards scab is very severe and most fruit is worthless. There was very little scab in most commercial orchards where information sent out by the spray service was used. The total loss from scab in the State will be very small.

Virginia: Has developed rapidly during June as a result of heavy rainfall and cool weather. The Winchester section is notably free from scab but the lower sections of the Valley of Virginia will probably suffer greater losses this year than in any year since 1924. A very heavy secondary infection appeared about July 6. (Schneiderhan)

West Virginia: In the earlier part of the season the infection was fairly abundant on the leaves and seemed to point toward severe damage. At the end of the year, however, infection was not as severe as had been expected. The commercial crop showed a low percentage of damaged apples and even in some neglected orchards much of the fruit was clean. The wild crab *Pyrus coronaria*, was moderately infected. (Archer)

North Carolina: Much more severe in mountain orchards as well as throughout the State than during 1927. In some unsprayed orchards the infection amounted to 100 per cent with very poor quality fruit resulting. (Poole & Fant)

## Apple - Scab

Arkansas: Very abundant on fruit and leaves. More on fruit stems than usual.

Indiana: Calyx and 2 weeks sprays important this year because of incessant rains beginning during full bloom and lasting about 6 weeks. Winesap receiving pink but no calyx spray, 38 per cent fruit scabby; Winesap receiving pink + calyx spray, 1.7 per cent fruit scabby; Stayman no calyx spray, 12 per cent scab; Stayman sprayed, 1 per cent scab. (Gardner)

Illinois: Very serious now throughout the State. Dry weather early in the season prevented early scab infection except in extreme south where pedicel infection was common. Heavy rains in late May and early June started another infection period which became extremely serious since orchardists are not able to spray. Leaf and fruit infection both serious. (H. W. Anderson, July 1)

Minnesota: First reported July 2. Both primary and secondary infestation present at this time. Dry weather up to week of June 16 prevented development. Common in orchards at present time but doing little damage. (Sect. Pl. Path., Aug. 1)

Wisconsin: Very little early scab. Development dependent on rains. One or two additional sprays in July resulted in good control. Regular 4-spray program gave poor control. (Vaughan)

Iowa: Very prevalent and severe on unsprayed trees. It came on early and has been increasing in severity. (R. H. Porter, Aug. 20)

Missouri: Found to be quite generally present in home orchards where little effort is made to control it. Commercial orchards show but slight infection. (Scott)

Montana: Well controlled in sprayed orchards in Bitter Root and Flathead Sections, but serious in unsprayed orchards. No late-season infections seen. (H. E. Morris & P. A. Young)

Washington: None east of the Cascades. (Dept. Pl. Path.)

Oregon: Loss this year due mostly to infection of floral parts during blossom period preventing set of fruit. Much more severe in Willamette Valley than other localities. (Zeller)

## Apple - Scab

Table 48. Percentage losses from apple scab as estimated by collaborators, 1928.

Percentage:		Percentage:	
loss :	States reporting	loss :	States reporting
35 :	Georgia	3 :	Maryland, Ohio,
30 :	New York, New Hampshire	:	Indiana
17 :	Michigan	2.5 :	Virginia
10 :	Kentucky, Tennessee	2 :	Kansas, Montana, North
8 :	Massachusetts, New	:	Dakota
:	Jersey	1.5 :	Arkansas
7 :	Iowa	1 :	West Virginia, Missouri
:		.5 :	Mississippi
:		:	

Data on ascospore discharge will be found in The Plant Disease Reporter (12: 1-6, 14-15, 25-27, 37-38. 1928.)

Table 49. Data on varietal susceptibility of apples to scab as compiled from collaborators' reports, 1928. (It will be noted that the same varieties are sometimes rated differently by collaborators of different States.)

Varieties	:	:
very susceptible	Susceptible	Resistant
McIntosh (1) (2) (3) (4) (6)	Stayman (5)	Baldwin (1)
(7)	Arkansas Black (5)	Yates (5)
Ben Davis (4)	Winesap (5) (7)	Terry (5)
Gano (4)	Wealthy (6)	Yellow Transparent (6)
Delicious (3)	Duchess (6)	Golden Delicious (6)
Stayman (6)	Northern Spy (6)	
Winesap (6)	Golden Delicious (7)	
Rome (6)	Turley (7)	
Bonum (6)	Grimes (7)	
:	:	:

- (1) O. Butler - New Hampshire.
- (2) W. H. Davis - Massachusetts.
- (3) G. P. Clinton - Connecticut.
- (4) W. D. Mills - New York.
- (5) C. H. Alden and O. C. Boyd - Georgia.
- (6) R. F. Poole and G. W. Fant - North Carolina.
- (7) M. W. Gardner - Indiana.

Recent literature: Pl. Dis. Repr. 12: 1-6, 14-15, 25-27, 37-38, 48-49, 78-79, 79, 88-89, 104, 126, 135, 140-141.

1. Anderson, H. W. Apple scab control in northern Illinois. Trans. Illinois State Hort. Soc. 61: 282-293. 1928.

## Apple - scab

2. Goodwin, W., E. S. Salmon, and W. M. Ware. Control of apple scab on Allington Pippin and Newton Wonder by two types of Bordeaux mixture. Jour. Mins. Agr. Great Britain 35: 226-235. June 1928.
3. Hamilton, J. M. Studies of the fungicidal action of certain dusts and sprays in the control of apple scab. (Abstract) Phytopath. 19: 87. Jan. 1929.
4. Howitt, J. E. Another season's experience with apple scab. Canad. Hort. 51: 139-140. May 1928.
5. Hurt, R. H. Calcium monosulphide, a substitute for lime-sulphur for summer spraying. (Abstract) Phytopath. 19: 106. Jan. 1929.
6. Keitt, G. W., and E. E. Wilson. Third progress report of studies of fall applications of fungicides in relation to apple scab control. (Abstract) Phytopath. 19: 87-88. Jan. 1929.
7. Martin, W. H., and E. S. Clark. Apple scab studies. Ann. Rep. New Jersey Agr. Exp. Sta. 48: 218-221. 1928.
8. Williams, R. C., and H. C. Young. Chemistry of the toxic factor of sulphur. (Abstract) Phytopath. 19: 89. Jan. 1929.
9. Wilson, E. E. Studies of the ascigerous stage of *Venturia inaequalis* (Oke.) Wint. in relation to certain factors of the environment. Phytopath. 18: 375-418. May 1928.
10. Young, H. C. Dusts composed of lime sulphur and sulphur. (Abstract) Phytopath. 19: 88. Jan. 1929.

## BLITCH, PHYLLOSTICTA SOLITARIA ELL. &amp; EV.

In Illinois and Indiana, and also in Iowa, blotch was evidently more prevalent than usual. In the former States the excessive rainfall of June provided many infection periods with the result that the disease became very prevalent even on well-sprayed trees. In the larger commercial areas of Virginia and West Virginia blotch is not important according to collaborators as the more important varieties grown are not susceptible and the ordinary spray schedule holds it well in check. In some of the neglected orchards of susceptible varieties, however, especially in the southern parts of these States blotch is a factor. In Ohio, H. C. Young reported the disease of only comparatively minor importance this year.

Some of the collaborators' reports are as follows:

Virginia: Found wherever Northwestern Greenings and Limbertwigs are grown. It is not uncommon to see 100 per cent of infection on these varieties which are of minor importance. (Schneiderhan)

## Apple - Blotch

West Virginia: Severe this year only in southern neglected orchards. In the commercial areas, i.e., in the eastern panhandle, infection was controlled perfectly by spray. Northwestern Greening, Smith Cider, Duchess, Stark, and Winter Banana are considered to be most susceptible; Rome Beauty and Ben Davis only moderately so. (Archer)

North Carolina: Conditions were very favorable for this disease during 1928. There was an unusually heavy infection of twigs as well as fruit. (Poole)

Indiana: Dates of infection were determined at Lafayette and Mitchell as in previous years by exposing potted trees during each rain. At Lafayette, petal fall occurred during 7 rains previous to May 18. Infection occurred during 22 out of the 23 rains, between May 18 and June 19, covering a period from 4 days after petal fall to 9 1/2 weeks after petal fall. At Mitchell, petal fall occurred about May 9. A trace of infection occurred May 5, none May 11 or May 15, and then infection occurred during each of the 23 rain periods between May 17 and July 22 (10-1/2 weeks after petal fall). This season was characterized by an unusually large number of infection periods covering an unusually long interval of time. No evidence was obtained, however, to indicate the standard spray program (petal fall, 2, 4, and 6 weeks) was not reliable under these conditions. (Gardner)

Illinois: The first infection was noticed at Ozark on May 24, but this was very light. The main infection took place during early June, when, during two weeks, twelve inches of rain fell. The disease appeared in severe form about June 16. If the three and four-weeks' spray had been applied according to our schedule, the fruit would have been well protected at this time. But the heavy rains of early June washed off much of the spray materials, and consequently, blotch was abundant in many well-sprayed orchards.

The northward advance of blotch cannot be questioned in the light of our observations during the last ten years.: We are constantly receiving specimens of blotch from the central and northern sections of the State, and the spray program for central Illinois must now contain a warning that blotch susceptible varieties must have the regular blotch sprays applied. Fortunately, the central Illinois orchards do not contain many blotch susceptible varieties.

Blotch was rather common on the Jonathans this season. While this variety has not been classed as very resistant, we have never considered it susceptible. It is probable that a special warning will be necessary in regard to spraying this variety for blotch in those orchards where it is near blotch cankered trees of other varieties. Unfortunately, this variety is especially susceptible to Bordeaux russeting and care must be taken where this fungicide is used. (H. W. Anderson)

## Apple.- Blotch

Table 50. Percentage losses from apple blotch as estimated by collaborators, 1928.

Percentage:		Percentage:	
loss :	States reporting	loss :	States reporting
5 :	Kentucky	1.5 :	Ohio
4.5 :	Missouri	1 :	Maryland, Iowa, Arkansas,
4 :	Kansas	:	Texas
3 :	Mississippi	.3 :	New Jersey
:		:	

The following varieties were reported as susceptible or very susceptible in 1928:

Ben Davis (New Jersey, Virginia, West Virginia)  
 Duchess (New Jersey, West Virginia, Illinois)  
 Golden Delicious (Indiana)  
 Limbertwig (Virginia)  
 Maiden Blush (New Jersey)  
 Northwestern Greening (Virginia, West Virginia)  
 Pippin (Virginia)  
 Smith Cider (New Jersey, West Virginia)  
 Stark (West Virginia)  
 Tulpahocken or Fallawater (Indiana)  
 Winesap (New Jersey)  
 Winter Banana (West Virginia)  
 Yates (North Carolina)  
 York (Virginia)

W. H. Martin (1) in New Jersey reported that in 1925 and 1926, as a result of experiments on the dates of infections, it is not apparent that the 17 and 28-day spray applications are important in control in New Jersey and that as a spray Bordeaux mixture was superior to lime-sulphur. Fruit given the 7 and 17-day spray with Bordeaux showed 70.4 per cent clean fruit as compared with 45.1 per cent on lime-sulphur treated trees, and 12.2 per cent on trees (picked fruit).

Recent literature: Pl. Dis. Repr. 12: 29,39, 51, 70, 91, 126, 136.

1. Martin, W. H. Apple blotch control studies. Ann. Rep. New Jersey Agr. Exp. Sta. 48: 216-218. 1928.

CEDAR RUSTS, GYMNOSPORANGIUM JUNIPERI-VIRGINIANAE,  
 G. GLOBOSUM AND G. GERMINALE

At the New York meeting of the American Phytopathological Society, Thomas and Mills (1) pointed out that not only is the ordinary Gymnosporangium juniperi-virginianae destructive in New York but also that the quince rust (G. germinale) and the hawthorn rust (G. globosum) are also of importance on apple in that State. They found the quince rust on the fruit of five varieties of

## Apple - Cedar Rusts

apples, causing heavy losses, and they found the hawthorn rust on the foliage of 13 varieties with infection severe in some instances.

Gymnosporangium germinale according to Kern (N. A. Flora 7 (3): 197-198. 1912) occurs from Maine west to the northern peninsula of Michigan and to Iowa, south to Texas and northern Florida (see plate). This refers to the occurrence on Juniperus. On apple he only records it from Massachusetts. To this must now be added the 1928 occurrences in New York. There are also specimens from Rhode Island and Virginia on file in the Mycological Collections of the Bureau of Plant Industry.

Gymnosporangium globosum is recorded in North American Flora (7 (3): 204-206) as occurring from Maine west to southeastern South Dakota and south to northern Florida and Texas; but on the apple the range is limited to Maine, Vermont, Massachusetts, Connecticut, and New York (see map). In addition to this the Survey has what seem to be reliable reports of occurrence on apple from New Hampshire and Pennsylvania.

It will be seen therefore that the definite records of occurrence of these two rusts on apple are for the extreme northeastern United States. On juniper, however, their range is almost, although not quite as wide as the commoner G. juniperi-virginianae which occurs on both apple and red cedar from Massachusetts and Vermont west to southeastern South Dakota and south to eastern Texas and northern Florida. (see map, figure 9).

Owing to the similarity of these three rusts of apple, and because of the variation in symptoms displayed on different varieties and different parts of the host, it is probable that numerous wrong identifications have been made in the past. In regions where all three rusts occur care in diagnosis is especially necessary. Thomas and Mills (1, 2) say that the terminal peridial cells of the aecidium seem to offer the best diagnostic character.

For the purposes of the remainder of this section of the summary all three rusts will be treated together except where specifically mentioned.

The year was notable for the unusual prevalence of rust. Rainy weather in May and June favored teliospore germination and infection. Most of the States from Massachusetts and New York westward to Iowa and Missouri reported more rust than usual. In the former State it was said to be the worst in five years, and in New York, Vermont, Connecticut, and Iowa it was the worst in many years. Indiana (Gardner) reported the heaviest foliage infection in ten years. On the other hand in commercial sections in Maryland, Virginia and West Virginia where cedar eradication has been in progress for several years rust was not as severe as has often been the case. Schneiderhan in Virginia reported a relatively small loss in areas where cedars have been cut. In one section, however (Cedar Creek - Strasburg), where cedars have not been cut and are growing in close proximity to apple trees some of the heaviest infections on record were noted. This is probably an indication of what would have happened in Virginia if cedars had not been generally removed from the important apple section. Archer from West Virginia reported less than the normal amount of rust in commercial areas where cedar eradication has been practiced. He reported some damage in the southern sections.

## Apple - Cedar Rusts

A few collaborators' reports on prevalence are as follows: Losses are given in table 51.

New York (Green Co.): Cedar rust infection is unusually severe this year. Most varieties of apples are affected. Counts on McIntosh on June 27 ran as high as 65 per cent near cedars. Those a mile away from cedars only had 9 per cent infection. A count on dropped fruit near cedars showed 47 per cent had rust spots. Rust spots on McIntosh leaves are beginning to die out. An occasional cedar rust lesion is found on pear leaves. (New York Week News Letter, July 2).

I have had two collections from Vermont and Massachusetts but I have no extensive records outside of New York State. At Orwell, Vermont, six of seven varieties bore G. globosum. Collections by Burrill. (Thomas)

Indiana: Worst foliage infection in 10 years. Calyx spray of lime-sulphur important in preventing leaf infection on Winesap and Stayman, Lawrence County. Trace noted on fruit of these varieties and Jonathan, on 7-12. (Gardner)

Illinois: In 1925 a dry growing season reduced infection on the cedar trees to such an extent that it was rare to find cedar apples during the season of 1926-27. In the late summer of 1926, abundant rains gave heavy infections on the cedars, and in the spring of 1928, the cedar apples were so abundant that thousands could be obtained on a tree no higher than one's head. During April, the spore horns of the cedar apples did not expand, and consequently, there was no early infection. In May, no rain fell in the neighborhood of Ozark, and yet we find infection on the leaves in abundance on June 5. Infected leaves from northern Illinois (Blackstone) were received on June 19. As was to be expected, the rust infection was extremely severe. (H. W. Anderson)

Michigan: Found in one orchard affecting foliage of Jonathan and fruit of Hubbardston. (Nelson)

Minnesota: Very severe locally but did little general damage. (Sect. Pl. Path.)

Iowa: Most severe of all foliage troubles on apples in the nursery during 1928. Bechtel's Crabs were a complete loss due to excessive stem cankers and rust lesions on the buds, petioles and leaves. Although found on small red cedars in nursery rows, cedar rust was not a limiting factor in the growth of these trees. Large trees in the vicinity were heavily loaded with rust galls. (Bliss)

Missouri: Unusually severe throughout the State this season. Numerous complaints have come in from all sections especially from the apple-growing region of southwest Missouri. Pycnial stage is now (June 23) quite well developed, the leaves being well covered with lesions. Pycnia are abundant on crabs and species of Crataegus. The last of May and June has been marked by heavy rainfall, the total for the central part of the State being nearly 11 inches for June alone. High humidity with considerable wind throughout this period has probably contributed to the wide dissemination of inoculum. (Scott)

## Apple - Cedar Rusts

Table 57. Percentage losses from rust diseases of apple as estimated by collaborators, 1928.

Percentage:		Percentage:	
loss :	States reporting	loss :	States reporting
7	Tennessee	.5	Maryland, Mississippi,
5	Virginia		Indiana
2.7	North Carolina	Trace	New Hampshire, New Jersey,
2	Massachusetts, Arkansas,		West Virginia, Kentucky,
	Kansas		Michigan, Wisconsin,
			Missouri, North Dakota

W. D. Mills of New York has supplied the following information concerning the occurrence of the three rusts on different varieties.

Gymnosporangium globosum: Identified on leaves of Baldwin, Esopus, Spitzenberg, Fameuse, Hubbardston, Jonathan, McIntosh, Northern Spy, Northwestern Greening, Rhode Island Greening, Rome Beauty, Tallmon Sweet, Tompkins King, and Winesap. Not found on apple fruit.

Gymnosporangium germinale: Counts in 14 orchards in 4 counties showed fruit infection on Fameuse (1 count) 21 per cent; Hubbardston (1 count) 28 per cent; McIntosh (15 counts) 18 per cent average; Winesap (2 counts) 74 per cent; Yellow Transparent (1 count) 84 per cent; Delicious (3 counts) 60 per cent. Specimens were from 6 or 7 counties. Not found on foliage or twigs.

Gymnosporangium juniperi-virginianae: Counts of infection of 17 varieties showed the following percentages: Jonathan (2 counts) 25 per cent; Rome Beauty (4 counts) 30 per cent; Spitzenberg (1 count) 95 per cent, Sutton Beauty (1 count) 27 per cent; Twenty Ounce (1 count) 18 per cent; Wealthy (6 counts) 25 per cent; Winter Banana (2 counts) 12 per cent.

Varieties mentioned by collaborators as susceptible in 1928 were Wealthy in Massachusetts, New York, New Jersey, and Iowa; Rome in New Jersey and Indiana; Winter Banana in New Jersey; York in Virginia; and Jonathan, Early Harvest, Golden Delicious, Winesap, Grimes and Duchess in Indiana. The varieties Delicious, Ben Davis and Turley were reported resistant in Indiana and the Northwestern Greening in Virginia. D. E. Bliss of Iowa noted that in apple nurseries of Iowa some of the varieties that suffered the most were Benoni, Yellow Bellflower, Bayfield, Twenty Ounce, Wealthy and Jonathan; and that the more resistant sorts were Northwestern Greening, Anesim, Wisconsin Russet and Delicious.

Recent literature: Pl. Dis. Repr. 12: 30, 39, 50, 70, 79, 89, 104, 137-138, 141.

1. Thomas, H. E. And W. D. Mills. Rust diseases of the apple. (Abstract) Phytopath. 19: 87. Jan. 1929.

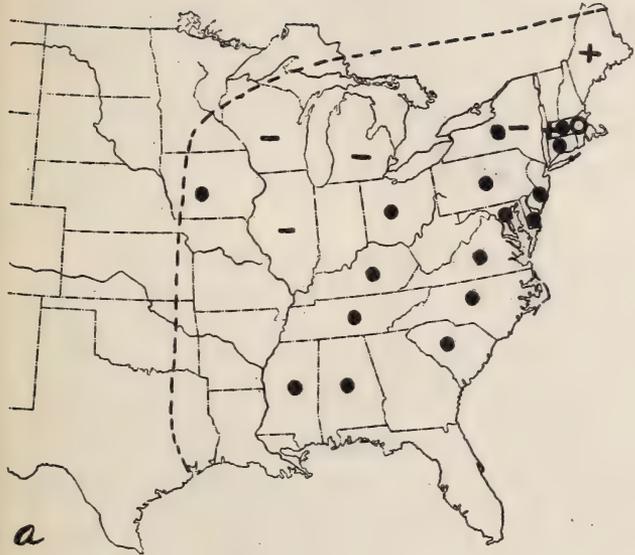


Fig. 9. Geographic distribution of three apple rusts according to North American Flora (7 (3): 197-198, 204-206, 209-210. Apr. 15, 1912).

a. Gymnosporangium germinale

b. G. globosum

c. G. juniperi-virginianae

o : Apple

+ : Juniperus communis

- : J. sibirica

o : J. virginiana

v : J. barbadensis

## Apple - Black Rot

Table 52. Percentage losses from black rot of apple as estimated by collaborators, 1928.

