

A SURVEY OF THE PLANT DISEASES OF ECONOMIC IMPORTANCE
IN SEMINOLE COUNTY

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IN SEMINOLE COUNTY

By

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INTRODUCTION

This survey was conducted during the years of 1938, 1939, and 1940, in an attempt to determine the plant diseases of economic importance in Seminole County. However, the growing of plants is now of minor importance since this county is the center of one of the largest oil fields in the state of Oklahoma.

Notwithstanding, many diseases of importance to the plant growers were found. An attempt was made to determine the comparative losses from diseases among the years, the weather relations having an influence upon them, and the varieties susceptible to attack. Where serious infestation was found, control measures have been suggested, and which, if followed, may, to some degree, help prevent future losses.

It is recognized that several diseases have probably escaped my attention, but this list will serve as the framework for future studies in the county, and possibly the state, since a few new host records for Oklahoma have been recorded. All diseases listed herein are from my own collections and identifications. Full responsibility is accepted by me for any errors, although repeated attempts have been made to eliminate them by frequent checking.

To Dr. K. Starr Chester, head of the Botany and Plant Pathology Department, who suggested this survey and gave

me invaluable aid, go my sincere thanks and appreciation. I wish to express my gratitude to Gertrude Tennyson for her assistance in identification of some of the diseases; to Chas. C. Brown, whose "Host Index for Oklahoma" was followed for nomenclature, and to all others, including the plant growers of Seminole County, who have contributed to this work.

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INDEX

Alfalfa	16	Oats2, 3
Apple14,15	Okra10
Barley10,11	Onion1
Bean17,18	Pea, Garden18
Beet	4	Pea, sweet . . . . .	.12
Bermuda grass	7	Peach . . . . .	.1, 2
Blackberry . . . . .	.20,21	Peanut . . . . .	.2
Bluestem grass	2	Pear . . . . .	.19
Cabbage	4, 5	Persimmon . . . . .	.8
Canteloupe	6	Pigweed . . . . .	.1
Cedar	12	Plum . . . . .	.19
Cherry . . . . .	.18,19	Potato, Irish . . . . .	.21,22,23
Clover . . . . .	.16,17	Potato, Sweet . . . . .	.11,12
Corn . . . . .	.27,28	Rose . . . . .	.20
Cotton	9	Snow-on-the-	
Cowpea . . . . .	.26,27	mountain . . . . .	.8
Cucumber	6, 7	Sorghum . . . . .	.23,24
Dewberry	21	Spinach . . . . .	.24
Dock	21	Strawberry . . . . .	.8, 9
Elm	26	Sudan grass . . . . .	.24
Grape	27	Tomato . . . . .	.12,13,14
Iris	12	Turnip . . . . .	.5
Johnson Grass	23	Virginia Creeper . . . . .	.19
Lettuce	12	Watermelon . . . . .	.5,6
Lilac	24	Wheat . . . . .	.24,25
Mustard	4	Youngberry . . . . .	.21
Oak	20		

LIST OF DISEASESALLIUM

A. cepa

COMMON ONION

Erwinia carotovora (Jones) S.A.B. Soft-rot
Common on market onions throughout county. Estimated loss of 1%, which may be lowered by careful handling and proper storage conditions, as low humidity and free circulation of air. The bacteria enter only through wounds.

Fusarium malli Taub. Pink-rot
Only a trace of infection on Bermuda onions was found in one garden west of Seminole in 1940. During cool weather and on rich soil this disease, which remains in the soil, will seldom become dangerous.

Macrosporium parasiticum Thumen. Black stalk-rot
Of slight importance on Bermuda onion leaves injured during cultivation. Growth aided by wet weather during late spring of 1940. No control measures as yet necessary. A new host record for Oklahoma.

Urocystis cepulae Frost Smut
A trace of infection was found on Bermuda onions during 1938, 1939 and 1940. No trouble was encountered where green sets were employed.