Percentage:		Percentage:	
loss :	States reporting	loss :	States reporting
5 :	Maryland	1 :	Massachusetts, Virginia
4 :	Missouri	:	Arkansas, Kansas
3 :	North Carolina	.5 :	Indiana, Ohio
:		:	

Indiana: Calyx spray reduced foliage infection on Stayman. Pycnidia with spores found on dead fruit spur in October, and also in a 1928 fire blight canker. Frog-eye followed rust lesions. (Gardner)

Illinois: This disease has rarely been serious in Illinois orchards probably due to our dry summers. It is one of the major diseases of apple foliage throughout the east. The past season showed that the frog-eye leaf spot could cause serious injury in our orchards. Fortunately, the spray schedule followed by Illinois growers seems to have kept the disease in check. Unsprayed orchards suffered severely. One uncared for orchard near Nooga was observed to be completely defoliated by the middle of the summer, largely on account of this disease. As many as 65 spots were counted in a single leaf in this orchard. (Anderson)

Arkansas: Leaf spot stage very common. Little on fruit, less codling moth accounts for this. (V. H. Young)

Missouri: More detailed check-up on black rot infection in Missouri shows that it is more widespread than it was thought to be. Many commercial plantings are suffering from cankers. (Scott)

Recent literature: Pl. Dis. Repr. 12:40, 60-61, 135, 140.

## BITTER ROT, GLOMERELLA CINGULATA (STON.) SPAULD. &amp; SCHRENK.

Considerably more than the usual damage was reported from most States reporting in 1928. A slight outbreak started in Ohio about August 1 but dry weather checked it and prevented spread so that the actual loss was slight and then only on the most susceptible varieties.

Delaware: Later in appearance than usual. Heavy outbreak in some plantings of King David and Stark.

West Virginia: Limited to a local infection in a few orchards in the eastern panhandle. It has never had an important status since it seems always to be slight and limited to localized areas. In a rare year it has occurred severely in restricted areas on a few susceptible varieties, such as King David. (Archer)

## Apple - Bitter Rot

North Carolina: In the college orchard this disease caused severe injury to late apple varieties. It was more destructive than during the two previous seasons. (Poole)

Indiana: 1-3-50 Bordeaux mixture too weak to control on Grimes near Ohio River, Perry County. Known to be very severe in 4 large commercial orchards. Caused loss of entire crop of Grimes in one. No cankers could be found. (Gardner)

Illinois: During a season when abundant rainfall occurs throughout the summer months, bitter rot may be expected. Such was the situation in 1928. The heavy rains of June started an early infection which threatened to become an epidemic. With few exceptions, however, no great loss was experienced. This is probably due to the fact that most growers used Bordeaux mixture in the second brood codling moth spray, and took the usual precautions of spraying with special care in that part of the orchard where bitter rot was commonly found in former years. Bitter rot is becoming a disease of more importance in the Calhoun County area. In grading unsprayed fruit this season, a number of specimens were found. The disease was also found in abundance in the unsprayed blocks in the University orchard. It is probable that bitter rot will stage a come-back if conditions favorable for its development are experienced during the next season. Orchardists should not neglect the addition of a fungicide to the second and third brood codling moth sprays. (Anderson)

Arkansas: More present than in any year since 1923. Rather late appearing but losses often amounted to 20 per cent of crop. Warm wet weather in August combined with lighter spraying than usual on account of the spray residue regulations probably accounts for this outbreak. (V. H. Young)

Missouri: Where no effort has been made to control bitter rot serious damage has resulted. Many cankers present in old orchards. (Scott)

Table 53. Percentage losses from apple bitter rot as estimated by collaborators, 1928.

Percentage:		Percentage:	
loss	States reporting	loss	States reporting
5	Northern Georgia	1	Maryland, Arkansas,
	Mississippi		Massachusetts
4.2	North Carolina	0.8	Virginia
3	Missouri	0.5	Ohio
2	Indiana	0.1	New Jersey

In Northern Georgia, C. H. Alden and Q. C. Boyd reported the varieties Yates and Terry resistant; Stayman and York Imperial, susceptible; and Ben Davis, Black Ben and Gano, very susceptible. The last three varieties in Georgia usually suffer moderate to heavy losses each year in spite of the usual control measures.

## Apple - Bitter Rot

In New Jersey, W. H. Martin mentioned Maiden Blush, Winter Banana and Gravenstein as susceptible. In Indiana, Gardner reported Winesap resistant, and Grimes, Ben Davis, Jonathan, Rome, King David and Golden Delicious as susceptible. In Virginia, Schneiderhan reported as follows:

"Found on Grimes, Stayman, Winesap, York, Mother, Pippin and Ben Davis. We have never seen bitter rot on Grimes and Staymans in Virginia before this year."

Recent literature: Pl. Dis. Repr. 12: 79, 135, 141.

## BLIGHT, BACILLUS AMYLOVOROUS (BURR.)TREV.

For the country as a whole blight was probably subnormal in prevalence. However, in parts of the southern Appalachian apple section, also in Indiana, Illinois, and Iowa it was reported as more prevalent than last year and the average. In Oregon according to the pathologists there was far less blight than usual.

New York: Even less than in 1927 which was exceptionally light. (Mills)

Delaware: Cool weather of May apparently kept this disease in check.

New Jersey: Severe in some orchards in Burlington County. (Martin)

Virginia: Not important. (Schneiderhan)

West Virginia: Blossom and twig blight severe over entire State. Wild crab and English hawthorn severely affected. (Archer)

North Carolina: Much worse than during the past five seasons and probably any previous year. Infection was through the blossoms, since there is very light twig infection except where the organism has worked into the twigs from the spurs.--- On some of the susceptible varieties there is a total loss on some limbs, while others show from 50 to 85 per cent blighted spurs. Will greatly reduce apple crop. (Poole)

Georgia: Slight injury every year. (Alden & Boyd)

Indiana: Much infection on leaf twigs but not as much floral infection as in 1926. (Gardner & McCown)

Illinois: Since my previous report on the scarcity of this disease, it has become abundant and serious. Twig blight in Transparent and Jonathan is especially serious in southern Illinois. Fruit blight on apples an inch or so in diameter is very common. Northern Illinois has more blight on apples than usual judging from report. (Anderson, July 1)

Michigan: As a rule blossoms infection in both apples and pears has been light. (Bennett)

## Apple Blight

Developed to an unusual extent in nurseries following heavy fall rains and mild temperature. (Nelson)

Wisconsin: Very light infection. Associated with lack of rain during early growing period. (Vaughan)

Minnesota: Absent until middle of June. Did damage only in a few localities. Dry cool weather up to middle of June apparently checked it. (Sect. Pl. Path.)

Iowa: Early and severe. (R. H. Perter)

Colorado: Present in some orchards this year, but it is not causing nearly as much damage as it did last season. (LeClerg, Sept. 1)

New Mexico: Extremely severe in northern part of State around Espanola. Of little importance in Mesilla and Pecos Valleys. (Crawford, Sept. 10)

Utah: Blossom blight on the apple has been reported from practically all parts of the State and in some cases will seriously decrease yield. In a few orchards in Boxelder and Weber Counties the trouble has become so severe as to discourage further culture of the orchard for the season. (Richards, June 25)

Oregon: During 1928 there was far less blight than usual. The weather conditions seemed to be favorable for its development but probably there was very little hold-over blight left from 1927 when we had practically no blight. (F. C. Reimer)

Table 54. Percentage losses from blight of apple as estimated by collaborators, 1928.

Percentage:		Percentage:	
loss :	States reporting	loss :	States reporting
5	Tennessee, Mississippi,	.5	Ohio, Wisconsin, Missouri
	Iowa, North Dakota	Trace	New Hampshire, Massachusetts,
4.2	North Carolina		New York, Virginia,
3	West Virginia		Kentucky, Georgia,
1.5	Arizona		Arkansas, Michigan, Kansas,
1	Maryland, Indiana,		Montana, Washington,
	Colorado, Utah		Oregon

## Apple - Blight

Table 55. Varieties listed as susceptible by collaborators, 1928.

Very susceptible	Susceptible
Jonathan (2, 3)	Greening (1)
San Jacinto (4)	Alexander (1)
Red June (4)	Winesap (4, 6)
Yates (4)	Delicious (4, 6)
Bonium (4)	Jonathan (6)
Golden Delicious (5)	Transparent (5)
Wild Crab (3)	Maiden Blush (6)
English Hawthorn (3)	Rome (6)
King (1)	
Yellow Transparent (1)	Note: Found on Golden Delicious in Indiana.

- (1) W. D. Mills, New York.
- (2) J. F. Adams, Delaware.
- (3) W. A. Archer, West Virginia.
- (4) R. F. Poole, North Carolina.
- (5) J. A. Andes, Tennessee.
- (6) M. W. Gardner, Indiana.

Monroe McCown (1) in Indiana has reported reduction of blossom blight in Grimes by spraying with Bordeaux at the full bloom stage. This is based on field experiences and a test conducted at Lafayette in April 1927. In the latter test one hundred blossom clusters were sprayed. Fifty of these were inoculated immediately after spraying by atomizing them with a suspension of *B. amylovorus*. Twenty-five were inoculated in the same manner 24 hours later and twenty-five 48 hours later. The results follow:

Interval elapsing after spraying with Bordeaux	Per cent infection in sprayed clusters	Per cent infection in checks
Immediately	8.3	87.5
After 24 hours	70.8	95.8
After 48 hours	75	88

In other tests (2) "Bordeaux (1-3-50) applied when the clusters were opening into full bloom reduced natural infection 79 per cent and 52 per cent respectively, in two field tests with Jonathan apple and 98 per cent in one test on pear."

The work of P. W. Miller (3, 4) Wisconsin, coupled with the results of other investigators who have obtained results along somewhat similar lines indicates the need for a revision of the generally prevalent idea that *B. amylovorus* is disseminated principally by insects and that infection is through wounds or through the nectary. Miller has concluded that under Wisconsin con-

## Apple - Blight

ditions meteoric water is an important agent of inoculation in both primary and secondary infections; that it may infect unwounded, young leaves and unopened blossoms; and that infection may take place through the stomata.

In Pennsylvania, Nixon and his associates have continued their studies on migration of the organism in the tissues of various organs of the host, and also on immunity studies of apple seedlings and varieties.

Recent literature: Pl. Dis. Repr. 12: 27-29, 38-39, 49-50, 60, 79, 104.

1. McCown, M. Spraying for the control of fire blight in the apple. Trans. Indiana Hort. Soc. 67: 129-133. 1928.
2. McCown, M. Bordeaux spray in the control of fire blight of apple. Phytopath. 19: 285-300.
3. Miller, P. W. Progress report on studies of fire blight of apple. (Abstract) Phytopath. 19: 8. Jan. 1929.
4. \_\_\_\_\_ A preliminary report on studies of fire blight of apple. Science 68: 386-388. Oct. 19, 1928.

## CROWN GALL, BACTERIUM TUMEFACIENS EFS. &amp; TOWN.

Beyond what is reported in the literature, very few field reports of especial interest on crown gall of apple have been received by the Survey. R. B. Streets of Arizona reported the disease as general and estimated a loss of about 5 per cent for the State. The following references indicate that a considerable amount of work is being done on this and related problems.

Recent literature

1. Kauffman, F. Über die Veränderlichkeit von Tumefaciens-bacillen. (On the variability of tumefaciens bacilli.) Zeitschr. für Krebsforsch., 26 (4): 330-332. 1928.
2. Levine, Michael. The chromosome number in crown gall and cancer tissues. (Abstract) Phytopath. 19: 97. Jan. 1929.
3. Muncie, J. H., and M. K. Patel. Potency and specificity of a lytic principle (bacteriophage) obtained from Pseudomonas tumefaciens. (Abstract) Phytopath. 19: 98. Jan. 1929.
4. \_\_\_\_\_ Crown gall and callus knots on nursery apple trees. Rep. Iowa State Hort. Soc. 62: 23-26. 1928.
5. Patel, M. K. A study of pathogenic and non-pathogenic strains of Pseudomonas tumefaciens Sm. & Town. Phytopath. 28 (4): 331-343. 1928.
6. Riker, A. J. Notes on the crown gall situation in England, France and Holland. Phytopath. 18: 289-294. Mar. 1928.

## Apple - Crown Gall

7. Siegler, E. A. Studies on the entiology of apple crown gall. Hour. Agr. Res. 37: 301-313. Sept. 1; 1928.
8. Wright, W. H., A. J. Riker, H. E. Sagen and W. M. Banfield. Studies on the bacteriological differentiation of the crown gall and hairy root types of bacteria. (Abstract) Phytopath. 19: 97-98. Jan. 1929.
9. Wright, W. H., A. J. Riker and H. E. Sagen. Studies on the differentiation of the crown gall type of bacteria from non-pathogenic bacteria of the radiobacter group. (Abstract) Phytopath. 19: 98. Jan. 1929.

SOOTY BLOTCH AND FLYSPECK, GLOEODES POMIGENA (SCHW.) COLBY  
AND LEPTOTHYRIUM POMI (MONT. & FR.) SACC.

These two diseases increased in prevalence in the northeastern quarter of the United States in 1928 and in some States assumed the rôle of the most important apple diseases. It seems to be the prevalent opinion that the increase is due to the omission of the late summer sprays from the schedule.

Losses were estimated as follows: Maryland, 4 per cent; Virginia, 3 per cent; West Virginia, 2 per cent; Tennessee, Indiana, 1 per cent; Missouri, trace.

Light colored varieties show the blemish much more than darker skinned sorts.

New York: Largely in orchards with poor air drainage and where summer sprays are omitted. Most noticeable on light colored varieties, Greening, Newtown, etc. (Mills)

New Jersey: Present, but not severe in south Jersey. Common in north Jersey where summer sprays are often omitted. (Martin)

Delaware: Wet weather during August and September favored development. Very little observed where summer sprays or dusts were applied. (Adams)

Virginia: Caused more loss than any other in Virginia. The cessation of spraying early in July on account of the arsenical residue problem has given this disease a chance to spread rapidly in recent years. (Schneiderhan)

West Virginia: Fly speck and sooty blotch were unusually severe, especially in home orchards. In commercial areas they were adequately controlled by the regular spray schedule, but where the late spray applications were omitted considerable damage occurred in low-lying orchards. (Archer)

North Carolina: Abundant throughout State on unsprayed fruit. In this State this disease injures the market value of otherwise good marketable fruit. (Poole)

## Apple - Sooty Blotch and Fly Speck

Indiana: Necessary to use sulphur dust late in summer on Golden Delicious to prevent sooty blotch. (Gardner & Zaring)

Kentucky: Readily controlled by 1st to 15th August sprays. (Magill)

Illinois: Prevalent in many orchards this season, especially in those where no fungicide was added on the second brood codling moth sprays. (H. W. Anderson)

Recent literature: Pl. Dis. Repr. 12: 126, 140.

## FRUIT SPOT, PHOMA POMI PASS.

An increase in the amount of damage from this disease seems to be apparent. Whether this is due to weather conditions favorable to infection, or to the reduced spraying late in the season on account of the arsenic residue problem, or to other factors, is not entirely evident. In 1928 an increase was reported from several important apple States from Ohio and Virginia north-eastward to New England. A loss of 5 per cent was reported in New Jersey and 1 per cent in Maryland and West Virginia. Some of the collaborators' reports are as follows:

New York: Much more fruit spot in lower Hudson Valley than for several seasons. (Mills)

New Jersey: Reported on Grimes, Winter Banana, Wilson's Early June, Jonathan, King David, Rome Beauty, Rhode Island Greening, Golden Delicious, Baldwin. Summer applications of sulphur sprays or dusts failed to control this disease. Good control followed the use of 2-6-50 (hydrated lime) Bordeaux mixture. Fruit spot was the most serious disease of the year and next year many of the growers will use Bordeaux mixture for its control. (Martin)

Delaware: The most conspicuous disease experienced by orchardists during the season. Heaviest outbreak ever observed with late apples. Heavy rains in August and September associated with outbreak. No late variety found without evidence of infection. (Adams)

West Virginia: Losses from this source have never been more than a trace except in 1923 when it was considered to be 2 per cent. In 1928 infection appeared late and caused considerable damage. (Archer)

North Carolina: Observed on Rome Beauty in Henderson County. (Poole)

Ohio: Very severe in southern Ohio. Inspectors' reports indicate that the loss due to this disease alone in 4 counties in southeastern Ohio, will be \$750,000. In many orchards every variety is attacked and many of these completely so. It is causing the bulk of what should be No. 1 fruit to go into No. 2 and culls. (H. C. Young)

## Apple - Fruit Spot

Recent literature: Pl. Dis. Repr. 12: 136.

1. Adams, J. F. Sulphur sprays in relation to control of fruit spot. Trans. Peninsular Hort. Soc. 17 (3): 23-26. 1928.

## BITTER PIT (NON-PARASITIC)

Of the 16 States reporting bitter pit only Delaware, Maryland and Virginia reported more than the average amount. In Virginia 1.5 per cent loss was estimated and as high as 85 per cent affected fruit were noted in a single orchard. The varieties York, King David and Black Twig were listed by Schneiderhan as particularly susceptible. Regarding the situation he reported:

"Bitter pit was more severe in apples of the Winesap group than during the past seven years. Entire crops of King David apples had to be sold as canners this year due to bitter pit."

In North Carolina R. F. Poole observed it as severe on King David and slight on Delicious in the mountain area. In Georgia Alden and Boyd reported a trace of loss for the State with Jonathan and King David susceptible. In Indiana, Gardner noted the surface type on Ben Davis, Stayman and Grimes. He reported the disease as less prevalent than usual. Losses of 0.5 per cent were indicated for Ohio and Arizona.

Valleau in Kentucky (2) has recently advanced the theory that this disease and possibly others such as cork, drought spot, dieback, and rosette may be due to nitrogen deficiency more than to unfavorable water relations. In his plant disease survey report he states that, "During the past three years bitter pit has been completely controlled by growing sweet clover in a Grimes orchard where formerly the disease had been severe for years. This in in uniformity with the nitrogen starvation theory, as explained in Kentucky Bulletin 281. It is severe each year in a clean cultivated orchard of Polly Eads (a local late summer variety) near Henderson, Kentucky." Butler (1) has conducted studies which are said to indicate more trouble from bitter pit during years of light bearing of Baldwin trees than when there is a heavy crop.

Recent literature: Pl. Dis. Repr. 12: 140.

1. Anon. Plant disease investigations at the New Hampshire Station. New Hampshire Agr. Sta. Bul. 232: 10, 22, 29. 1928.
2. Valleau, W. D., and W. M. Johnson. Tobacco frenching - a nitrogen deficiency disease. Kentucky Agr. Exp. Sta. Res. Bul. 281: 179-253. 1927.

## EUROPEAN CANKER, NECTRIA GALLIGINA BRES.

No reports received in 1928 although the disease is known to occur in parts of eastern United States and on the Pacific coast.

## Apple - European Canker

H. Richter (1) in Europe has found by inoculation that the following species of *Nectria* can infect apple:

- Nectria galligena* Bres. (true canker and an active fruit rot)  
*N. ditissima* Tul. (typical cankers and active fruit rot)  
*N.* " Tul. var. major Wr. (canker and also fruit rot)  
*N. coccinea* (Pers.) Fr. (slow fruit rot)  
*N. coccinea* (Pers.) Fr. var. longiconia Wr. (active fruit rot)

The fungus causing canker in this country has generally been considered as *Nectria galligena* Bres.

Recent literature

1. Richter, H. Die wichtigsten holzbewohnenden Nectrien aus der Gruppe der Krebserreger. (The most important wood-inhabiting Nectriae of the group of organisms causing canker.) Zeitschr. für Parasitenkunde 1 (1): 24-75. 1928.

BLACK ROOT ROT, *XYLARIA MALI* FROMME

In a recent publication F. D. Fromme (1) has described the fungus causing black root rot of apple under the above name, it having been referred to previously as *X. hypoxylon*. It has also been called *X. digitata* (Ell.) Grev. but an examination of this latter species shows it to be distinctly different.

Fromme reports that *X. mali* has been collected in Virginia, West Virginia, North Carolina, South Carolina, Kentucky, Tennessee, Indiana, Illinois, and Arkansas. The accompanying map shows the more exact distribution. Another species, *Xylaria polymorpha* is said to occur rarely on apple in Virginia but is more common in the northern States, especially New York.

Orchard studies in the Shenandoah Valley indicate black root rot to be the most important single cause of apple tree death according to Fromme. In the average infested orchard the loss has equaled 18 per cent at 21 years of age. Replants usually die before reaching bearing age. Virginia and West Virginia were the only States reporting this disease in 1928.

## Apple - Black Root Rot

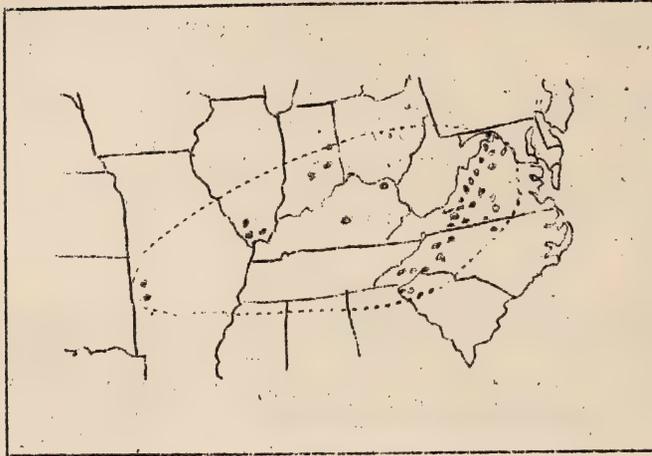


Figure 10. Geographic distribution of black root rot of apple according to Fromme. (1, p. 32)

Recent literature

1. Fromme, F. D. The black root rot disease of apple. Virginia Agr. Exp. Sta. Tech. Bul. 34. 52 pp. Mar. 1928.

POWDERY MILDEW, *PODOSPHAERA LEUCOTRICHA* (ELL. & EV.) SALM.

D. F. Fisher reported an unusually heavy loss from this disease in Washington. It was much more prevalent than usual in the central part of the State and throughout the Wenatchee and Okanogan district. In the latter sections it was especially bad on Jonathan and Spitzenberg causing blighting of twigs and russetting of fruit.

Three States in the east reported slight trouble from powdery mildew of the terminal growth. In New York it was rather common but not of economic importance. In Virginia it was more severe than ordinarily especially on one-year twigs of Jonathan. On young trees of that variety it was thought to be the most important factor in the retardation of growth. In West Virginia it was also more prevalent than usual on certain varieties of young unsprayed trees, especially Jonathan, Gano and Stayman Winesap.

Recent literature: Pl. Dis. Repr. 12: 15, 126.

## Apple - Scald

## SCALD, NON-PARASITIC

In spite of the fact that oiled wrappers and shredded oil paper have done a great deal in reducing the amount of scald the losses are still high. Brooks, Cooley and Fisher (1) in their revised Farmers' Bulletin have recently reported new evidence to show that maturity and color of apples at picking time are very important factors in determining the susceptibility of apples to scald, the more mature and better colored fruit scalding less than that which is green.

Recent literature

1. Brooks, C., J. S. Cooley, and D. F. Fisher. Apple scald and its control. U. S. Dept. Agr. Farm. Bull. 1380. 17 p. Sept. 1928.

## WEATHER INJURY

Winter injury

New York, Arkansas and Washington were the only States reporting winter injury in 1928 and in none of these was the damage of great importance.

Frost injury

Considerable russetting thought to be due to spring frost and probably associated with other weather conditions was reported from New York, particularly on Ben Davis, Gano, Baldwin, Greening, Wolf, Piven, Rome, Twenty Ounce and McIntosh. Five per cent loss in grade was estimated from this cause. Considerable injury to leaves and young apple fruits also occurred in Pennsylvania, Maryland and Virginia. In Michigan frost damaged blossoms were common. Two freezes seemed to be involved, one when the buds were in prepink and the other when in full bloom. The variety Duchess was especially susceptible to that injury.

In Montana, P. A. Young reported a considerable amount of damage from cracking of fruit, some of which was thought to be caused by late frost. In the State of Washington, D. F. Fisher noted that the frosts of April 29 and 30 when the trees were in full bloom reduced the crop somewhat and caused considerable russetting of fruit.

Sun scald

More or less sun scald of McIntosh was reported from New York. Injury was most noticeable on the southwest side of trees. (W. D. Mills)

Hail injury

Considerable in Clinton and Essex Counties, New York, according to W. D. Mills.

## Apple - Weather Injury

Recent literature: Pl. Dis. Repr. 12: 29.

## SPRAY INJURY

Sulphur injury

In New York this injury occurred wherever lime sulphur sprays were applied during very hot weather. Also occurred under the same conditions with dry mix sulphur lime and sulphur dust (W. D. Mills). In New Jersey it was more or less general in the southern part of the State. Effects showed as small leaves with margins burned, heavy leaf fall and fruit russetting. In Virginia it was particularly damaging to Ben Davis and Grimes and serious losses have occurred during the past few years. The use of lime sulphur and lead arsenate in combination during hot weather has been the main cause. The use of an excess of lime in this spray has been helpful in reducing injury. (Schniederhan)

Arsenical injury

Rather general and widespread in Massachusetts, according to McLaughlin and Davis. In Delaware it was responsible for several cases of leaf and fruit injury according to Adams.

Copper injury

Severe burning noted to leaves and buds with copper lime and calcium arsenate, especially on the variety Duchess, according to W. D. Mills of New York. In Delaware copper dust used as a summer application caused spotting of leaves and fruit russetting. More trouble from Bordeaux injury was reported from Arkansas than usual. Colloidal copper injury in the form of a conspicuous flecking of the fruit of King David was mentioned by Adams of Delaware.

Butler (1) in New Hampshire has reported that foliage injury from Bordeaux is dependent on rain or dew. When these were absent no injury followed spraying. Increasing the proportion of lime reduced this injury in the presence of dew or rain.

Oil injury

Less in the Hudson Valley in New York than in 1927. Cases of severe injury reported in two orchards. (W. D. Mills)

Recent literature: Pl. Dis. Repr. 12: 51.

Anon. Plant Disease investigations at the New Hampshire Station. New Hampshire Agr. Sta. Bul. 232: 10, 22, 29. 1928.

## Apple - Parasitic Diseases

## MISCELLANEOUS PARASITIC DISEASES

Cercospora mali Ell. & Ev., leaf spot. Reported from two places in Texas.

Cytospora sp., canker. D. F. Fisher of Wenatchee, Washington, reported cankers at base of leaf buds, pruning cuts and crotches, also girdling of young trees and branches in Douglas County, Washington. While infection at leaf buds indicates a strictly parasitic nature the trees have been devitalized by drought and winter injury in the past and no doubt this is a predisposing factor according to Fisher. Found on Northern Spy, Delicious and Winesap. This canker was also collected a number of times by P. A. Young in Montana.

Gleosporium perrenans Zeller & Childs, perennial canker. The Department of Plant Pathology at Pullman, Washington, reported this as scattered in occurrence in the eastern half of the State. Zeller in Oregon mentioned it as occurring in the Hood River section only, but very important there. Some spread was noted in 1928 due to freezes and woolly aphis injury. He states that the loss from fruit rot was considerably diminished by mechanical removal of spores in washing processes employed for spray residue removal.

Glutinium macrosporum Zeller, canker. Oregon- "Cankers observed in previous years have enlarged and several new infections found. By correspondence this disease has been reported to me from England." (Zeller)

Hypochnus sp., rot. A decay of apples has been noted on the market which somewhat resembles pink mold rot or anthracnose but which is due to a species of Hypochnus according to market pathologists. Spots are usually tan in color with a brown or black border. The disease tissue is rather tough and stringy in consistency and the spots somewhat sunken. When infected apples are kept in a moist chamber the mycelium spreads over their surfaces radiating uniformly from the lesions and forming a characteristic, fine closely appressed white mucelial mass.

Illosporium malifoliorum Shel., leaf spot. Reported from West Virginia in the southern part of which most of the unsprayed orchards are severely defoliated on account of this leaf spot. This is a different leaf spot from that caused by the black rot fungus. (See more extensive report under black rot).

Myxosporium corticolum Edg., superficial bark canker. Reported as common in New Jersey, especially on Rome, Gravenstein, McIntosh, Twenty Ounce, Duchess, and Missouri Pippin. (Martin)

Nectria cinnabarina (Tode) Fr., twig blight. H. E. Thomas and W. D. Mills report the occurrence of a twig blight constantly associated with a fungus which is very close to, if not identical with, N. cinnabarina. It occurred commonly in one variety, Rome Beauty, in a single orchard in Onondaga County. Cultural and inoculation studies are in progress.

## Apple - Parasitic Diseases

Neofabraea malicorticis (Cordley) Jack., anthracnose. More than the usual number of cankers developed in Oregon this year following the long, rainy fall of 1927. The increase was particularly noticeable in western Oregon and Hood River Valley where summer Bordeaux has not been applied regularly. In orchards where spraying is neglected for one or two years it becomes prevalent. S. M. Zeller states that the fruit rot was materially reduced by the washing process employed for spray residue removal.

Mummularia discreta Schw. (Tul.), blister canker. New York, West Virginia, Missouri and Kansas reported it in the same amounts as usual which for the most part is in neglected orchards of susceptible varieties. New York and West Virginia reported a trace loss, Missouri, 3 per cent, and Kansas, 2 per cent.

Phymatotrichum omnivorum (Shear) Dug., root rot. Taubenhans, Bach, Lusk and Dana reported that in the black lands of Texas apples cannot be grown on account of this disease. Fifty per cent loss in nurseries of that State. Streets of Arizona estimated a 3 per cent loss.

Phytophthora cactorum (Leb. & Cohn) Schroet., fruit rot. In Indiana, Gardener and McCown found this rot on young fruit of Grimes which were 1 to 2.5 centimeters in diameter and which were growing on lower limbs near the ground. They also found it on drops in another locality.

Sclerotinia fructicola (Wing.) Rehm., brown rot. Massachusetts (trace); New Jersey (trace); Delaware, somewhat more prevalent especially on Williams; North Carolina, common on mechanically injured fruit; Kentucky, very rare; Tennessee (trace); Ohio, (of no consequence).

Septobasidium pseudopedicellatum (Schw.) Pat., limb blight. Mississippi.

Volutella fructi Stevens & Hall, spongy dry rot. Prevalent on unsprayed fruit and wild fruit in Massachusetts according to W. H. Davis.

Recent literature: Pl. Dis. Repr. 12: 15, 104, 135, 141.

1. Boyle, C., M. Murphy, and H. A. Cummins. "Blossom Wilt" of apple trees and "wither tip" of plum trees, with special reference to two biologic forms of *Montilia cinerea* Bon. Sci. Proc. Roy. Dublin Soc. n.s. 19: 63-76. Sept. 1928.

2. Gardner, M. W. Apple diseases, 1927. Trans. Indiana Hort. Soc. 67: 27-30. 1928.

3. Heald, F. D. Blue mold in relation to fruit cleaning methods. Proc. Washington State Hort Assoc. 23: 143-148. [1928.]

4. Newton, G. A. Some fungi of the *Stemphylium* type and their relation to apple rots. Phytopath. 18: 565-578. 1928.

5. Thomas, H. E. Root and crown injury to apple trees. Phytopath. 18: 547-551. June 1928.

## Apple - Non-Parasitic Diseases

## MISCELLANEOUS NON-PARASITIC DISEASES

Brown bark spot (undet.) Still present in same orchard in Brown County where it was noted in 1921. (Gardner) An undetermined bark spot is also noted as present in northern Texas.

Black lenticels. An unusual amount of blemish on account of small fly-speck-like spots around the calyx end was noted in New York according to W. D. Mills. It was especially prevalent on Greenings.

Burr knot (non-par). Encountered a number of times in West Virginia this year, according to reports to the Plant Disease Survey by W. A. Archer. Specimens from Alexandria, Virginia, representative of the condition on several trees were brought into the Washington office March 6. Recent work in this country and abroad has shown this disease to be non-parasitic and a peculiarity of certain varieties.

Chlorosis, caused by excess lime. Prevalent in limestone regions of Texas according to Taubenhaus and Lusk.

Cork and drought spot. These diseases, generally attributed to water supply factors and recently mentioned by Valteau (7) as possibly being caused by nitrogen deficiency, was reported from New York and Washington. This group of diseases was also mentioned by McLarty as causing more economic loss to the apple industry of the Okanogan section of British Columbia than any other. He suggested that the cause might be an unbalanced food supply due to excessive root killing by dry conditions. In the Champlain Valley of New York, where the disease is most troublesome for that State, it was much less prevalent than usual. A. B. Burrill stated that he thought the reason for this was the wet, late spring and early summer conditions. These diseases are usually most serious in years when dry weather prevails during that period.

Cracking of fruit. In Delaware and Virginia considerable trouble was reported by cracking of apples, particularly Staymans. It was associated with excessive rainfall during the month previous to harvest. In Montana a cracking accompanied by russetting was common and serious on McIntosh in Ravelli County according to Young. Since he observed it in a few unsprayed orchards the theory of spray burn does not entirely explain the condition.

Core molds (various fungi). More of this trouble was reported from Indiana than usual this year especially on Stayman.

Flap tumor (undet.). In West Virginia, near Morgantown, an example was observed of this peculiar malformation. All the branches of a single tree were involved. It has been observed once or twice in past years. Unquestionably this is the disease described by Reed and Crabill (Virginia Tech. Bul. 2: 42-44. 1915.) (Archer)

Jonathan spot (undet.). New Jersey, Delaware, Virginia, Kansas and Washington. The loss for the State was estimated at 0.1 per cent in New Jersey and 2 per cent in Kansas. It was said to be more prevalent in Virginia and Delaware than usual.

## Apple - Non-Parasitic Diseases

Measles. Reported as occurring scatteringly in West Virginia and Illinois and locally in Mississippi. In Illinois, according to Anderson, the disease seems to be increasing locally especially on Delicious and Rome Beauty. The cause of this disease has never been reported definitely.

Mosaic (virus). Reported from 8 separate New York counties in about the same amount as usual. Some orchards exhibit the trouble year after year in varying intensity. It does not appear to be increasing according to W. D. Mills.

Ring spot. Crescent shaped sunken areas becoming circular in some cases were noted on fruit of certain varieties especially Winter Banana, Maiden Blush, and Newtown Pippin in the lower Hudson Valley, New York. Many early fruit dropped because of this. It appeared to be unusually conspicuous this year, according to Mills.

Root rot, apparently influenced by excess of bone meal at time of planting, was responsible for the death of 500 Cortlandt trees in a newly planted orchard in Ulster County, New York. (Mills)

Target canker. In the southern part of West Virginia there occurs moderately a type of canker which seems to be the target canker described recently by Roberts (Phytopath. 17: 735-738). (Archer)

Water core. Noted on Yellow Transparent, McIntosh and Greening in New York where it was said to be much less common than usual, and in one orchard in New Jersey where it was severe on Transparent and moderately so on Red Astrachan.

Recent literature: Pl. Dis. Repr. 12: 71, 89-90, 91, 140.

1. Carne, W. M. Burr-knot and stem-tumour of apple and quince trees. Jour. Dept. Agr. West. Australia II, 5: 123-126. Mar. 1928.
2. Fisher, D. F., and C. Brooks. Apple water-core theories revised. Better Fruit 22 (6): 5, 21, 1927 (7): 14, 15, 22, 24, 25, 1928.
3. Kidd, Franklin and Cyril West. Two types of storage internal breakdown in apples. Rept. Food Invest. Bd. Great Britain 1927: 42-43. 1928.
4. McLarty, H. R. Some observations on physiological diseases in apple in British Columbia. Scient. Agr. 8: 636-650. June 1928.
5. Plagge, H. H., and E. J. Maney. Soggy breakdown of apples and its control by storage temperatures. Iowa Agr. Exp. Sta. Res. Bul. 115: 61-116. 1928.
6. Ramsey, G. B., and L. F. Butler. Injury to onions and fruits caused by exposure to ammonia. Jour. Agr. Res. 37: 339-348. Sept. 15, 1928.

7. Smith, R. E., and H. E. Thomas. Copper sulphate as a remedy for exanthema in prunes, apples, pears and olive. *Phytopath.* 18: 449-454. May 1928.
8. Valteau, W. D., and E. M. Johnson. Tobacco frenching - a nitrogen deficiency disease. *Kentucky Agr. Exp. Sta. Res. Bul.* 281: 179-253. 1927.
9. Whipple, O. B., and G. G. Melhart. More about water-core in apples. *Better Fruit* 22 (9): 9. Mar. 1928.

D I S E A S E S O F P E A R

BLIGHT, BACILLUS AMYLOVORUS (BURR.) TRÉV.

Of the many States reporting blight only four, Virginia, Tennessee, Utah and California, reported more than during the average year. The losses for the country as a whole therefore can probably be considered as below normal. As given by collaborators they are listed in table 56.

Some of the collaborators' reports on prevalence are as follows:

Virginia: The worst disease of pears in State. Causes severe dwarfing of trees and acts as centers of infection for nearby apple orchards. (Schneiderhan)

North Carolina: Very destructive this year. Observed on young fruit and pedicles approximately one week after petal fall. (Fant)

Kentucky: For the past three seasons on Kieffers controlled completely by cutting in winter. Yellow Transparents in adjacent planting protected in this way. (Valteau)

Michigan: Heavy fall rains and mild temperature resulted in considerable development of blight in nursery stock during September and October. (Nelson)

Missouri: As in previous year not so severe over the State. Hold-over cankers apparently have not been so abundant for the past two years. (Scott)

Table 56. Percentage losses from pear blight as estimated by collaborators, 1928.

Percentage: loss	States reporting	Percentage: loss	States reporting
50	Georgia	6	Maryland
25	Tennessee	5	Iowa
20	North Carolina	3.5	Arizona
11	Missouri	2.5	Virginia
10	West Virginia, Utah	1.5	Michigan
		1	Ohio, Kansas

## Pear - Blight

Colorado: Not seen nor reported to staff. (LeClerg)

New Mexico: Not common in Mesilla Valley but causing damage in places where fruit was not killed by frost. (Crawford)

Oregon: Far less blight than usual. Weather conditions seemed favorable for development but probably there was very little hold-over left from 1927 when we had practically no blight. (Reimer)

California: Developed for the first time in several counties. Condition about the same as in 1927. (Milbrath)

In last year's supplement the extremely heavy losses from pear blight in California were estimated by Milbrath at about one million dollars. With more complete data at hand Milbrath estimated on June 15, 1928 that the loss was probably nearer two million dollars. This included trees eradicated, blight cutting work and crop loss, counting the average value of a tree at ten dollars and including all labor items. In certain individual counties as many as 40,000 trees were grubbed out.

The Pineapple and Sand pear varieties were mentioned as very resistant in Georgia and Louisiana and in Tennessee, Pyrus calleryana was mentioned as resistant. The Kieffer was especially mentioned as susceptible in Georgia, Louisiana and Arkansas.

In parts of New Zealand, where this disease has been introduced and has become serious, the problem is considerably complicated by the establishment of infection in hawthorn much of which is used as hedges. In order to control the disease in apple and pear sections where hawthorns grow an eradication campaign aimed against that host seems necessary. (Hyde, 4):

Recent literature: Pl. Dis. Repr. 12: 7, 27-29, 38-39, 61.

1. Becker, G. G. Non-pear zones and blight eradication. Jour. Econ. Entom. 21: 485-487. June 1928.
2. Day, L. H. Pear blight control in California. Univ. California Coll. Agr. Ext. Serv. Circ. 20, 50 p. June 1928.
3. Howard, F. L. Disinfectants in fire blight eradication work. Phytopath. 18: 710-711. Aug. 1928.
4. Hyde, W. C. Replacing the hawthorn hedge. New Zealand Jour. Agr. 36: 92-95. Feb. 1928.
5. Reimer, F. C. Pear blight control. Better Fruit 22 (11): 9, 10, 28. 1928.
6. Rosen, H. R., and A. B. Groves. Studies on fire blight: host range. Jour. Agr. Res. 37: 493-505. Oct. 15, 1928.

## Pear - Scab

## SCAB, VENTURIA PYRINA ADERH.

Scab was mentioned as being especially troublesome in important pear sections of New York, southwestern Michigan and the Pacific Coast. In New York it was occasionally serious in Bartlett orchards of Wayne and Onondaga County. Twenty per cent of fruit infection of Bartletts was noted in one orchard. In Michigan there was an unusual development in the southwestern section. Heavy rainfall and temperatures favorable to scab in June apparently favored the establishment of general twig infection according to Nelson. In Wisconsin very few pears are grown but the late fruit was said to be unusually scabby. In the Willamette Valley of Oregon according to Zeller late spring rains prevented effectual spraying and the loss was due mostly to blossom infection preventing set of fruit. Losses were estimated as follows: Michigan, 13 per cent; New Hampshire, 10 per cent; Wisconsin and Oregon, 5 per cent; Kansas and California, 2 per cent; Massachusetts and New York, 1 per cent; Maryland, 0.5 per cent. Flemish Beauty was mentioned as very susceptible in New York and Michigan. Bartlett was listed as susceptible in the same States and Keiffer was said to be very resistant in Michigan.