AMARANTHUS

A. retroflexus

PIGWEEED, GREEN AMARANTH

Albugo bliti (Biv.) Kze. White rust
Found locally in the northwest corner of county early in 1940. On this host it is important in so far as it might serve to infect valuable crucifers.

AMYGDALUS

A. persica

PEACH

Phytopomonas pruni S.A.B. Bacterial blight of stone fruits
Most common peach disease found in the county, principally on the Elberta variety. Estimated loss of 5% with 100% infection in some

orchards. A cool spring, as 1940, inhibits spread. Proper pruning, cultivation, and fertilization affords the best control.

Cladosporium carpophilum Thm.

Scab

Causes an estimated loss of 2% with 60% infection in some orchards. The Elberta variety seems more resistant to this disease than to *P. pruni*. Market value of the dwarfed fruit is lowered due to the skin spots. Abundance of moisture in the early spring of 1940 gave rise to more infection than in 1938 and 1939. Control may be obtained by spraying with self-boiled lime sulphur.

Sclerotinia fructicola (Wint.) Rehm

Brown rot

Very common, producing 4% loss. More loss during the warm wet springs of 1938 and 1939. Often the fruit decayed rapidly during transportation, the fungus entering through wounds. May be controlled to a great extent by following a spray program with self-boiled lime-sulphur.

ANDROPOGON

A. scoparius

LITTLE BLUE STEM

Puccinia Andropogonis Schw.

Rust

A trace of this disease was found scattered throughout county. No. control measures necessary as yet.

ARACHIS

A. hypogaea

PEANUT

Botrytis sp.

Stem-rot

Found in one field south of Wolf. This host seems to be singularly free of destructive disease. Not listed in Oklahoma host index.

AVENA

A. sativa

COMMON OATS

Phytophthora coronafaciens (Ell.) S.A.B.

Halo leaf blight

A trace found along the North Canadian river valley. The disease is of slight importance on the Texas Red variety. Rains at the time the sheaths were opening

in 1940 aided infection. Control may be obtained by treating seed with formaldehyde.

Gibberella saubinetii (Mont.) Sacc. Scab
Rarely found and causes little damage. Attack in 1938 came too late for serious trouble. Only plump kernels should be selected for planting and seed should be treated with "New Improved Ceresan."

Puccinia coronata Cda. Rust
A leaf disease causing an estimated loss of 5% during epidemic year of 1938. Less serious the two following years. Texas Red oats are very susceptible. The best control lies in using resistant varieties such as Red Rustproof, Victoria and Burt.

P. graminis avenae Erikss. & Henn. Stem rust
Each year a moderate infection was observed but no serious loss. Infection comes from spore laden winds from southern areas, usually too late for much damage to early maturing varieties. Resistant varieties may be planted instead of Texas Red.

Ustilago avenae (Pers.) Jen. Loose smut
Found in every field and is the most serious pathogene of this major crop. 10% loss in 1938 and 5% in 1939 and 1940. May be controlled by treating seed with a disinfectant, as formaldehyde or an organic mercury dust.

U. levis (Kell. & Sw.) Mann. Covered smut
Not as prevalent as loose smut, but caused a moderate loss of 3% each year. Infection not uniform in all fields, although all are of Texas Red variety. For control seed should be treated with a disinfectant before planting and resistant varieties should be used. It is not always possible to distinguish these two smuts, as they hybridize, producing intermediate forms.

BETA

B. vulgaris

BEET

Cercospora beticola Sacc.

Leaf-spot

Generally found in all gardens, especially during the spring of 1940, due to high humidity. Warm springs of 1938 and 1939 also produced infection estimated at 1% loss. Plants were never killed outright. No highly resistant varieties were seen. For control practice field sanitation and dip seed in formaldehyde. Bordeaux spray will hold spots in check when they first appear.

Phoma betae (Oud.) Frank

Leaf-spot

Often confused with the above leaf spot because of similar appearance. Trace of infection found locally, causing little damage. A new host record for Oklahoma.