Recent literature: Pl. Dis. Repr. 12: 61, 79, 137.

## LEAF BLIGHT, FABRAEA MACULATA (LEY.) ATK.

More than usual and more than last year was mentioned as occurring in the New Jersey, Maryland, Delaware, Virginia and Tennessee regions. More than last year was also mentioned as occurring in Michigan in unsprayed orchards. In Delaware both leaf and fruit infection were very heavy according to Adams. In Virginia, Schneiderhan reported it as always present on old Seckel pears and when the leaves are heavily infected defoliation results. In West Virginia severe defoliation was noted on many unsprayed trees and in some localities the fruit was badly spotted. In Illinois some damage occurred even to resistant Keiffers. The disease is not a factor of importance in the extreme western part of the United States.

Summer sprays with Bordeaux mixture are supposed to give good control but no experimental data covering this point was reported in 1928.

Recent literature: Pl. Dis. Repr. 12: 126.

## LEAF SPOT, MYCOSPHAERELLA SENTINA (FR.) Schroet.

In New York this leaf spot was said to be more common than last year being especially severe on Seckels which were defoliated in many cases in the western part of the State. In West Virginia slight to moderate defoliation was also observed in various localities on account of this spot. In Georgia it is said to be decidedly more prevalent than usual and causing a loss estimated at about 5 per cent. Traces were reported from Kansas.

## Pear - Leaf Spot

Recent literature: Pl. Dis. Repr. 12: 79-80, 126.

## MISCELLANEOUS DISEASES AND INJURIES

Bacterium tumefaciens EFS. & Town., crown gall. Occurred locally in New Jersey, and generally in Arizona. In Maricopa County of the latter State a loss of 5 per cent in 50 acres was reported.

Bitter pit (non-par.). Walla Walla, Washington.

Brown bark spot or measles (undet.). Reported by Gardner from Putnam Co., Indiana on Flemish Beauty.

Brown blotch (undet.). "Reported for the first time from West Virginia although undoubtedly it has been present previously. Many varieties were attacked but seemingly the market value of the fruit was not damaged. In fact the blotched appearance is generally considered to be the natural condition of the fruit." (Archer)

Corticium koleroga, thread blight. Observed in June in Baton Rouge, Louisiana.

one Gloeodes pomigena (Schw.) Colby, sooty blotch. Noted in West Virginia in/locality on an early yellow variety which was severely blotched.

Glomerella cingulata (Stone.) Spauld. & Schrenk., bitter rot. Reported Massachusetts and Mississippi.

Gymnosporangium globosum Farl., rust. Leaf infection but not fruit infection noted in Dutchess and Greene County, New York where it was unusually prevalent according to W. D. Mills.

Phyllosticta pyrorum CKE., leaf spot. Mississippi.

Podosphaera leucotricha (E. & E.) Salm, powdery mildew. Serious on D'Anjou pears in central Washington causing a russetting of the fruit, according to D. F. Fisher. This is the only variety observed seriously affected and it was worst on it when planted among susceptible varieties of apples from which the disease undoubtedly spread.

Sclerotinia cinerea (Bon.) Schroet., blossom blight. Considerably more of this disease was reported from Oregon. Near Roseburg in one D'Anjou group of 34 trees only one-quarter of the crop was harvested due to this spur blight. Winter Melis was also severely affected in the same locality. The disease was probably more or less general all through western Oregon. (Barss)

Xylaria

Xylaria mali Fromme, black root rot. In his recent bulletin (1) Fromme reports artificial infection of pear seedlings. Five out of 72 Pyrus communis trees became infected and died as a result of inoculation by inserting mycelium in a wound in the root.

## Pear - Miscellaneous Diseases

Recent literature: Pl. Dis. Repr. 12: 15, 79, 126.

1. Fromme, F. D. The black root rot disease of apple. Virginia Agr. Exp. Sta. Tech. Bul. 34. 52 pp. Mar. 1928.

D I S E A S E S O F Q U I N C E

BLIGHT, *BACILLUS AMYLOVORUS* (BURR.) TREV.

The quince is an especially susceptible host of *Bacillus amylovorus*. However, it is not an especially important fruit crop and is only grown commercially in a few sections. The majority of the trees are in home orchards.

As in the case of blight on pears and apples in 1928 it was generally relatively slight on quince. No State reported more than usual. A loss of 10 per cent was estimated in West Virginia, 5 per cent in Maryland, and 1 per cent in Ohio. More damage was indicated in West Virginia than any other State.

OTHER QUINCE DISEASES

*Cephalothecium roseum* Cda., pink rot. Collected on the Cincinnati market by O. T. Wilson.

*Botrytis* sp., fruit rot. Reported from Connecticut by Clinton and McCormick.

*Fabraea maculata* (Lev.) Atk., leaf blight and fruit spot. This, one of the commonest quince diseases was reported from New York, New Jersey, Delaware, West Virginia, Michigan and Mississippi. Heavy defoliation and moderate spotting of the fruit was reported from Delaware and West Virginia and severe defoliation with 2 per cent reduction in yield was mentioned as occurring in Michigan.

*Glomerella cingulata* (Ston.) Spauld. & Schroet., bitter rot. Noted in several localities in the eastern panhandle of West Virginia where it was causing some damage.

*Gymnosporangium germinale* (Schw.) Kern, rust. Massachusetts, New York, New Jersey, West Virginia and Mississippi. In West Virginia, Archer reported only a slight amount but mentioned that in 1924 it was epidemic on quince fruits causing a loss of about 3 per cent. In New York it was reported only from the Hudson Valley and in Dutchess County the percentage of infected fruit was estimated at 3 per cent. This is a heavier infection than ordinarily occurs there.

*Phoma pomi* Pass., fruit spot. Specimens of badly affected quince fruits which had been grown in West Chester County, New York, were received in Washington October 25. Practically all of the fruit on 40 trees in the orchard were badly affected. The disease also occurred scatteringly in New Jersey according to W. H. Martin.

## Quince - Other Diseases

Phyosalospora malorum (Pk.) Shear, black rot. General and severe in West Virginia causing a loss of possibly 2 per cent according to W. A. Archer. This seems to be the first report of this disease to the Plant Disease Survey from West Virginia although it undoubtedly has occurred there for many years.

Podosphaera oxycanthae (D.C.) D By., powdery mildew. According to W.A. Archer it occurred abundantly on lower leaves in parts of West Virginia. First report to Survey from that State.

Recent literature: Pl. Dis. Repr. 12: 126-127.

1. Carne, W. M. Burr knot and stem tumour of apple and quince trees. Jour. Dept. Agr. West. Australia 2 (5): 123-126. Mar. 1928.

## D I S E A S E S O F S T O N E F R U I T S

### P E A C H

#### BROWN ROT, SCLEROTINIA FRUCTICOLA (WINT.) REHM.

Favored by a wet June and July in eastern United States, brown rot was more common and destructive in 1928 than usual, not only in the field, but also in transit and on the market. Blossom infection was apparently not so bad as is sometimes the case but there was enough of it to provide plenty of inoculum for twig and fruit infection. In Illinois and Indiana the stage seemed to be set for an epidemic but such did not materialize. H. W. Anderson pointed out that uninjured, green fruit is highly resistant to brown rot and that as the crop was relatively free from injury only a small percentage of brown rot developed on the fruit. In Virginia, Schneiderhan report that the disease is on the increase because of infection through the wounds caused by the oriental peach moth. In the Willamette Valley of Oregon the twelve spotted cucumber beetle was said to be responsible for making punctures through which infection occurred. Losses were estimated as given in table 57.

One grower in Orange County, New York, lost 80 per cent of his early peaches on account of this disease. Heavy losses occurred in many orchards in North Carolina according to Fant. In the Fort Valley section of Georgia an unusual amount of damage occurred. Cloudy and wet weather of June and July resulted in a large amount of rot. The fruit in some orchards was abandoned on account of the disease.

Notes on apothecial development were received from Pennsylvania and Indiana. In the former State, R. S. Kirby reported on April 12 as follows:

"Apothecia have been observed on peach mummies in the following counties during the past ten days: Delaware, Chester, Montgomery, Bucks. The stalks were observed to be forming 7 to 10 days ago but the first fully opened apothecia were observed at Media, Delaware County on April 9."

## Peach - Brown Rot

Leslie Pierce of Vincennes, Indiana, found the first apothecia on April 3 under a seedling tree. Spores from these apothecia germinated within 24 hours when placed on slides. About 95 per cent of the blossoms of Hale and Elberta in this orchard were open at the time.

Table 57. Percentage losses from brown rot of peaches as estimated by collaborators, 1928.

Percentage: loss :		States reporting	Percentage: loss :		States reporting
40	:	Tennessee	6.5	:	New Jersey
15	:	Georgia, Kentucky,	5.	:	Michigan, Missouri
	:	Mississippi	4	:	Maryland, Kansas
10	:	Massachusetts, Ohio,	3	:	Virginia
	:	Oregon	1	:	West Virginia, Arkansas
8	:	North Carolina	.5	:	Delaware, Indiana
	:			:	

Recent literature: Pl. Dis. Repr. 12: 40, 61, 70, 80-81, 92, 142.

1. Pierce, L. Brown rot and shothole. Trans. Illinois State Hort. Soc. 61: 405-418. 1928.
2. Wormald, H. Further studies of the brown-rot fungi. III. Nomenclature of the American brown-rot fungi: a review of literature and critical remarks. Trans. British Mycol. Soc. 13: 194-204. Oct. 1928.
3. Wormald, H. The present distribution of the brown rot fungi: its economic significance. Jour. Min. Agr. Gt. Brit. 35: 741-750. Nov. 1928.

## LEAF CURL, EXOASCUS DEFORMANS (BERK.) Fckl.

Collaborators in New England, Georgia, Illinois and on the Pacific coast reported more leaf curl than usual. Infection of the fruit was unusually prevalent in parts of Georgia and in California. In Arkansas particular mention was made of a late infection with the earliest leaves free from curl while later ones were badly deformed. Some of the collaborators reports are as follows:

Indiana: Dry April and March. All growers able to get spraying done on time. (Gardner)

Illinois: Appeared late this season. Severe in parts of central and southern Illinois. (H. W. Anderson)

Michigan: Not causing much injury this season. The most severely affected area is a narrow strip along the shore of Lake Michigan. Much less curl away from the Lakes. (Bennett)

## Peach - Leaf Curl

Missouri: Appears to be decreasing as a whole. The most conspicuous cases are on seedlings growing along fence rows, etc. (Scott)

California: General on unsprayed trees. Loss on such trees very heavy. Much fruit infection. (Milbrath)

Estimated percentage losses as given by collaborators are: 5 per cent in Tennessee and North Georgia; 2 per cent, Virginia; and 1.5 per cent, North Carolina.

As regards control, Gardner in Indiana reported "On Elberta at Vincennes, Leslie Pierce sprayed November 26, 1927 with Bordeaux plus oil, copper sulphate plus oil, and oil alone and obtained control only with the Bordeaux plus oil." In Illinois, H. W. Anderson stated that the control with Bordeaux plus oil emulsion gave perfect control although some injury resulted when applied in the fall. In Oregon, Zeller reported that Bordeaux mixture 6-6-50 applied in winter gives satisfactory control and is generally used,

Recent literature: Pl. Dis. Repr. 12: 30-31, 62, 70.

1. Mix, A. J. Further studies on Exoascaceae. (Abstract) Phytopath. 19: 90. Jan. 1929.
2. Sansone, F. Una speciale deformazione dei frutti de mandorlo dovuta and attacco dell'Exoascus deformans (Berk.) Fuck. Boll. R. Staz. Patol. Veg. Roma. n.s.8: 291-299. July-Sept. 1928.

## SCAB, CLADOSPORIUM CARPOPHILUM THUEM.

Rainy weather in eastern United States during a large part of the peach growing season favored scab with the result that several of the States reported more trouble from this disease than usual. A few collaborators reported that even in orchards which were thought to be fairly well sprayed or dusted, scab was a factor. Ordinarily it is very easily controlled by the ordinary spray schedules. In Virginia, Schneiderhan stated that it is becoming of more importance due to more stringent grading rules, and that it was very severe in certain parts of the Piedmont Section of Virginia. In Illinois it was usually very rare in commercial orchards but last year it was fairly common although the damage was negligible.

Losses were estimated by collaborators as shown in table 58.

Table 58. Percentage losses from peach scab as estimated by collaborators, 1928.

Percentage: loss :	States reporting	Percentage: loss :	States reporting
6	Kentucky	1.5	New Jersey
5	North Georgia, Michigan	1	Massachusetts, Delaware, West
4	North Carolina		Virginia, Ohio, Missouri
2	Virginia, Kansas, Tennes:	.5	Maryland
	see, Mississippi	Trace	Arkansas

## Peach - Scab

Recent literature: Pl. Dis. Repr. 12: 70, 91, 142.

1. Bensaude, M., and G. W. Keitt. Comparative studies of certain Cladosporium diseases of stone fruits. Phytopath. 18(4): 313-329. 1928.

## BACTERIAL SPOT, BACTERIUM PRUNI EFS.

During recent years Bacterium pruni seems to be becoming increasingly troublesome. In 1928 it was probably the most serious it ever has been for the country as a whole. Of the peach diseases, it appeared to be second only to brown rot which also was unusually abundant. In all the Coastal States from New Jersey to Georgia and also in Kentucky, Tennessee, Indiana, and Iowa, bacterial spot was more or much more prevalent than usual. Some of the collaborators' reports are as follows:

**New Jersey:** Severe on both leaves and fruit. One of the most serious outbreaks in years. Many orchards were almost completely defoliated. (Martin)

**Delaware:** Most disturbing disease throughout peach orchards in Sussex County. Trees at this time showing 50 per cent defoliation. Twig infections more common than ever observed. Can consider it in epidemic form this season. (Adams)

**Maryland:** Unusually severe on Eastern Shore and in Washington County. Many cases of severe defoliation and fruit infection severe in some instances. (Jehle)

**Virginia:** More than in any year since 1923. Frequently mistaken for spray injury. (Schneiderhan)

**Kentucky:** Fruit spotting severe in starved orchards and negligible in well cared for orchards. Defoliation appears to be largely a nutritional response. (Valleau)

**North Carolina; South Carolina and Georgia:** In the Sandhill Section of the Carolinas and also in some Georgia orchards Bacterium pruni caused much damage. It presents the most important problem to the peach growers in the former States. The injury took the form of leaf spotting with defoliation, fruit spotting, cankers on new shoots and weakening of trees. (Haskell & Poole)

**Illinois:** About the usual damage was done by bacterial spot of peach this year. The outstanding difference this year was the appearance of the disease on very young fruit in sufficient quantities to cause heavy loss in some orchards. The fruit was more generally infected this year than in previous years, but the loss of foliage was much less in spite of rather severe infection. This was probably due to the abundance of moisture in the ground throughout the season and the well distributed rains which prevented "shocks" to the trees. In other words, the twigs made a normal, uniform growth throughout the season with no sudden checks.

## Peach - Bacterial Spot

The orchards where bacterial spot was most destructive this year were those where cultural conditions were such as to cause sudden changes in the growth of the trees. In one orchard under observation the trees were nitrated and cultivated in May in order to bring them out of a weak condition following a bad case of leaf curl the preceding season. The trees made a very excellent growth following the heavy rains of June, but in July and August they were somewhat neglected. Severe leaf spotting resulted and defoliation was pronounced. In this case another application of nitrate and cultivation during July was indicated by the response of the trees. (Anderson)

Missouri: Only noted in two localities this year. Does not seem to be increasing to any extent. (Scott)

Table 59. Percentage losses from bacterial spot of peach as estimated by collaborators, 1928.

Percentage:		Percentage:	
loss :	States reporting	loss :	States reporting
12 :	North Carolina	1 :	Virginia, Ohio
6 :	Indiana	.1 :	Iowa
4 :	Maryland, Georgia	:	:
:	:	:	:

The disease was most commonly reported on the Elberta as it is one of the most susceptible varieties and very widely grown. Carman, Hale and Early Rose were mentioned as especially susceptible in Georgia.

Roberts and Pierce (1) have reported on a new spray for the control of this disease. Two formulas that gave good results are as follows:

Formula 1.

Zinc sulphate - 4 pounds  
Hydrated lime - 3 pounds  
Casein lime - 1/2 pound  
Water - 50 gallons

Formula 2.

Zinc sulphate - 4 pounds  
Hydrated lime - 4 pounds  
Alum - 1-1/2 pounds  
Water - 50 gallons

In 1928 in southern Indiana six applications were made at intervals of 2 weeks beginning at petal fall. Care was taken to cover fruits and the under side of leaves. Spotting of leaves and defoliation were markedly less on these leaves and the leaves were a deeper green and larger than those of trees sprayed or dusted with sulfur.

Recent literature: Pl. Dis. Repr. 12: 16, 30, 40, 51, 62, 69, 80, 100-102.

1. Roberts, J. W., and Leslie Pierce. A promising spray for the control of peach bacterial spot. (Abstract) Phytopath. 19: 28. Jan. 1929.

## Peach - Bacterial Spot

2. Valleau, W. D. Bacterium pruhi problem in Kentucky. U. S. Dept. Agr. Plant Dis. Rep. 13: 100-102. Sept. 15, 1928.

## YELLOWS (VIRUS)

Six States reported the occurrence of yellows in 1928. In New York it was reported to the Survey for the first time from Tompkins County and was thought to be somewhat more prevalent in the State generally. In Wayne County some of the growers thought that it was increasing. In New Jersey scattered cases were observed, as high as 10 per cent being found in one orchard, according to W. H. Martin. In Maryland a loss of about 0.5 per cent for the State was estimated by Jehle but he thought that there was less evidence of the disease than usual. In West Virginia it has not been observed by pathologists since 1925 when a few scattered occurrences were noted. From Kentucky, W. D. Valleau sent in specimens on August 11 showing typical fruit characters of yellows as determined by M. B. Waite. In Illinois, the Natural History Survey made a special survey to determine the extent of yellows. According to H. W. Anderson the disease seems to be confined to small regions south of Centralia but presence in other sections may also exist.

In Pennsylvania the State Department of Agriculture continued their inspection and examined orchards especially in counties which they had not covered earlier. The results have been given by W. A. McCubbin as follows in a statement and two tables:

"In summing up the results of the year's results it may be seen from the accompanying tables that yellows inspection was carried on in 19 counties in 1928; in these 533 orchards containing 922,540 trees were examined; and diseased trees to the number of 1317 were marked for the owner's attention. The amount of yellows found this year is much lower than ever before, reaching only the small proportion of 0.142 per cent, or less than 3 trees in 2,000.

"In the six new counties 94 orchards containing 104,250 trees were examined and many others located and listed for future visits. In those inspected, 261 yellows trees were marked, which indicates the rather low percentage of .25 per cent for those orchards.

Table 60. Peach yellows inspection over the eight year period in Pennsylvania, 1921-1928.

Year	Orchards inspected	No. trees inspected	No. trees blazed	Per cent yellows
1921	324	287,456	17,376	4.45
1922	422	442,507	11,052	2.50
1923	417	422,614	10,698	2.21
1924	456	476,012	6,064	.89
1925	408	655,495	2,326	.35
1926	390	624,743	2,524	.40
1927	447	802,033	1,846	.23
1928	533	922,540	1,317	.14
	3,397	4,891,408	53,203	1.08

## Peach - Yellows

Table 61. Summary of yellows inspection in all counties inspected in Pennsylvania in 1928.

County	Orchards inspected	No. trees inspected	No. trees blazed	Per cent yellows
Adams	56	79,986	31	0.038
Berks	49	128,070	155	0.121
Bucks	43	53,890	177	0.328
Cumberland	31	54,793	82	0.149
*Columbia	11	13,582	18	0.139
*Carbon	5	28,568	61	0.210
Chester	36	29,160	24	0.082
Dauphin	22	19,897	36	0.180
Delaware	17	13,601	24	0.176
Franklin	75	238,235	296	0.124
Lancaster	27	39,806	41	0.103
Lebanon	14	25,470	17	0.066
Lehigh	11	52,120	57	0.109
Montgomery	18	33,698	55	0.163
*Northumberland	5	9,570	30	0.313
*Perry	9	11,700	20	0.170
*Schuylkill	35	16,501	83	0.503
*Snyder	29	24,329	49	0.201
York	40	49,564	61	0.123
19 counties	533	922,540	1,317	0.142

\* Counties inspected in 1928 for first time.

Valleau (4) has suggested a possible relationship between peach yellows and leaf roll of potatoes.

Recent literature: Pl. Dis. Repr. 12: 102-103, 103.

1. Ferraris, T. Peach yellows; peach rosette e l'arriciamento del pesco in Piemonte. Curiamo le Piante. 6: 101-114. June 28, 1928.
2. McCubbin, W. A., and F. L. Holdridge. Observations on peach yellows. Proc. Pennsylvania Acad. Sci. 2: 82-83. 1928.
3. \_\_\_\_\_ Peach yellows report. Bul. Pennsylvania Dept. of Agric. 11 (6): 25 pp. 1928.
4. Valleau, W. D. Peach yellows and potatoes. U. S. Dept. Agr. Plant. Dis. Repr. 12: 102-103. Sept. 15, 1928.

## Peach - Little Peach

## LITTLE PEACH (VIRUS)

During 1928 little peach was reported to the Survey from 3 additional New York counties, Suffolk, Dutchess, and Chautauqua. In the two latter counties an estimate of 1 per cent infected trees was made by W. D. Mills. In New Jersey the disease continued about the same or less according to Martin and in Delaware and Maryland traces were noted. Both L. M. Hutchins and Ray Nelson mention the fact that for the past few years this disease has been increasing in the Michigan peach district along Lake Michigan. Hutchins adds that losses will be severe unless vigorous action toward eradication is undertaken.

Recent literature: Pl. Dis. Repr. 12: 103.

## ROSETTE (VIRUS)

Rosette was reported from Illinois for the first time in 1928 by H. W. Anderson. It was a case of a single tree in Madison County. A new location was also found in Tate County, northern Mississippi. This case was reported by Neal, Wedgworth and Miles and observed July 29. In 1927 the disease was first reported from Kentucky. In 1928 many more peach trees as well as wild and cultivated plums were found affected in McCracken County of that State, according to Valleau. In Tennessee a trace of this disease was reported by McClintock from Knox County.

On June 16, specimens of rosette were received at the Bureau of Plant Industry from the Experiment Station orchards at Clemson College, South Carolina and were determined as rosette by M. B. Waite. Wild plums in the vicinity were also found affected later on. Hutchins reported on August 29 that this disease was more serious in Georgia than it has been for some years. From 200 to 300 cases were noted in one locality. He observed, however, that the loss over the entire State remains only a trace.

Recent literature: Pl. Dis. Repr. 12: 62-63, 90, 103, 142.

## PHONY DISEASE (VIRUS)

The situation with regard to this increasingly important disease in Georgia is well given in a paper (1) by L. M. Hutchins before the American Phytopathological Society at New York, December 30, 1928: The Plant Quarantine and Control Administration held a hearing to consider the advisability of prohibiting the shipment of peach nursery stock from outside of the present known infested areas in Georgia and Alabama. The action taken on this hearing has not been announced to date.

Recent literature: Pl. Dis. Repr. 12: 70.

1. Hutchins, Lee M. Phony disease of the peach. (Abstract) Phytopath. 19: 107. Jan. 1929.

## Peach - Phony Disease

2. \_\_\_\_\_ Peach orchards in Georgia menaced by phony disease.  
U. S. Dept. Agr. Yearbook 1927: 499-503. 1928.

## BLIGHT, CORYNEUM BEIJERINCKII OUD.

This disease is of more economic importance in California than all of the other States put together but during 1928 no reports concerning its prevalence were received from that State. It was mentioned by Barss in Oregon as causing serious fruit spotting there and that it was apparently favored by late rains in the spring. In Utah, Richards reported a trace of damage but less than the usual amount on account of dry weather.

Recent literature: Pl. Dis. Repr. 12: 81.

## WINTER INJURY

Considerable trouble from winter injury was reported from some of the more Southern States of the peach growing area.

Georgia: Winter injury to the trunks of peach trees is more severe than usual. In one orchard near Griffin approximately 75 per cent of the trees are killed and practically all are severely injured. The trees are three-year-old Elbertas in high state of cultivation. Other growers report Elbertas less severely injured than other varieties. In one orchard that I visited a high percentage of the Early Rose trees are killed while Elbertas show little injury. In this case the Early Rose trees are headed unusually high, exposing long shanks to the weather. (Higgins)

Illinois: A large number of trees were killed in various sections of the State by the past winter, perhaps as a result of adverse weather conditions the preceding winter. These winter-killed trees were found in widely separated localities. In general, the injury was confined to the area near the ground line where the bark was brown and water-soaked. This condition on account of the location of the injury was frequently ascribed to injury from paradichlorobenzene, but the evidence was such as to eliminate this as a factor in most cases at least. Usually lack of drainage or other soil conditions could be assigned as the most important factor in this injury, but a few orchards in remarkably well drained and fertile soil were seriously injured. This was especially true in the orchards of southern Jackson County near Kamanda. (H. W. Anderson)

Arkansas: A relatively large number of young and old peach trees are reported to have died out in the main peach section of the State. No specimens have been received but the following symptoms are noted: A killing of the bark around the base of the tree, discoloration and dropping of the foliage, premature ripening and lack of quality in the fruit. Growers insist it is not winter injury because the disease did not appear until late in the growing season, but it is to be questioned if this would entirely exclude winter injury. It has been ascertained by extension workers that the crown injury was not due to paradichlorobenzene, to oil emulsion, or to any peach borer effects. (Rosen)

## Peach - Winter Injury

Recent literature: Pl. Dis. Repr. 12: 69, 80.

## SPRAY INJURY

During recent years more or less trouble has been experienced from spray injury. A considerable amount of this both to the leaves and twigs is a result of the arsenicals in the sprays. Less trouble than in previous years was reported from New Jersey by Martin. In Maryland it continued as a rather serious factor and Jehle estimates about 4 per cent loss on account of it. In Ohio H. C. Young reported arsenical injury to small twigs very severe. Schnëiderhan and Wingard made a study of the situation in Virginia orchards and have reported as follows:

"Widespread reports of injury on fruit and foliage of peach trees have been coming in. A special inspection trip covering the entire Valley of Virginia from Roanoke to Winchester, a distance of 185 miles was made to determine the extent of the injury and to identify the causes.

"We found that a small percentage of the trouble was caused by a bacterial shot hole. In fact this disease was strictly secondary as a cause of defoliation and leaf injury. The inspection of many peach orchards indicates quite clearly that the injury on the fruits which may be described as sunken brown areas usually surrounded by a halo even though the peaches are still green and followed by gummosis, is caused by the improper use of spray equipment and spray materials. On the leaves, the injury is of a shot hole nature but largely marginal. The lower margin of leaves was usually brown and disintegrated with a ragged edge. In extreme instances, heavy defoliation followed. On the twigs, typical dark brown areas especially at the union of petioles of leaves and usually accompanied by heavy gummosis, was observed.

"Upon reviewing the history of the spray schedule and the equipment used we found that the heaviest injury followed the use of guns instead of rods in the orchard. Furthermore, it seems that most of the damage is caused by lead arsenic wherever it was used without an excess of lime. We also found injury of the same type following the use of dry-mix sulphur lime, self-boiled lime-sulphur and sulphur dusts.

"A correlation of this injury with weather conditions is quite probable. During the month of June we had heavy and continuous rains. The heaviest rainfall in a decade was recorded at Winchester during June. The periodicity of rainfall was one rain every two days in June. This resulted in a heavy development of tender foliage which may have been more susceptible to spray injury than normally.

"Striking instances of spray injury were noted in one orchard near Winchester. Unsprayed parts of one side of a row of trees bordering a corn field showed no injury on fruit or foliage while the other half of the same trees was nearly defoliated. Wherever the growers used the prescribed 1 pound of lead arsenate to 50 gallons of water and added 4 pounds of either slaked lime or hydrated lime, the injury was negligible. Foliage injury amounted to 90 per

## Peach - Spray Injury

cent in some orchards. In one orchard 85 per cent of peaches were injured. No varietal difference was noted."

Recent literature: Pl. Dis. Repr. 12: 90-91, 102, 142.

## MISCELLANEOUS DISEASES AND INJURIES

Armillaria mellea (Vall.) Quel., Texas.

Cephalothecium roseum Cda., pink rot, New Jersey.

Clitocybe tabescens Berk., root rot. Florida, in several instances on East Coast of Florida this fungus has killed peach trees usually in the vicinity of diseased Guava clumps (Psidium guajava). (West)

Caconema raditicola (Greef.) Cobb., root rot. Mississippi and Texas.

Phymatotrichum omnivorum (Shear) Dug., root rot. Texas, traces but unimportant on this host; Arizona, moderate importance, 1 per cent of 200 acres in Maricopa County.

Bacterium tumefaciens (EFS.) Town., crown gall. Quite prevalent in Texas according to Taubenhaus and Bach. In Arizona, Streets estimated a loss of 5 per cent for the State.

Sphaerotheca pannosa (Wallr.) Lev., powdery mildew. General and severe in California according to Milbrath. Leaves, twigs and fruit were attacked. When the attack occurs early in the season the fruit can outgrow the effects but if late in the season the epidermis is brown. Milbrath estimated a loss of about 0.5 per cent. Other States reporting a slight amount of this disease were New York, New Jersey, Texas and Washington.

Tranzschelia punctata (Pers.) Arth., rust. Louisiana, Texas, and California reported rust. It is always a more important factor in California than anywhere else. On July 1 Milbrath reported it as severe on leaves in that State.

Chlorosis (excess of lime), Texas.

Canker (non-par.) Mississippi.

Premature dropping (non-par.) Quite prevalent in Texas.

Sun scald (non-par.) Scattered cases on Elberta in Delaware.

Recent literature: Pl. Dis. Repr. 12:62.

1. Anon. 1929 spray calendar for peaches. New Jersey Agr. Exp. Sta. Circ. 214: 4 p. Dec. 1928.

## Peach - Miscellaneous Diseases

2. Blake, M. A. and A. J. Farley. The Elberta and its near kin lack hardiness. New Jersey State Hort. Soc. News 9: 234. June 1928.
3. \_\_\_\_\_ Peach fruits must grow at certain rate or drop. New Jersey State Hort. Soc. News 9: 233-234. June 1928.
4. Brooks, C. and J. S. Cooley. Time-temperature relations in different types of peach rot infection. Jour. Agr. Res. 37: 507-543. Nov. 1, 1928.
5. Carne, W. M. Leaf rust of stone fruits (*Puccinia prunispinosae*). Jour. Dept. Agr. West. Austral. II, 5: 177-178. June 1928.
6. Fant, G. W. The development of peach sooty mold at normal and low temperatures. Jour. Elisha Mitchell Sci. Soc. 43 (3-4): 217-219. 1928.
7. Talbert, T. J. Serious peach pests and their control. Amer. Fruit Grow. Mag. 48 (6): 6-7, 14. June 1928.
8. Duruz, W. P., and M. C. Goldsworthy. Spraying for peach rust. Proc. Amer. Soc. Hort. Sci. 24 (1927): 168-171. 1928.

D I S E A S E S   O F   P L U M   A N D   P R U N EBROWN ROT, *SCLEROTINIA FRUCTICOLA* (WINT.) REHM.

For the country as a whole there was probably somewhat more brown rot than usual. The States of New York, Delaware, Virginia, Tennessee, North Carolina and Ohio, reported more or much more fruit rot than the average. As high as 80 per cent rot was noted on unsprayed trees in Delaware, 75 per cent in Virginia, 95 in Ohio, and 40 in Missouri. Infection through injuries caused by cucurlio and bacterial spot was noted in Delaware. In Ohio losses of 10 per cent in the orchard and 10 per cent after picking were estimated.

In the Oregon prune orchards less brown rot occurred than usual on account of dry weather.

## Plum - Brown Rot

Table 62. Percentage losses from brown rot of plum and prune as estimated by collaborators, 1928.

Percentage:		Percentage:	
loss :	States reporting	loss :	States reporting
30 :	New Hampshire	4 :	Kansas
25 :	Massachusetts	3 :	New York
20 :	Ohio	2.5 :	Michigan
9 :	North Carolina	2 :	Texas
7 :	Missouri	1 :	Oregon
6 :	Wisconsin, Mississippi	.5 :	Delaware
5 :	Maryland, Virginia, Iowa	:	

Recent literature: Pl. Dis. Repr. 12: 137.

1. Curtis, K. M. The morphological aspect of resistance to brown rot in stone fruit. Ann. of Botany 42 (165): 39-68. 1928.
2. Wormald, H. The present distribution of the brown rot fungi: its economic significance. Jour. Min. Agr. Great Britain 35: 741-750. Nov. 1928.

#### BLACK KNOT, PLOWRIGHTIA MORBOSA (SCHW.) SACC.

Reported generally from the Eastern States and as far West as Kansas and Colorado on both wild and cultivated plums. In Maine it is thought that this disease is one of the factors limiting the cultivation of plums. In West Virginia it is thought to be one of the most important diseases. Damson was mentioned as susceptible in Tennessee and Indiana.

#### POCKETS, EXOASCUS PRUNI FCKL.

In Massachusetts this disease was observed in one orchard according to Davis. In Mississippi it was found in Yazoo County. In Minnesota more specimens and inquiries were received concerning this disease than have been received for the past four years. In Iowa it is said to be severe on unsprayed trees. In Kansas it was somewhat more prevalent than usual although the total loss was estimated at only a trace by O. H. Elmer. In Texas it was very prevalent according to Taubenhau. Observed in Oregon according to Zeller.

Recent literature: Pl. Dis. Repr. 12: 32.

## Prune - Leaf Spot

## LEAF SPOT, COCCOMYCES PRUNOPHORAE HIG.

Much more than last year and much more than usual in New York. It was especially severe in the commercial areas of Niagara County and western New York. All varieties appeared to be susceptible and probably a loss of from 25 to 30 per cent occurred. (W. D. Mills) In Ohio it was quite prevalent doing considerable damage according to Mendenhall. In Iowa it was severe on some varieties and seedlings according to R. H. Porter. Reports of occurrence were received also from Minnesota, Kansas, and Nebraska.

## MISCELLANEOUS DISEASES

Bacterium pruni EFS., bacterial spot. One case of injury to leaves in Connecticut (Stoddard). Heavy twig foliage and fruit infection in Delaware (Adams). Traces of injury in Maryland (Jehle). Severe throughout North Carolina causing heavy defoliation (Poole). Fruit infection noted on variety Abundance in Indiana (Gardner). More than last year causing a trace of loss in Iowa (R. H. Porter). Only one case reported with slight damage in Missouri (Scott). The fruit of some Japanese varieties rather heavily infected in Kentucky. (Valleau). Traces of injury in Mississippi, Tennessee and Texas.

Bacterium tumefaciens EFS., & Town., crown gall. Fifteen States reported that it had not been seen nor collected during the year on this host. Streets in Arizona reported a 10 per cent loss of trees in Pinal County and a total loss of trees on 6 acres.

Cercospora circumscissa Sacc., shot hole. One case observed in Massachusetts. (Doran)

Exoascus mirabilis Atk., hypertrophy. A specimen was sent in to Washington by J. A. McClintock of Tennessee, also it was reported by Neal, Wedgworth and Miles as being somewhat more plentiful than usual in Mississippi.

Fumago vagans Pers., sooty mold. King County, Washington.

Leptothyrium pomi (Mont. & Fr.) Sacc., flyspeck. Collected in several counties in West Virginia by W. A. Archer.

Phyllosticta sp., blotch. Traces reported from five counties in Texas. (Taubenhaus)

Phymatotrichum omnivorum (Shear) Dug., root rot. Reported from two counties in Texas (Taubenhaus & Bach), and from Arizona (Streets).

Podosphaera oxycanthae (DC.) D By., powdery mildew. Mississippi and Washington.

Tranzschelia punctata (Pers.) Arth., rust. Mississippi and Texas.

## Plum - Miscellaneous Diseases

Chlorosis (excess of lime) Texas.

Gum spot (non-par.) Reported from Oregon but probably less abundant than usual. (Barss)

Spray injury, estimated loss of 1 per cent in Iowa. Weather conditions of June and July favored injury.

Diamond canker (undet.) Doing considerable damage to French prunes in Napa County, California. It is transmitted by budding and grafting. Apparently has spread from one orchard. (1)

Recent literature:

1. Baade, J. H. Diamond canker in Nappa County. California Cult. 71: 494. Nov. 17, 1928.
2. Boyle, C., M. Murphy, and H. A. Cummins. "Blossom-wilt" of apple trees and "wither-tip" of plum trees, with special reference to two biologic forms of *Monilia cinerea* Bon. Sci. Proc. Roy. Dublin Soc. n.s. 19: 63-76. Sept. 1928.
3. Marsh, R. W., and R. M. Nattrass. Investigations on die-back of fruit trees. I. A preliminary experiment and some field observations on *Diaporthe pernicioso* as a cause of 'die-back' of plum trees. Ann. Rept. Agric. & Hort. Res. Stat., Long Ashton, Bristol, for 1927: 93-98. 1928.
4. Maynard, B. D. Prune die-back conquered. California Cult. 71: 78. July 23, 1928.
5. Smith, R. E., and H. E. Thomas. Copper sulphate as a remedy for exanthema in prunes, apples, pears, and olives. Phytopath. 18 (5): 449-454. 1928.
6. Wormald, H. On the cause of "die-back" in plum trees. Gard. Chron. III, 84: 372-373. Nov. 10, 1928.

D I S E A S E S O F C H E R R Y

BROWN ROT, *SCLEROTINIA FRUCTICOLA* (WINT.) REHM.

Brown rot was said to be more prevalent than usual in New York, Virginia, and Kansas. In Virginia it was said to be one of the commonest causes of loss. In California, according to Milbrath, it was about as severe as in 1926 and 1927 affecting twigs, blossoms and fruit. The percentage losses were estimated as follows by collaborators: Tennessee, 40; New Hampshire, 30; Massachusetts, 20; New York and New Jersey, 5; Virginia, 3.5; Oregon, 3; Iowa and Kansas, 2; Maryland, Indiana, Michigan, and California, 1.

## Cherry - Brown Rot

Recent literature

1. Curtis, K. W. The morphological aspect of resistance to brown rot in stone fruit. *Ann. of Botany* 42 (165): 59-68. 1928.

## LEAF SPOT, COCCOMYCES NIEMALIS HIG.

This disease along with brown rot is regarded as one of the most important cherry diseases. Defoliation usually accompanies this disease but the question as to whether the fungus is the entire cause of the defoliation has been raised. In his survey report, W. D. Valleau of Kentucky raises the question, and in a recent bulletin from the Geneva Experiment Station, Gloyer and Glasgow (3) mention lack of vigor as a cause of yellow leaf and leaf dropping.

The States reporting more leaf spot than average are: New York, Ohio, Illinois, Indiana, Michigan, Wisconsin and Kansas. Five other States reported average prevalence. In New York, according to W. D. Mills, all varieties appeared to be susceptible, but particularly the English Morello. Severe defoliation occurred in most cases where the petal fall spray was omitted and the disease was regarded as the worst in five seasons. The effect on this year's crop was not great but the effect on future crops is liable to be considerable. Mills states that the petal-fall, two maggot sprays and after-picking spray are all necessary in western New York. In West Virginia, Archer reported that by mid-autumn infection and defoliation were severe. In Arkansas, it is said to be very serious in poorly sprayed orchards. In Michigan, R. Nelson reported as follows:

"Leaf spot was the outstanding plant disease of 1928 in Michigan. In the Traverse region and northward there was less leaf spot than usual. This was due to light initial infections. The temperature was low and precipitation deficient after blossoming. While the disease made considerable later developments no serious defoliation occurred, which is unusual for the Traverse district. In the southern half of the lower peninsula unsprayed trees were generally defoliated by August, resulting in the most serious epidemic of leaf spot in years. In the regions of severe defoliation the initial infections were heavy as rainfall was generally abundant at the critical periods for infection. Thus we have this year a reversal of conditions as usually found since defoliation normally occurs most severely in the Traverse and other more northerly regions."

In Iowa, according to D. E. Bliss, this disease was considered as probably the most serious of all diseases in the nurseries. By August 20, untreated trees were completely defoliated and dusted plants were only slightly better. Liquid Bordeaux 4-4-50 proved considerably more effective for control than other treatments.

Percentage losses were estimated by collaborators as follows: Tennessee, 30; Maryland, Kansas, Kentucky, 10; Michigan, Missouri, 8; Ohio, 5; Arkansas, 4; Iowa, 3; Virginia, Wisconsin, Oregon, 1; Delaware, .5.

## Cherry - Leaf Spot.

Recent literature: Pl. Dis. Repr. 12: 52, 81, 137.

1. Anderson, H. W. Cherry leaf spot. Trans. Illinois State Hort. Soc. 61: 119-123. 1928.
2. Bradford, F. C. Cherry trees defoliated by leaf spot. Future fruit crops threatened by failure of trees to store food. Michigan Agr. Exp. Sta. Quart. Bull. 11: 7. Aug. 1928.
3. Gloyer, W. O., and Hugh Glasgow. Defoliation of Cherry Trees in Relation to Winter Injury. New York State Agr. Exp. Sta. (Geneva) 555: 3-27. Aug. 1928.