Heterodera marioni (Cornu) Goodey

Root-knot

Observed locally, west of Wewoka, late in the 1940 season for beets in light sandy soil. 75% of the plot was rendered unfit for use. The Detroit Dark Red variety was attacked. Best control lies in rotating crops with non-susceptible hosts and keeping down the weeds.

BRASSICA

B. juncea

MUSTARD

Albugo candida (Pers.) Ktz.

White rust

Of slight economic importance except where radish seed is grown. The wet season of 1940 produced heavy infection. Usually no control measures are necessary.

B. Oleracea

CABBAGE

Phytophthora campestris (Pam.) S.A.B.

Black-rot

Prevalent more in 1940 due partly to heavy spattering rains, causing a 1% loss. Jersey Wakefield and Early Dwarf Flat Dutch varieties were attacked. For control use resistant varieties and healthy stock.

Phytophthora carotovora (Jones) S.A.B. Soft-rot
 The soft, mushy, slimy decay of the entire plant was seen in scattered gardens, with a 20% infection of Jersey Wakefield in one field west of Seminole near the county line. Bacteria enter through wounds. No direct control measures are known.

Fusarium conglutinans Woll. Yellows
 Most common disease, generally observed. Average loss of 3%. Infection increased by a warm spring, as 1938 or 1939 where temperature early reaches optimum of 70°F. No very resistant varieties seen although their use offers best control.

Phoma lingam (Tode.) Desm. Black-leg
 Locally found with slight damage. Disease aided in 1940 by moist periods and spattering rains. Treat seed with mercuric chloride, practice field sanitation and a three year crop rotation for control.

B. rapa TURNIP

Erysiphe polygoni DC. Powdery mildew
 20% infection in one garden on white Globe with slight loss resulting. Leading cause was the high relative humidity of 1940. If necessary, dust with sulphur for control. A new host record for Oklahoma.

Colletotrichum brassicae Schultz & Sacc. Leaf-spot
 Trace of infection found on Purple Top from one garden in 1939. No control measures as yet necessary. Not listed in Oklahoma host index.

CITRULLUS

C. vulgaris WATERMELON

Erwinia tracheiphila (E.F.S.) S.A.B. Bacterial wilt
 Various fields of Tom Watson and Kleckley showed as much as 25% infection, but loss as a whole was slight over a period of 3 years. Insects are chief means of dissemination,

and may be controlled by dusting with calcium arsenate and nicotine sulphate. In addition, plants should be sprayed with Bordeaux mixture.

Colletotrichum lagenarium (Pass.)

Anthracnose

This host is most severely attacked of all cucurbits. Symptoms were observed on leaves and fruit in scattered instances causing a loss of 1%. Satisfactory control may be had by a two-year rotation of crops, dipping seed in corrosive sublimate, and spraying with Bordeaux.

Macrosporium cucumerinum Ell. & Ev.

Leaf-blight

Not previously listed for Oklahoma, but for the past three years more generally observed than any other disease on this host. Humid, warm weather aids infection. Estimated loss was 2% with practically every field sharing in it. Spraying or dusting as for *Erwinia tracheiphila* will afford control.

CUCUMIS

C. melo

CANTELOUPE, MUSKMELON

Erwinia tracheiphila (E.F.S.) S.A.B.
Generally found, with estimated loss of 2% in the Rocky Ford variety. Control measures are the same as on *Citrullus vulgaris*.

Bacterial wilt

C. sativum

CUCUMBER

Erwinia tracheiphila (E.F.S.) S.A.B.
Scattered gardens showed traces of infection. Not influenced directly by temperature or rainfall. Control is the same as that for watermelon.

Wilt

Phytophthora lachrymans (E.F.S.) S.A.B.
Caused an estimated loss of 1% for 1939. Moisture relationship helped hold it in check due to infrequent rains. This disease fails to attack other common cucurbits. Dipping seed in corrosive sublimate, rotation

Angular leaf-spot

of crops and spraying or dusting as for *Erwinia tracheiphila* will keep pathogene under control.