## WINTER KILLING

Cherry trees are very subject to winter killing particularly when weakened by other causes such as leaf spot. Reports of it were received from New York, Arkansas, Illinois and Washington. In Illinois, H. W. Anderson reported the sour cherry, which is supposed to be resistant to winter injury, dying by the thousands during the year on account of the abnormal weather conditions of 1927-28. In 1927 leaf spot defoliated many trees which stimulated them to development in the fall and they entered the winter in a weakened condition. Death of several cherry orchards in the vicinity of Fort Collins, Colorado, was reported as due to winter killing.

Recent literature: Pl. Dis. Repr. 12: 63, 92.

## MISCELLANEOUS DISEASES

Armillaria mellea (Vahl.) Quel., root rot. Several cases in western Washington.

Bacillus amylovorus (Burr.) Trev., fire blight. This disease has been reported on sweet cherry before from the Pacific Coast. This year it was reported to the Survey for the first time from New York where W. D. Mills mentioned it as occurring in some orchards in Ontario County, June 25.

Bacterium cerasi Griffin, bacterial gummosis. Skagit and Benton Counties, Washington. In New Jersey the Department of Plant Pathology reported as follows:

"In one orchard in Burlington County the Bing variety showed serious twig injury and also heavy cankering at the base of fruit spurs. Isolation showed the presence of a Bacterium similar to Bacterium cerasi. The trouble may have followed winter injury but this point has not yet been determined."

Bacterium pruni EFS., bacterial spot. Reported as causing considerable leaf spotting in the Hudson Valley and in western New York.

## Cherry - Miscellaneous Diseases

Bacterium tumefaciens, EFS. and Town., crown gall. Arizona.

Cercospora circumscissa Sacc., shot hole. Delaware, on sand or wild cherry, not of economic importance. (Adams)

Cladosporium carpophilum Thuem., scab. Reported from New York. Severe in one unsprayed orchard.

Coryneum beijerinckii Oud., blight. Asotin County, Washington.

Plowrightia morbosa (Schw.) Sacc., black knot. A few heavily infected sour cherry orchards in Hudson Valley. In one case sweet cherries were unaffected while adjoining sour cherries showed 100 per cent infected trees.

Podosphaera oxycanthae (DC.) D By., powdery mildew. New York, Kentucky, Tennessee, Indiana, Michigan, Wisconsin, Iowa, Kansas, Colorado and Montana. For the most part only a trace reported but in Iowa it was severe on nursery stock where it probably caused about 2 per cent loss.

Brown spots. In Columbia County, New York, brown spots in the flesh of Early Richmonds gave the fruit a knotty, dimpled appearance. The cause of this was not definitely determined but was attributed to cold and possibly to wet weather at the time of setting of fruit.

Splitting. A large amount of rain caused considerable injury to sweet cherries in the Ontario Peninsula of Canada by inducing fruit splitting.

Recent literature:

1. Faes, H., and M. Staehelin. La maladie criblée du cerisier (Clasterosporium carpophilum) et la tavelure (Fusicladium dendriticum-pirinum) des pommes et poires. Ann. Agr. Suisse, 29: 83-92. 1928.
2. \_\_\_\_\_ Un champignon parasite de cerisier: le Clasterosporium carpophilum. Pomol. France. 1928: 175-177. Sept. 1928.
3. Goodwin, W., E. S. Salmon, and W. M. Ware. The spraying of cherry orchards against "leaf scorch." Jour. S. E. Agr. Coll. Wye. 25: 147-151. 1928.
4. Wilson, E. E., and G. W. Keitt. The effect of sprays on the weight of cherry fruit. (Abstract) Phytopath. 19: 10. Jan. 1929.
5. Gleyer, W. O., and High Glasgow. Defoliation of Cherry Trees in Relation to Winter Injury. New York State Agr. Exp. Sta. Bul. 555: 3-27. Aug. 1928.

D I S E A S E S O F A P R I C O T

Bacterium tumefaciens EFS., and Town., crown gall. Arizona, in Maricopa County, 4 per cent loss in 700 acres. (Streets) An orchard near Scottsdale showed galls reducing water supply so that foliage was being badly sunburned. (Ariz. News Letter 6 (6): 3, June 30, 1928.)

Cladosporium carpophilum, Thuem., scab. Indiana, canker on twigs; and Texas, quite prevalent.

Phymatotrichum omnivorum (Shear), Dug., root rot. Arizona, more than last year, possible 2 per cent loss. (Streets)

Recent literature

1. Duruz, W. P. Coryneum of apricots and its control. Proc. Amer. Soc. Hort. Sci. 24: 176-179. 1928.
2. Fish, S. Scab or shot hole of apricots. Control experiments in the Goulburn Valley. Jour. Dept. Agr. Victoria 26: 310-312. May 1928. Coryneum beijerinckii Cud. (Clasterosporium carpophilum (Lev.) Aderh.)

D I S E A S E S O F S M A L L F R U I T SG R A P EBLACK ROT, GUIGNARDIA BIDWELLII (ELL.) VIALA & RAVAZ

Reports seem to be in general agreement that black rot was worse than usual in the areas where it occurs. In some sections particularly those further south it is liable to be very bad on unsprayed vines when weather conditions are favorable. In Ohio it was said to be very severe on home vines but not of much importance in commercial plantings. In Michigan low June temperature prevented a serious outbreak. In Virginia it was the worst grape disease and much more prevalent than usual. In some southern sections of West Virginia fully half the crop was rotted. In Georgia, according to Boyd, the heaviest early leaf infection ever noted occurred; also more fruit rot on wild grapes, Scuppernongs and on vineyard varieties. In Arkansas the wet weather in mid-summer threatened very serious loss but sudden, dry spell checked disease before it became serious. Losses are estimated as follows:

## Grape - Black Rot

Table 62. Percentage losses from black rot of grapes as estimated by collaborators, 1928.

Percentage: loss :		States reporting	Percentage: loss :		States reporting
40	:	Tennessee	3	:	Maryland
10	:	Virginia, West Virginia,	2.5	:	New York
6	:	Kentucky	2	:	Wisconsin, Kansas,
6	:	North Carolina,		:	Texas, Arkansas
	:	Mississippi	1	:	Massachusetts, Ohio,
5	:	Michigan	.5	:	Delaware
4	:	Utah		:	
	:			:	

Recent literature: Pl. Dis. Repr. 12: 65, 127.

DOWNY MILDEW, PLASMOPARA VITICOLA (PERK. & CURT.)  
BERT. & DETONI

More downy mildew than usual was reported from New England, New York, Ohio and the Virginias and North Carolina. In Massachusetts some vines showed 50 per cent defoliation and a crop not worth harvesting. In Chautauqua County, New York, growers who claimed never to have been troubled before were observing it in their vineyards. Leaves and shoots and more than half the berries in a cluster were affected. The disease caused many growers to spray. In West Virginia, Archer reported it abundant for the first time in four years but stated that it was not usually of economic importance on account of scarcity or lateness of infection.

Bisby and Conners (1) noted the occurrence of downy mildew in Manitoba for what they think is the first occurrence.

Recent literature: Pl. Dis. Repr. 12: 71, 127.

1. Bisby, G. R., and I. L. Conners. Plant diseases new to Manitoba. Sci. Agr. 8: 456-458. Mar. 1928.
2. Gladwin, F. E. Downy and powdery mildew of the grape and their control. New York (Geneva) Agr. Exp. Sta. Bul. 560: 1-14. Dec. 1928.
3. Moreau, L., and E. Vinet. Le mildiou. Evolution et traitements en 1927. Conclusions pratiques. Rev. de Vitic. 68 (1764): 255-258; (1765): 269-274; (1766): 265-287. 1928.

POWDERY MILDEW, UNCIJNULA NECATOR (SCHW.) BURR.

This disease is annually much more important in California than all of the other States put together but this season the Survey has received no reports from that State. The outstanding feature as indicated by the reports that were received is the increased amount in New York where a 20 per cent loss was estimated and where it was probably the most severe it has been for many years.

## Grape - Powdery Mildew

Recent literature: Pl. Dis. Reprtr. 12: 127.

1. Bonnet, L. O. Enemies of the flower and fruit. California Grape Grow. 9(3): 6-7. Mar. 1928.
2. Gladwin, F. E. Downy and powdery mildew of the grape and their control. New York (Geneva) Agr. Exp. Sta. Bul. 560: 1-14. Dec. 1928.
3. Jacob, H. E. Powdery mildew of the grape and its control in California. California Agr. Ext. Serv. Circ. 31: 18 p. Mar. 1929.
4. Johnstone, H. W. Controlling grape mildew. California Cult. 70: 322-323. Mar. 17, 1929.

## ANTHRACNOSE, SPHACELOMA AMPELINUM D BY.

Several States from Maryland, Ohio and Iowa southward reported anthracnose but all are in agreement that it was of about average or less than the average prevalence. In Arkansas, V. H. Young mentioned its occurrence in severe form on the varieties Ellen Scott, Albania, Armalaga, Muscat Rose, Christine and only slight infection on America and R. W. Munson. Salamander was noted affected in Ohio.

Recent literature: Pl. Dis. Reprtr. 12: 10.

## BITTER ROT, MELANCONIUM FULIGINEUM (SCRIB. &amp; VIALA) CAV.

Only four States reported bitter rot, New Jersey, Georgia, Florida and Ohio. In the two Southern States it was said to be abundant and serious on the common cultivated varieties. A 10 per cent loss was estimated for Georgia. In Ohio four samples were received at the Experiment Station for identification.

Recent literature: Pl. Dis. Reprtr. 12: 70.

## CROWN GALL, BACTERIUM TUMEFACIENS EFS. &amp; TOWN.

Out of 17 States returning report cards on this disease, 13 reported that the disease had not been observed and only 4, Maryland, Kansas, Utah, and Arizona mentioned occurrence in very small amounts. In Utah it was said to be fairly prominent and thought to be causing perhaps as much as 2 per cent loss. In Arizona a loss of 0.5 per cent was estimated.

## OTHER DISEASES

Cryptosporrella viticola (Reddick) Shear, dead arm. New York - found in several counties was the cause of some fruit rot. A specimen was sent in to Washington from Ohio.

## Grape - Other Diseases

Glomerella cingulata (Ston.) Spauld. & Schrenk, ripe rot. Mississippi.

Isariopsis clavispora (Berk. & Curt.) Sacc., leaf spot. Slight premature defoliation observed in several instances in Georgia where it was thought to be more prevalent than usual. Specimens collected at Quincy, Florida, July 14.

Pestalozzia uvicola Speg., leaf blight. Reported for the first time to the Disease Survey from Connecticut.

Phymatotrichum omnivorum Shear & Dug., root rot. Fairly prevalent in Texas being very severe in Hidalgo County.

Rhytisma vitis Schw., tar spot. New York.

Recent literature: Pl. Dis. Repr. 13: 70, 71, 127.

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2. Battail, J. Contribution aux recherches sur le court-noué. Progr. Agr. et Vitic. 89: 600-602. June 17, 1928.
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4. \_\_\_\_\_ Le court-noué (cont.) Progr. Agr. et Vitic. 90: 37-39. July 15, 1928.
5. Bonnet, L. O. Enemies of the flower and fruit. California Grape Grow. 9 (3): 6-7. Mar. 1, 1928.
6. Coleman, L. C. The dead arm disease of grapes in Ontario. A preliminary study. Scient. Agr. 8 (5): 231-315. 1928.
7. Gandhi, Sohrab R. A grape vine disease new to India. "Dematophora necatrix Hartig." Poona Agr. Coll. Mag. 19: 205-207. Feb. 1928.
8. De Castella, F. Sulphuring and spraying vines. Jour. Dept. Agr. Victoria 25 (12): 732-735. 1927.
9. Limouzy, J. Le rot blanc. Progr. Agr. et Vitic. 90: 3-4. July 1, 1928.
10. Manns, T. F. Grape disease control in Delaware. Delaware Agr. Exp. Sta. Bul. 154: 37 p. Feb. 1928.
11. Muth, F. Die melanose der amerikanerreben. Mitt. Deut. Landw. Ges. 43: 1063-1066. Nov. 24, 1928.

## Grape - Other Diseases

12. Osterwalder, A. and H. Schellenberg. Ueber den falschen Meltau und Rotbrenner der Reben und die Bekämpfung dieser Krankheiten. Schweiz. Zeitschr. Obst. u. Weinb. 37: 172-176. May 12, 1928.
13. Ravaz, L. Un cas special de chlorose des vignes américaines greffées. Prog. Agric. et Vitic. 89 (1): 10-12. 1928.
14. \_\_\_\_\_ Recherches sur le court-noué. Bull. Soc. Dép. Encouragement Agr. Herault. 35: 117-128; Aug. 1928.
15. Viala, P. Recherches sur les maladies de la vigne. Nouvelles observations sur l'esca. Rev. Vitic. 69: 229-235. Oct. 11, 1928.

S T R A W B E R R YLEAF SPOT, MYCOSPHAERELLA FRAGARIAE (TUL.) LINDAU

Leaf spot occurred generally as indicated by reports from a majority of States. For the most part it seemed to be of only slight economic importance, only the older leaves and older beds being seriously affected. However, losses of 5 per cent and 6 per cent were estimated in Louisiana and Iowa, respectively. Mississippi, Illinois, Minnesota, and Missouri estimated more than the average prevalence. The variety Lupton in New Jersey and Gandy in Kentucky were mentioned as susceptible.

Recent literature: Pl. Dis. Repr. 12: 77.

LEAF SCORCH, DIPLOCARPON EARLIANA (ELL. & EV.) WOLF

Florida, Mississippi, Louisiana, Texas, Arkansas, Missouri and Oregon are the only States definitely reporting leaf scorch to the Survey during 1928. Four per cent loss was estimated from Louisiana and 1 per cent from Texas.

Florida: It appeared on old plants in April and in the nursery plants from May to September. Spraying nursery beds every two weeks with Bordeaux 4-2-50 from May 1 to October 1 gave complete control. (A. N. Brooks)

Arkansas: Appears to be increasing in importance. Aroma, resistant; Klondike, susceptible. (V. H. Young)

Oregon: A strain of this disease is common on the wild hosts, Fragaria chiloensis and F. cuneifolia but does not affect our commercial varieties except the Clark Seedling grown in Hood River Valley and some new Oregon Station hybrids which have F. chiloensis as one parent. (Zeller)

Recent literature: Pl. Dis. Repr. 12: 77.

## POWDERY MILDEW, SPHAEROTHECA HUMULI (DC.) BURR.

In Chautauqua County, New York, an infection of 3 per cent of the leaves was estimated. In Orange County of that State several patches were affected and copper-lime dust that was applied was not effective. In Ohio, C. W. Bennett reported that it is rarely observed except on the Mastodon variety and not even very injurious on this. A. G. Plakidas stated that he has never observed this in Louisiana.

## FRUIT ROTS

Botrytis cinerea Auct., grey mold rot. Reported from several States and the cause of considerable loss. Said to be unusually abundant in New England, New York, New Jersey, Delaware, Illinois and Missouri. It affected the berries both on the vine and after picking. Davis in Massachusetts reported 10 to 23 per cent infection of the berries on the vines in some patches. Rainy weather in May and June favored development of this disease. Eight per cent loss for the State was estimated in Missouri and the crop in southern Illinois was far below standard on account of this and other fruit rots.

Phytophthora cactorum (Leb. & Cohn) Schroet., leather rot. In one field in Mississippi twelve long rows receiving drainage showed 75 per cent loss from leather rot while the remainder of this particular field showed only 10 per cent loss. Less than the normal amount was reported by Plakidas from Louisiana. A dry, cool picking season resulted in only about 1 per cent loss. I. T. Scott reported that this is a serious disease in the southwestern sections of Missouri and that last year probably about 5 per cent loss occurred.

Rhizoctonia sp., hard rot. Reported from Florida and Louisiana by Brooks and Plakidas but in both of the States it appeared to be less prevalent than is often the case.

Rhizopus nigricans Ehr., leak. A. N. Brooks of Florida reported that dry, cool weather which prevailed throughout most of the fruiting season resulted in firm fruit and less leak in transit. In the southern Illinois sections this is one of the diseases that is seriously interfering with production. It is reported also from southern Texas by W. J. Bach.

Recent literature: Pl. Dis. Repr. 12: 77.

## BLACK ROOT AND OTHER ROOT ROTS

Connecticut: As in past years we have had a complaint or two of root rot of strawberry plants. Mycelium is often associated with these rots but as no fungus has been definitely accused of the trouble we report it as winter injury until we learn differently. (Clinton)

## Strawberry - Black Root

New York: Several reports commencing June 12. The varieties Jumbo and Glen Mary susceptible. (Mills)

New Jersey: Moderately to very important. Slight differences in varietal susceptibility but no resistant sorts have been obtained. (Dept. Pl. Path.)

Virginia: Numerous complaints of root rot during June. (McWhorter)

Illinois: Very common this year. Seems to be associated with winter injury. (Anderson)

Florida: Moderately important. Less than usual. (Brooks)

Mississippi: Average prevalence; first noted March 26. (Neal, Wedgworth and Miles)

Louisiana: Average prevalence. Moderately important. (Plakidas)

Wisconsin: Average prevalence. Limiting factor in securing full stand of plants. Needs investigation. Associated with winter injury. (Vaughan)

Recent literature: Pl. Dis. Repr. 12: 63-64, 77, 78.

1. Thomas, H. E. Killing of strawberry roots. Phytopath. 18: 245-246. Feb. 1928.

## OTHER DISEASES

Armillaria mellea (Vahl.) Quel., root rot. Some damage on newly cleared land in three localities on Marshall variety in Oregon, according to Zeller; also reported from Washington.

Caecoma radiculicola (Greef.) Cobb., root knot. Florida, Mississippi, Wisconsin, Kansas and Arizona. In Florida 60 per cent of plants observed in a single field. Brooks reported that dry weather resulted in a higher percentage in death of affected plants. This disease was observed in Wisconsin for the first time. The variety Mastodon reported affected in Michigan.

Colletotrichum sp., anthracnose. Abundant from July to September in Florida. It attacks runners and where severe interferes with production of new plants. (A. N. Brooks)

Dendrophoma obscurans (Ell. & Ev.) And., angular spot. Appeared in isolated spots in Florida and was widely distributed in Oregon on the native host Fragaria chiloensis. It did not attack the commercial varieties however.

Peizella

lythri (Desm.) Shear & Dodge., stem rot. Florida - although fruit rots were scarce during the past season this one was noted more often in the field than were the others. (A. N. Brooks). Louisiana - less than usual, moderately important, only a trace of loss (Plakidas)

## Strawberry - Other Diseases

Phyllosticta fragaricola Desm. & Rob., leaf spot. Collected at Quincy, Florida, but not common.

Rhizoctonia solani Kuehn, crown rot. Western Washington.

Tylenchus dipsaci (Kuehn) Bast., stem nematode. In Oregon, according to Zeller, it is found on wild strawberry Fragaria chiloensis along the ocean beach from the California line to Winchester Bay.

Dwarf (virus). Average prevalence in Louisiana. Klondike is very susceptible. (Plakidas)

French bud, crimps, or briar bud (undet.) Florida - much more than last year and more than the average. Generally distributed and moderately important. As high as 90 per cent infected plants noted in one field. Apparently there is no varietal resistance but disease is more abundant in plants raised from stock that have been in Florida for several seasons than in those raised from stock secured from the North in the spring.

Xanthosis or yellows. Plakidas (3) has selected the name "Xanthosis" for the California disease formerly called yellows. This is the most important strawberry disease in California. There seem to be other diseases of the same general type but their identity is uncertain. In 1928, Doran of Massachusetts reported a disease of this nature from Concord, Mass. Considerable trouble is being experienced particularly with the variety Howard 17. In Montana many patches were observed with plants having symptoms of virus disease. High percentages of yellows plants were seen. A similar condition occurred in southwestern Washington. Recent work of Kunkel has shown that aster yellows can not be transmitted to strawberry.

Recent literature: Pl. Dis. Repr. 12: 7, 41, 71, 77, 92.

1. Anon. Aster yellows yields to science. Flor. Rev. 62 (1608): 35-36. Sept. 20, 1928.
2. O'Brien, D. G. and E. J. M'Naughton. Disease in strawberries. Scottish Jour. Agr. 11 (3): 286-297. 1928.
3. Plakidas, A. G. Strawberry xanthosis (yellows), a new insect-borne disease. Jour. Agr. Res. 35 (12): 1057-1090. 1927.
4. Plakidas, A. G. Strawberry dwarf. Phytopath. 18: 439-444. May 1928.
5. Small, T. A disease of the strawberry plant. Ann. Rep. Exp. & Res. Stat. Nursery & Mark. Gard. Industr. Devel. Soc. 13: 45-46. 1928.
6. Smith, R. E. and H. E. Thomas. Copper sulphate as a remedy for exanthema in prunes, apples, pears, and olives. Phytopath. 18: 449-454. May 1928.

## Strawberry - Other Diseases

7. Thomas, H. E. Killing of strawberry roots. *Phytopath.* 18: 245-246. 1928.
8. Wardlaw, C. W. The Lanarkshire strawberry industry. Recommendations for the treatment of diseased fields and for effecting improvement in the cultivation of the strawberry. 53 pp., Glasgow, R. MacLehose & Co., 1928.
9. \_\_\_\_\_ Lanarkshire strawberry disease. Further observations on its biology. *Scott. Journ. Agr.* 11: 65-71. Jan. 1928.

R A S P B E R R YORANGE RUST, *GYMNOCONIA INTERSTITIALIS* (SCHL.) LAGH.

This rust was reported from Massachusetts, Pennsylvania, Delaware, Maryland, Indiana, Michigan, Wisconsin, Minnesota, and Iowa, on black cap raspberries. The usual prevalence was indicated except in the case of Michigan where it was much more prevalent than usual and where as high as 60 per cent of the plants in some fields of Cumberland were infected, and also in Iowa where it was general, severe and much more prevalent than usual. In Michigan this disease is worse in the southeastern corner of the State. Losses of 5 per cent were reported in Michigan, 2 per cent in Iowa and 1 per cent in Maryland. Varieties mentioned as susceptible by collaborators were Early Harvest in Delaware, Cumberland in Michigan, and Gregg in Minnesota.

Recent literature: *Pl. Dis. Repr.* 12: 31-32, 40.

ANTHRACNOSE, *PLECTODISCELLA VENETA* (SPEG.) BURK.

This disease, which is probably the most important fungus disease of black raspberries, was reported to the Survey for 1928 only from New York, New Jersey, Pennsylvania, Maryland, Illinois, Indiana, Iowa, Nebraska, Kansas and Texas. In Pennsylvania it was said to be very severe in the unsprayed patches in northwestern counties. In New Jersey on July 19, C. M. Haenseler determined that 85 per cent of the new canes on certain unsprayed plots were infected while only 11 per cent of the canes on the sprayed plots showed infection. The sprays used, however, caused apparent injury. In West Virginia heavily infected canes were observed in several localities and a loss of 2 per cent was estimated for the State. In Illinois, H. W. Anderson stated that anthracnose was the outstanding disease of black caps. In the Peoria region the growing of black caps has been abandoned by some growers on account of anthracnose and crown gall. The tendency there now is to abandon standard black cap varieties and grow either reds or anthracnose resistant blacks. In Arkansas it is very serious and destructive and is said to be the greatest obstacle to raspberry growing in the State.

## Raspberry - Anthracnose

Recent literature: Pl. Dis. Repr. 12: 78.

1. Colby, A. S. Anthracnose of our black raspberries. Illinois Farmer 76 (3): 7, 19. Mar. 15, 1928.

## VIRUS DISEASES

Mosaic. Bennett (2) distinguishes three types of mosaic namely red raspberry mosaic, mild mosaic and yellow mosaic. W. E. Rankin of New York in his report to the Plant Disease Survey for 1928 mentions four types, namely, red mosaic (the original mosaic described on red varieties), mild mosaic of red raspberries, yellow mosaic of black and purple varieties and mild mosaic of black and purple varieties. Concerning these he reports as follows:

"Red mosaic was about as prevalent as usual being first observed by July 1 and as high as 50 per cent infected plants observed in a single field. Apparently the temperature was unfavorable as cool weather masked symptoms and reduced injury. The varieties Latham and Ranere were very resistant to the red mosaic, Cuthbert, June, Ontario, and Columbian were susceptible, while Plum Farmer was very susceptible.

"Mild mosaic of red raspberries was much more prevalent than usual but the loss was practically nil. General growth conditions including continued cool weather in June caused mild mosaic to show very strongly in red varieties. Leaf symptoms as strong as red mosaic were common in Cuthbert thus causing confusion in diagnosis.

"Yellow mosaic of black and purple raspberries has become more prevalent during the past two years in New York in the Plum Farmer and Columbian varieties. It spreads rapidly and the effect on the crop is severe.

"Mild mosaic of black and purple varieties is generally prevalent. The varieties Columbian and Plum Farmer are susceptible but there is no apparent injury to them. The symptoms were very pronounced this year on account of low temperatures in June."

Mosaic was rather generally prevalent where raspberries are grown in eastern United States. In Massachusetts it was said to be the worst ever seen and in Connecticut it was reported very common as a result of favorable conditions last season for infection. In Pennsylvania, Zundel reported severe late infection this year. In Georgia a trace of loss for the State was estimated but in one highly susceptible variety from Minnesota 90 per cent of the plants were observed heavily affected. The canes were stunted, leaves distorted and the fruit undersize. In Indiana what seemed to be the yellow mosaic was noted particularly on Cumberland. The variety Ranere (St. Regis) was said to show resistance to the virus diseases in general. In Wisconsin normal prevalence was indicated and the statement made that all three forms of the disease occurred. In Oregon, S. M. Zeller stated that the black and red raspberry mosaics do not occur in western Oregon and that the symptoms called mosaic a few years ago are not transmissible.

Leaf curl

In New York, according to W. H. Rankin, curl was rarely found except in some plantings of red varieties from Canadian stock. It was not found in black or purple varieties. In Pennsylvania according to Zundel it was much more prevalent than usual. At Bellwood 25 per cent was noted and in Warren County a patch of 100 per cent infected plants was observed. This disease is regarded as one of the most serious of the raspberry diseases in Pennsylvania. In Maryland 3 per cent loss was estimated, and in Ohio, where the usual prevalence was indicated, 5 per cent. The disease was noted at LaFayette, Indiana, on the varieties Cumberland and Plum Farmer and a red variety at South Bend was affected. In Wisconsin it was generally present to a slight extent throughout the whole season. Slight amounts were reported from Minnesota and the statement was made that the disease did not occur in Oregon.

Bennett in Ohio lists the following varieties with regard to their susceptibility: Ranere (St. Regis) immune; Plum Farmer and King very resistant; Gregg and Latham susceptible; and Cumberland and Cuthbert very susceptible.

Streak

New York, Ohio, and Oregon are the only States mentioning the occurrence of this disease. In New York it was prevalent in about the usual amounts on black varieties, according to Rankin, the variety Giant being very susceptible and the Plum Farmer resistant. In Ohio Bennett estimated a loss of about 1 per cent for the State with about the average prevalence. In one 2-acre field he noted a spread presumably in 1927 to about 2 per cent of the plants. In Oregon, S. M. Zeller stated that as far as he knew only one planting in the State had the disease and that it had been practically eliminated except from this one planting of Cumberland black caps.

Recent literature: Pl. Dis. Repr. 13: 64.

1. Bennett, C. W. Some raspberry mosaic symptoms. (Abstract) Phytopath. 19: 89. Jan. 1929.
2. \_\_\_\_\_ Michigan Raspberry diseases. Michigan Agric. Exper. Stat. Special Bul. 178, 52 pp. 1928.
3. Berkeley, G. H. Raspberry mosaic and its eradication. Canad. Hort. 51: 33-34. Feb. 1928.
4. Smith, Floyd F. Some life habits of *Aphis rubiphila* Patch. Proc. Pennsylvania Acad. Sci. 2: 83-84. 1928.

## LEAF SPOT, MYCOSPHAERELLA RUBI E. W. ROARK.

Reported from New York, New Jersey, Mississippi, Texas, Iowa, and Kansas. In New York, according to W. D. Mills, this is found in every planting of a

## Raspberry - Leaf Spot

variety known as Adams 87 which has recently been imported from Canada because of its resistance to mosaic. Every planting of this variety observed showed the lower leaves badly spotted. Other varieties grown beside this did not show the disease. In New Jersey the variety Herbert showed severe defoliation at the College Farm, New Brunswick. In Iowa this spot killed the leaves on many plantations in the western part of the State, according to R. H. Porter and in Kansas a 2 per cent reduction in yield is estimated by collaborators.

Recent literature: Pl. Dis. Repr. 12: 78.

CANE BLIGHT, *LEPTOSPHERIA CONIOTHYRIUM* (ECKL.) SACC.

Several States in the eastern part of the country as far west as Kansas mentioned the occurrence of the disease, and Maryland and Kentucky estimated somewhat more than usual. In New York, Mills reported very severe injury in two plantings that had been affected previously by winter injury. Nearly all of the new canes showed some lesions. It was common in both the Hudson Valley and western New York section. From Ohio, specimens were received with a notation that it was causing injury to 50 or more plants in a patch of the variety King. Vaughan in Wisconsin mentioned the fact that this may weaken the patch so that other diseases may obtain a foothold. In Colorado the disease was said to be very prevalent affecting all the plants in many plantations. It was not reported from Washington nor was it found in Oregon.

Recent literature: Pl. Dis. Repr. 12: 92.

CROWN GALL, *BACTERIUM TUMEFACIENS* EFS., & TOWN.

Several States reported crown gall but Pennsylvania was the only one reporting more than usual. In that State, Zundel is of the opinion that it is becoming general in the northwestern counties. In Illinois, crown gall together with anthracnose has been forcing growers to abandon raspberry growing in the Peoria section. Losses of 3 per cent were estimated for the State of Michigan where it was serious on red varieties and 1 per cent was estimated in Iowa where it was said to be common on black caps. In Oregon, Zeller states that it is occasionally found as a root or a cane gall but is not usually serious.

Recent literature: Pl. Dis. Repr. 12: 78.

## OTHER DISEASES

Ascospora rubi (Westend.) Zeller, cane spot. According to Zeller this disease occurs generally with the host west of the Cascade Mountains in Oregon. Growers think it does considerable damage to canes during their second or fruiting season.

Botrytis cinerea Auct., gray mold rot. Destroyed small percentages of fruit in New Jersey.

## Raspberry - Other Diseases

Mycosphaerella rubina (Pk.) Jacz., spur blight. Severe at College Farm and in other localities in New Jersey. Reported also from Indiana, Wisconsin and Oregon. In the latter State it is of considerable importance in the Askland district, southern Oregon.

Phragmidium imitans Arth., leaf rust. Washington and Oregon. S. M. Zeller reports for Oregon:

"In some localities this year certain plantings are reported to have serious uredinial infections on canes. In the worst cases 40 per cent of canes have been lost as a result of these lesions near the ground."

Phymatotrichum omnivorum (Shear) Dug., root rot. Texas, two counties.

Sphaerotheca humuli (DC.) Wint., powdery mildew. From New Jersey the Department of Plant Pathology gives the following notes on susceptibility based on observation of varieties at the college farm, New Brunswick:

Slightly resistant - Ranere, Newman, Cuthbert, Viking, Ohta, Starlight, Columbian, Herbert.

Somewhat resistant - Newman, Twenty Three, Sunbeam, # 167.

Susceptible - Fewthorn, Spineless, Twilight, Smooth Cane.

Very susceptible - King, Latham and Cardinal.

Verticillium albo-atrum Reinke., wilt. New York (1 per cent Chautauqua County); Ohio (1 per cent observed in one field); Washington (Lewis County); Oregon (more than average, 5 per cent loss, serious when black caps are planted on infested land, especially following potatoes).

Fruit rots in general. From Michigan, Nelson reported about a 25 per cent loss from fruit rots caused by various fungi. They were very much more prevalent than usual. Heavy rainfall at harvest combined with over-maturity resulted in the loss of thousands of cases.

Recent literature:

1. Bennett, C. W. Michigan raspberry diseases. Michigan Agr. Exp. Sta. Spec. Bul. 178: 1-52. June 1928.
2. Harris, R. V. Raspberry cane spot and its control. Ann. Rep. East Malling Res. Stat. 1927: 57-63. May 1928.
3. Peterson, P. D., and H. W. Johnson. Powdery mildew of raspberry. Phytopath. 18: 787-796. 1928.

## Blackberry - Orange Rust

B L A C K B E R R YORANGE RUST, *GYMNOCONIA INTERSTITIALIS* (SCHL.) LAGH.

Fourteen States reported this rust on wild and cultivated blackberries. In New Jersey one three-acre field of Mersereau blackberries was discarded on account of severe infection. In Delaware it was plentiful, the Early Harvest variety was especially susceptible. In Mississippi one patch showed 100 per cent infected plants and in central Missouri several plantings were seen where all plants were infected. In Michigan, C. W. Bennett reported that it was more prevalent than for a number of years, plantings of all ages being attacked. Evidence pointed to heavy spread in spring of 1928. As in many plantings only the new shoots were infected. One five-year old Mersereau blackberry planting of 400 plants from which 12 rusted plants were removed last year had 194 plants affected this year. Adjoining this patch was a planting of 200 Eldorado plants of which only 4 were affected and in a planting of seven-year old Cumberland raspberry 417 out of 1,472 plants were affected.

In Arkansas, V. H. Young reported that what appears to be the short cycle form of this rust (*Kunkelia nitens*) was very abundant and severe on some varieties and was the worst disease of blackberry in most localities. In Oregon, S. M. Zeller noted its occurrence in one planting at Salem on the Kittatinny variety and stated:

"Seems to work out from a center in the planting. In past years has done considerable damage but now only at the margins of the area; plants at center of area seem to be recovering."

Recent literature: Pl. Dis. Repr. 12: 31-32.

## OTHER DISEASES

Bacterium tumefaciens EFS., & Town., crown gall. New York, Texas and western Washington.

Fusisporium rubi Wint., double blossom. About 50 per cent of crop lost in one field of Black Diamond, New Jersey. In Mississippi it was said to be general in the southern part of State and very severe in Hinds County.

Plectodiscella veneta (Speg.) Burk., anthracnose. New York, trace; New Jersey, moderately important on Russell; Washington.

Kuehneola uredinis (Lk.) Arth., yellow rust. Noted on variety Russell in New Jersey.

Leptosphaeria coniothyrium (Fckl.) Sacc., cane blight. Two reports in New Jersey, one case being that of heavy loss in small plantation.

## Blackberry - Other Diseases

Phymatotrichum omnivorum (Shear) Dug., Texas root rot. Texas, 2 per cent loss.

Mycosphaerella rubi E. W. Roark, leaf spot. Texas and Kansas.

Mosaic (undet.). New Jersey variety Russell susceptible.

DEWBERRY

Fusicporium rubi Wint., double blossom. Occasional plants affected in New Jersey.

*Note +* Gymnoconia interstitialis (Schl.) Lagh., orange rust. Observed in Ocean and Middlesex Counties, New Jersey.

Mycosphaerella rubi E. W. Roark, leaf spot. New Jersey, Mississippi, Texas.

Phymatotrichum omnivorum (Shear) Dug., root rot. Texas.

Plectodiscella veneta (Speg.) Burk. General in New Jersey. Lucretia variety very susceptible.

Mosaic (undet.). Specimens sent in from Montana.

LOGANBERRY

Bacterium tumefaciens EFS. & Town., crown gall. Western Washington.

Mycosphaerella rubi E. W. Roark, leaf spot. According to S. M. Zeller this leaf spot is of general distribution on all species and varieties of the host but most serious on loganberries and blackberries, not particularly reducing yields of the current season but affecting vigor of the fruiting canes for next season.

Plectodiscella veneta (Speg.) Burk, anthracnose. Western Washington.

Mosaic (undet.). Specimens sent in from Montana.

CURRENT

Botryosphaeria ribis Gross. & Dug., cane blight. In 1928 N. E. Stevens noted cane blight as being practically absent in the Hudson Valley, whereas a

*Note + See ERRATA  
P. 120*

## Currant

few years ago it was common and destructive there. In New Jersey it was reported by the Department of Plant Pathology as severe in old plantations and in West Virginia Archer mentioned it as being the worst disease of currant.

Botrytis sp., leaf blight. Noted at College Farm, New Brunswick, N.J. No injury.

Cercospora angulata Wint., leaf spot. Practically complete defoliation noted by Archer in a number of cases in West Virginia.

Mycosphaerella grossulariae (Fr.) Lindau, leaf spot. Slight injury in lower Hudson Valley, New York, according to W. D. Mills. Only a few cases of premature defoliation noted. Reported also from Indiana.

Pseudopeziza ribis Kleb., anthracnose. The Department of Plant Pathology, New Jersey Experiment Station, reported complete defoliation late in the season but only little apparent injury. Reported also from western Washington.

Sphaerotheca mors-uvae (Schw.) Berk. & Curt., powdery mildew. Specimens sent in from Montana. Bisby and Conner (3) in Canada reported that this fungus was probably introduced into Manitoba about 1924 and has since been injurious to black currants each year. The gooseberry powdery mildew they regard as another physiologic form.

Recent literature: Pl. Dis. Repr. 12: 52-53.

1. Amos, J. and R. G. Hatton. "Reversion" in black currants. II. Its incidence and spread in the field in relation to possible control measures. Jour. Pomol. & Hort. Sci. 6: 282-295. Feb. 1928.
2. \_\_\_\_\_ R. C. Knight, and A. M. Masee, "Reversion" in black currants. Its causes and eradication. Ann. Rep. East Malling Res. Stat. 1927: 43-46. May 1928.
3. Bisby, G. R. and I. L. Conners. Plant diseases new to Manitoba. Sci. Agr. 8: 456-458. Mar. 1928.

GOOSEBERRY

Mycosphaerella grossulariae (Fr.) Lindau, leaf spot. Indiana.

Puccinia grossulariae (Schum.) Lagh., rust. Reported from widely scattered points in Wisconsin indicating that it was more prevalent than usual. (Vaughan)

Pseudopeziza ribis Kleb., anthracnose. New Jersey.

Sphaerotheca mors-uvae (Schw.) Berk. & Curt., powdery mildew. Pierce County, Washington.

Recent literature

1. Nattrass, R. M. The control of American gooseberry mildew: trials with sulphur in the Bristol province. Jour. Min. Agr. Great Britain 35: 161-167. May 1928.
2. Salmon, E. S. A die-back disease of gooseberries. Leaflet. Min. Agr. & Fish. Great Britain 234: 4 p. Dec. 1927.

C R A N B E R R Y

False blossom (virus). H. J. Franklin of the Cranberry Experiment Station, East Wareham, Massachusetts, estimated a reduction in yield of about 7 per cent to Massachusetts growers on account of this disease in 1928 and stated that it is general, more prevalent than usual, and a very important trouble. He pointed out that it is insect borne and that the weather is not a material factor. Flooding and spraying with pyrethrum - soap to kill the insect carriers is being practiced. Susceptible varieties are Howe, Centennial, Bennett's Jumbo and Wales Henry. Varieties that are very resistant are McFarland and Early Black.

Charles S. Beckwith of the New Jersey Cranberry Substation at Pemberton, New Jersey has reported:

"False blossom is more important this year than last, as it has made further progress on New Jersey bogs. Last year, definite information was presented showing that the blunt-nosed leaf hopper could carry this disease. During the year we have checked this information and have found in addition that the other common leaf hoppers do not carry it. For all practical purposes at any rate, the blunt-nosed leaf hopper may be considered the only carrier of false blossom."

Kunkel (1) has demonstrated that aster yellows can not be transmitted to cranberry and that false blossom is therefore another disease.

Exobasidium vaccinii (Fckl.) Wor., red leaf. H. P. Barss of Oregon reported this as much more prevalent than usual it being general along the coast. It was noticed especially in a bog at Bandon, Coos County.

Recent literature

1. Anon. Aster yellows yields to science. Flor. Rev. 62 (1608): 35-36. Sept. 20, 1928. (Work of L. O. Kunkel.)
2. Beckwith, C. S. False blossoms. Proc. Amer. Cranberry Grow. Assoc. 59: 10-11. 1928.

## Cranberry

3. Bain, H. F. Storage losses in cranberries. Ann. Rept. Wisconsin State Cranberry Grow. Assoc. 41: 22-33. 1928.
4. Dobrosky, I. B. Insect studies in relation to cranberry false blossom disease. Proc. Amer. Cranberry Grow. Assoc. 58: 6-7, 10-11. 1928.
5. Franklin, H. J. False blossom. Ann. Rept. Wisconsin State Cranberry Grow. Assoc. 41: 10-17. 1928.

M U L B E R R Y

Bacterium mori (Boyer & Lambert) EFS., blight. Indiana on drooping mulberry used for ornamental planting.

Cercospora sp., leaf spot. Specimens collected near Tifton, Georgia.

Phymatotrichum omnivorum (Shear) Dug., root rot. Prevalent in the black lands of Texas.

Sclerotinia sp., canker and swelling of berries. Texas.

Recent literature

1. Ciferri, R. Dominican Republic: A disease of the mulberry new to the country. Intern. Rev. Agr. S.s. 19: 210. Feb. 1928. (Bacterium mori)
2. \_\_\_\_\_ Dominican Republic: a disease of the mulberry new to the country. Internat. Bul. Plant Protect. 2 (2): 18. 1928.
3. Takimoto, S. A bacterial disease on mulberry and its causal organism. Bul. Kjusu Univ. Sci. Fak. Terkult. 2: 317-323. 1927. (Japanese with English summary.) (Ab. in Japanese Jour of Botany 4(1): 27. 1928.)

D I S E A S E S O F S U B T R O P I C A L F R U I T SC I T R U S

Alternaria citri Pierce, black rot. Texas - common on all fruits; Arizona about 0.1 per cent loss especially on Navel orange.

## Citrus

Bacterium citri (Hesse) Jekle. No new outbreaks were reported to the Survey. The present situation seems to be about the same as recently reported by Kellerman (15).

Colletotrichum gloeosporioides Penz. dieback and wither tip. Florida (wither tip favored by drought and hurricane, dieback disappears with adoption of better cultural practices - DeBusk), Mississippi; Texas (wither tip occasionally severe on young neglected trees - W. J. Bach).

Diplodia natalensis Ev., stem-end rot. Florida (much more than usual, favored by wind injuries of the September hurricane - DeBusk); Texas.

Nematospora sp., on fruit. Reported from Imperial County in California. (H. S. Fawcett)

Penicillium spp., blue-mold rot. General.

Phymatotrichum omnivorum (Shear) Dag., root rot. Texas (on various species and varieties. Severe in nurseries on young trees - W. J. Bach).

Phytophthora terrestris Sierb., foot rot. Florida (local, on sweet orange root. Sour stock almost resistant, lemon stock resistant, grapefruit susceptible and sweet orange very susceptible - DeBusk). Texas (traces, reported as *Phytophthora* sp.?).

Pythiacystis citrophthora S. & S. brown rot. Texas (severe on lemons, 1 per cent loss - W. J. Bach), Arizona (trace loss to orange and grapefruit).

Sclerotinia sclerotiorum (Lib.) Schroet. Texas (common on lemons, .01 per cent loss - W. J. Bach).

Sphaceloma fawcetti Jenkins, scab. Florida (on grapefruit, orange, King orange, Satsuma and tangerine - DeBusk). Mississippi, Texas (occasionally severe in nurseries on sour orange. Occurs on lemon, grapefruit, lime, Temple orange and tangerine. Not severe in groves. - W. J. Bach).

Chlorosis (non par.). Texas.

Dieback (undet.). Florida (disappears with adoption of better cultural practices - DeBusk), Texas.

False canker (undet.). Mississippi.

Frenching (undet.) Florida (more prevalent following drought or frost injury - DeBusk).

Greasy spot (undet.) Texas (traces - Bach).

Fumosis (undet.). Texas (severe in some groves - Bach).

## Citrus

Psorosis, California scaly bark (undet.). Texas (appears to follow injuries to trunk and branches, especially those caused by fruit pickers - Bach).

Recent literature: Pl. Dis. Repr. 12: 145-146.

1. Bach, W. J. and Wolf, F. A. The isolation of the fungus that causes citrus melanose and the pathological anatomy of the host. Journ. Agr. Res. 37: 243-252. Aug. 15, 1928.
2. Barger, W. R. Washing oranges in soda solution arrests decay. Citrus News. 4 (5): 3-4. May 1928.
3. Barger, W. R. Sodium bi-carbonate as citrus fruit disinfectant. Calif. Citrograph, 13 (5): 164, 172-174. 1928.
4. Bahgat, M. The action of *Phomopsis californica* in producing a stem-end decay of citrus fruits. Hilgardia. 3: 153-181. Apr. 1928.
5. Bartholomew, E. T. Internal decline (endoxerosis) of lemons V. Concerning the comparative rates of water conduction in twigs and fruits. Amer. Journ. Bot. 15: 497-508. Oct. 1928.
6. Bartholomew, E. T. Internal decline (endoxerosis) of lemons VI. Gum formation in the lemon fruit and its twig. Amer. Journ. Bot. 15: 548-563. Nov. 1928.
7. Carne, W. M. Crinkle of oranges. Journ. Dept. Agr. West. Australia II, 5: 292-293. Sept. 1928.
8. Cook, S. A. Rind marking of citrus fruits. Finding the cause. Journ. Dept. Agr. Victoria. 26: 549-556. Sept. 1928. Caused by wind and rain storms.
9. Cunningham, H. W. Histology of the lesions produced by *Sphaceloma fawcettii* Jenkins on leaves of citrus. Phytopath. 18: 539-545. June 1928.
10. De Vries, E.  
Een nieuwe ziekte bij djerboek-keprok. (A new disease of oranges.) Indische Culturen (Teysmannia), 13 (5): 226-228, 1928.
11. Doidge, E. M. Citrus scab or verrucosis. Farming South Africa. 3: 1031-1032. Oct. 1928.
12. Fawcett, H. S. *Nematospora* fungus found in citrus, pomegranate, cotton boll. Calif. Citrograph 14: 124. Feb. 1929.
13. Fulton, H. R. Decay in citrus fruit in transit. Proc. Florida State Hort. Soc. 41: 186-192. 1928.

## Citrus

14. Fulton, Harry R. and John J. Bowman. Decay of citrus fruits in transit. (Abst.) *Phytopath.* 19: 89-90. Jan. 1929.
15. Kellerman, K. F. Citrus canker under control and final eradication expected. U. S. Dept. Agr. Yearbook. 1927: 183-184. 1928.
16. Reichert, I. and J. Perlberger. The blast disease of citrus-- a new Citrus disease in Palestine. Reprinted from Palestine Citrograph, 1: 1-11. 1928.

Resembles disease known as blast in California (*Bacterium citriputeale*), and as 'mal secco' in Italy. Bacterial organism isolated.

17. Rhoads, A. S. Water injury to citrus trees in Florida. *Citrus Indust.* 9: 7-11, 31. May 1928.
18. Smith, R. E. and H. E. Thomas. *Phytopath.* 18: 449-454. May 1928.
19. Stevens, H. E. Citrus diseases affecting the production of better fruit. *Proc. Florida State Hort. Soc.* 41: 176-179. 1928.
20. Thomas, E. E. and A. R. C. Haas. Injection method as a means of improving chlorotic orange trees. *Bot. Gaz.* 86: 355-362. Nov. 1928.

AVOCADO

Colletotrichum gloeosporioides, anthracnose. Florida (several reports and specimens have been received recently where anthracnose was causing considerable damage. The organism closely resembles Colletotrichum gloeosporioides if it is not identical. The disease affects the fruit spurs and causes the fruit to drop. Many of the fruit subsequently rot with the same organism. --Erdman West).

Gloeosporium sp., anthracnose. Texas.

Pestalotia sp., blight. Texas (trace).

Recent literature: *Pl. Dis. Repr.* 12: 7-8, 64.

1. Horne, V. T. Note on the experimental inoculation of avocado seedlings with the pear blight organism, *Bacillus amylovorus*. (Burr.) *Trev.* U. S. Dept. Agr. Plant Dis. Rep. 12: 7-8. May 15, 1928. (Avocado not susceptible.)

B A N A N ARecent literature:

1. Ogilvie, L. "Black tip," a finger-tip disease of the Chinese banana in Bermuda. *Phytopath.* 18: 531-532. June 1928. (*Cercospora musarum*)
2. Ward, F. S. Preliminary report on *Fusarium cubense* causing Panama disease in Malaya. *Malayan Agr. Journ.* 16: 76-87. March 1928.

D A T E

Colletotrichum sp., anthracnose. Texas (traces)

Exosporium palmivorum Sacc., leaf spot. Texas (prevalent).

Graphiola phoenicis (Wong.) Poit., false smut. Texas (quite prevalent, unimportant).

Pestalotia sp., blight. Texas (trace, unimportant).

F E I J O A S E L L O W A Y A N A

Botrytis sp., California (occurred on crowded seedlings in greenhouse - W. T. Horne).

F I G

Cercospora sp., (probably Cercospora fici Heald & Wolf), leaf spot. Texas (prevalent, unimportant).

Caconema radicularis (Greof) Cobb, root knot. Texas (prevalent, 1 per cent loss).

Cerotelium fici Heald and Wolf., rust. Florida (always common and destructive; first infection reported first of June - Weber). Texas (traces, very serious in unsprayed orchards).

Colletotrichum elasticae F. Tassi, anthracnose. Mississippi (slight), Texas (trace, reported as Colletotrichum sp.).

Corticium koleroga, thread blight. Louisiana.

## Fig

Diplodia sp. Texas (serious limb canker - Taubenhaus).

Macrophoma fici Alm and Cam., canker. Texas (trace).

Nectria fici, canker. Texas (trace).

Phymatotrichum omnivorum (Shear) Dug., root rot. Texas (prevalent in black lands). Arizona.

Sclerotinia sclerotiorum (Lib.) Schroeter. Texas (serious limb canker).

Premature dropping (non. par.) Texas (very prevalent, 1 per cent loss).

Recent literature

1. Hansen, H. N. Endosepsis and its control in caprifigs. *Phytopath.* 18: 931-938. Nov. 1928.

L O Q U A T

Bacillus amylovorus (Burr.) Trev., fire blight. This was reported for the first time from Arizona by J. G. Brown who found one tree affected at Tucson, September 24, 1928.

Recent literature: *Pl. Dis. Repr.* 12: 127.

1. Nicolas, G. & Mlle. Aggery. Un nouveau parasite d'*Eriobotrya japonica* Lincl. *Rev. Path. Vég. et Entom. Agr.* 15: 102-105. Apr./May 1928. (*Phyllosticta fusiformis*, nov. sp.)

M A N G O

Colletotrichum sp., anthracnose. Florida (many mangoes in southern Florida are spotted by anthracnose and are rotting soon after picking. The fungus resembles Colletotrichum gloeosporioides or is identical with it. -- Erdman West).

Recent literature: *Pl. Dis. Repr.* 12: 92.

1. Clara, F. M. Control measures for the anthracnose disease of the mango. *Philipp. Agr. Rev.* 21: 81. 1928.

PINEAPPLERecent literature

1. Godfrey, G. H. Preliminary report on chemical treatments for nematode control. *Pineapple News*. 2: 55-60. Apr. 1928.
2. Godfrey, G. H. Legumes as rotation and trap crops for nematode control in pineapple fields. *Bull. Exp. Stat. Assoc. Hawaiian Pineapple Canners*. 10: 1-21. Mar. 1928.
3. Godfrey, G. H. A nematode root lesion of pineapple and other crops. (Abst.) *Phytopath.* 19: 94. January 1929.
4. Godfrey, G. H. Root-knot, an isolated "Center of infection." *Pineapple News*. 2: 8-9. 1928.
5. Illingworth, J. F. Further notes on the biological cause of wilt. *Pineapple News* 2: 23. Feb. 1928.
6. Johnson, M. O. Control of chlorosis of the pineapple and other plants. *Industr. & Engin. Chem.* 20: 720-722. July 1928.
7. Morita, H. T. Some nematode problems in the pineapple industry. *Journ. Pan-Pacific Res. Inst.* 3(4): 14-16. 1928.
8. Serrano, F. B. Bacterial fruitlet brown-rot of pineapple in the Philippines.--*Philipp. Journ. of Sci.*, 14: 271-305, 1928.
9. Sideris, C. P. In causes of crop failure and methods of attacking the problems involved. *Proc. Pineapple Men's Conf.* Apr. 2-3, 1928.
10. Sideris, C. P. Fungus parasites of pineapple roots. *Pineapple News*. 2: 61-63. Apr. 1928.
11. Tryon, H. Pineapple disease investigations. Interim report. *Queensland Agr. Jour.* 30: 23-34. July 1928.
12. Waldron, G. C. Relation of pH of pineapple fruit and susceptibility to disease. *Pineapple News*. 2: 6-7. Jan. 1928.
13. Waldron, G. C. Imperfections of pineapple fruit. *Proc. Pineapple Men's Conf.* 7: 20-23. 1928.

POMEGRANATE

Gloeosporium sp., fruit rot. Florida (a fruit rot attacking the blossom end has been rather prevalent this year. The causal organism is similar to Gloeosporium rufomaculans).

## Pomegranate

Nematospora sp., on fruit. Reported from Imperial County, California (H. S. Fawcett).

Mycosphaerella lythracearum Wolf. (Cercospora lythracearum Heald and Wolf.) blotch. Florida (about as prevalent as usual - Erdman West), Texas.

Recent literature: Pl. Dis. Repr. 12: 145-146.

D I S E A S E S O F N U T SP E C A N

## SCAB, CLADOSPORIUM EFFUSUM (WINT.) DEMAREE

Demaree (2) has recently demonstrated that this fungus is more properly classified as a Cladosporium than as a Fusicladium.

The disease was reported from a majority of southern states where pecans are grown. A report on prevalence in Georgia has already been given by O. C. Boyd. He estimated the loss in Georgia at 10 per cent reduction in yield and 4 per cent loss in grade and stated that it was difficult to control the disease in commercial orchards with either dust or spray because heavy rains prevented an early start of applications and also washed off the copper. In North Carolina, Fant mentioned it as important on seedling pecans. In Florida, Weber stated that it was very prevalent on all susceptible varieties. In Mississippi and Louisiana it was said to be more prevalent than usual. The susceptibility of varieties was reported as follows: by O. C. Boyd from Georgia and R. E. Nolan from Florida.

Varieties very susceptible - Delmas in Georgia and Florida; Schley, Alley, and Bolton in Florida; and Georgia in Georgia.

Varieties susceptible - Van Deman in Georgia and Florida; Schley, Alley, and Pabst in Georgia; Curtis, and Moore in Florida.

Varieties resistant - Stuart, Success, Moneymaker in Georgia and Florida; Frotscher, Nelson, Teche, and Moore in Georgia.

Varieties very resistant - Curtis in Georgia and Frotscher and Teche in Florida.

Recent literature: Pl. Dis. Repr. 12: 93, 136.

1. Boyd, O. C. Progress report on the experiments in the control of pecan scab and leaf case-bearer, and on the occurrence of an undescribed leaf spot of pecans. Proc. Nat. Pecan Grow. Assoc. 26: 30-46. 1927.

## Pecan - Scab

2. Demaree, J. B. Morphology and taxonomy of the pecan-scab fungus, *Cladosporium effusum* (Wint.) comb. nov. Jour. Agr. Res. 37: 181-187. Aug. 1928.
3. Demaree, J. B. and J. R. Cole. Some new ideas regarding pecan scab. Proc. Nat. Pecan Grow. Assoc. 26: 22-30. 1927.
4. Gladney, H., R. P. Colmer, J. P. Kislanko, and G. E. Miles. Controlling pecan scab and other pests. Quart. Bul. Mississippi State Plant Bd. 8(3): 1-7. Oct. 1928.

## OTHER DISEASES

Bacterium tumefaciens EFS. & Town., crown gall. Mississippi and Texas.

Cercospora fusca (Heald & Wolf) Rand, brown leaf spot. More than usual noted in Florida on varieties Stuart, Curtis and Success according to Nolan. In Georgia, Boyd reported it as prominent on impoverished and rosetted trees, but of little importance on healthy, vigorous trees. Also reported from Mississippi and Texas.

Cylindrosporium caryigenum Ell. & Ev., leaf spot. According to O. C. Boyd this disease was less prevalent than in either 1926 or 1927 in Georgia in spite of the fact that the spring and summer months were wetter than in 1927. He listed the following varieties in order of susceptibility:

Very susceptible - Delmas.

Susceptible - Moneymaker, Frotscher and Stuart.

Resistant - Mobile, Van Deman, Schley and Alley.

Very resistant - Moore, Success, Pabst, Teche, Curtis.

Microsphaera alni (Wallr.) Wint., powdery mildew. Florida, Louisiana, Mississippi and Texas. In the latter State where it was very prevalent it was said to cause premature setting of fruit. In the other States not much damage was indicated.

Microstroma juglandis (Bereng.) Sacc., leaf spot. Specimen received from Mississippi.

Mycosphaerella convexula (Schw.) Rand, leaf blotch. In Georgia leaf blotch developed during the latter half of the growing season according to Boyd. It was more destructive in nurseries where a considerable premature defoliation may occur. The regular dust or spray schedule for scab usually controls.

Phyllosticta caryae Pk., nursery blight or leaf spot. Florida, Mississippi and Texas. In Florida, Nolan stated that all budded or grafted trees were free from the disease but nursery seedlings were very susceptible.

## Pecan - Other Diseases

Phymatotrichum omnivorum Shear & Dug., root rot. Texas.

Septobasidium pseudopedicellatum, limb blight. Specimen received from Mississippi.

Black pit, insect punctures, etc. Georgia, Florida and Mississippi.

Mouse ear. Weber in Florida stated that it was plentiful but widely distributed especially in towns and cities and in poorly kept groves.

Kernel spot, southern stink bug. Noted especially in thinner shelled varieties in Georgia, Florida, and Texas.

Rosette (undet.) North Carolina, Georgia, (more prevalent than usual especially on summer growth, estimated loss 12 per cent. All cultivated varieties apparently susceptible - Boyd), Florida (more plentiful than last year, widely distributed - Weber), Mississippi, Louisiana, and Texas.

Shedding and cracking of nuts. Prevalent this season throughout the Gulf Coast area. See report of J. B. Demaree (Pl. Dis. Repr. 12: 127-128, Oct. 15, 1928). Other collaborators in the pecan States mentioned unusual trouble of this kind.

Recent literature: Pl. Dis. Repr. 12: 10, 127-128, 136, 150.

1. Boyd, O. C. A new leaf spot of pecan. Georgia State Bd. Entom. Circ. 40: 1-8. Feb. 1928. (Yellow leaf spot, fungus undet.)
2. \_\_\_\_\_ Progress report on the experiments in the control of pecan scab and leaf case-bearer, and on the occurrence of an undescribed leaf spot of pecans. Proc. Nat. Pecan. Grow. Assoc. 26: 30-46. 1927.

## W A L N U T

Bacterium juglandis (Pierce) EFS., bacterial blight. New York, Oregon and Washington reported this trouble on English walnut. In Oregon the disease was much less serious than during recent years especially the last two. S. M. Zeller estimates the loss from 10 to 15 per cent in that State, the highest actual count being 61 per cent infected walnuts in an orchard in September.

Gnomonia leptostyla (Fr.) Ces. & DeNot., anthracnose. New York and Delaware.

Microstroma juglandis (Bereng.) Sacc., leafspot. Specimen received from Mississippi.

Nectria sp., twig canker. Reported from Monroe County, New York, on English walnut.

W A L N U T

Phymatotrichum omnivorum (Shear) Dug., root rot. Texas.

Rosette (undet.). Mississippi.

Recent literature: Pl. Dis. Repr. 12: 81, 92, 113, 137.

1. Haas, A. R. C., L. D. Batchelor, and E. E. Thomas. Yellows or little leaf of walnut trees. Bot. Gaz. 86: 172-192. Oct. 1928.

A L M O N D

Bacterium tumefaciens EFS. and Town., crown gall. Moderately important in Arizona where a loss of about 4 per cent was indicated.

Exoascus deformans (Berk.) Eckl., leaf curl. Thurston County, Washington.

Coryneum beijerinckii Oud., blight. General in central part of California. Worse than 1927. Loss for State 2 per cent. (Milbrath)

F I L B E R T

Bacterium sp., blight. Reported only from Oregon where it was much less prevalent than usual for some reason according to Barss.

Cryptosporrella anomala (Pk.) Sacc., blight. Reported from New Hampshire on the wild hazel nut and specimens sent in from Illinois where the disease was found in a large filbert plantation. This disease has been reported previously from the northeastern section of the United States and from Wisconsin. The Illinois occurrence is a new one as far as Survey records are concerned.

Nut blight (undet.). A blighting of the nuts possibly of insect origin, but the exact cause of which is unknown, was reported from Oregon by H. P. Barss. It has existed in negligible amounts ever since filberts have been grown in Oregon but this year the damage is widespread in the western part of the State; In a few groves 75 per cent loss occurred, in many others 50 per cent loss, while in others damage was slight.

Recent literature: Pl. Dis. Repr. 12: 16, 68, 92.

C O C O N U T

Recent literature

1. Seal, James L. Coconut bud rot in Florida. Florida Agr. Exp. Sta. Techn. Bul. 199: pp. 87. Sept. 1928.

## Coconut

Found in vicinity of Miami in January 1924; since then has been found in an area 140 miles along the southeastern coast of Florida. Believes *Phytophthora* spp. described as causing coconut bud rot are only physiologic strains within a species. Agrees with Leonian in placing all these strains in the group species *P. omnivora* De Bary.