Macrosporium cucumerinum Ell. & Ev. Leaf-blight
Generally observed, defoliating the vines and thereby diminishing the yield and prematurely ripening fruit. Causes heaviest loss, estimated at 3%, with as many as 70% of the vines affected in one garden. 1940 temperature was unfavorable, thereby aiding control. If plants are sprayed or dusted for *Erwinia tracheiphila* this disease will not become serious.

Heterodera marioni (Cornu) Goodey Root-knot
20% infection in the only large commercial field in the county west of Sasakwa, during 1940. Usually found where there was an abundance of moisture. During 1939 this plot was in corn, which is highly resistant to the nematode. Diseased areas were small but scattered throughout the field. Control lies in rotation with non-susceptible hosts, as cereals.

CYNODON

C. dactylon

BERMUDA GRASS

Colletotrichum sp. Anthracnose
Only a trace of infection causing no serious damage. Control, as yet, unnecessary.

Helminthosporium sp. Leaf-spot
Caused scattered areas of grass to appear as if dead, and lowered nutrient value of pasture.

Ustilago cynodontis Henn. Loose smut
Rarely seen, and then covered a very small area. Prevalent more in 1940 than 1938 and 1939, but not serious enough to warrant control measures.

DIOSPYROS*D. virginiana*

COMMON PERSIMMON

Bacteria? or possibly physiological

Leaf-spot

Most infection during fall of 1938. Almost 100% throughout county, but caused little loss of fruit. Generally observed but not so serious in 1939.

EUPHORBIA*E. marginata*

SNOW-ON-THE-MOUNTAIN

Uromyces proeminens myristica B. & C. Rust

Found locally in the northwest corner of the county. Unless this host serves as an alternate rust host for some rust attacking an economic plant, it is of slight importance.

FRAGARIA*F. spp.*

STRAWBERRY

Botrytis sp.

Gray mold-rot

Slight damage caused on market berries in connection with *Rhizopus nigricans*. Wet Weather favored infection in the only large commercial plot in the county, located west of Sasakwa.

Mollisia earliana (Ell. & Ev.) Sacc. Scorch

40% of Klondike variety showed symptoms in 1939 and 1940 in a single large plot. The Blakemore variety showed marked resistance. The "spot" stage of the disease was more noticeable in 1939, often confused with the following leaf spot, while the dry, purplish margins readily showed in 1940. Bordeaux spray will give satisfactory control.

Mycosphaerella fragariae (Tul.) Lindau Leaf-spot

More serious than the preceding disease and loss estimated at 3% for 1939 and 1940. Found wherever strawberries were grown in the county. Injury resulted from weakening of the plant due to a reduction in needed leaf surface. The Klondike variety was most susceptible. Control may be had by spraying with Bordeaux mixture.

Rhizopus nigricans Ehrenb. ex. Fr.
Found as a market rot associated
with *Botrytis* sp. Became important
in 1940, more so than in 1939, due
to continued wet weather.

Soft, watery-
rot

GOSSYPIUM

G. hirsutum

COTTON

Phytopomonas malvaceara (E.F.S.) S.A.B.
The most commonly found cotton
disease on all varieties. Some
fields had as much as 75% infec-
tion, and the disease caused an
average loss of 7% over a period
of three years. It made its appear-
ance very early in spring, where, in
connection with *Corticium vagum* in
one field it caused such a poor
stand that replanting was necessary.
The best control lies in treating
seed with an organic-mercury dust
disinfectant or delinting the seed
with sulphuric acid.

Angular leaf-
spot, bacter-
ial blight

Corticium vagum B. & C.
Severe in only two fields in
1940 where much water had been
in contact with the seedlings.
No trace in 1938 and 1939. The
fungus undoubtedly is present in
most soils but attacks only under
favorable conditions which are
correspondingly unfavorable for
the host (cold, moist, weather).
No satisfactory control measures
are known. It is best to fertil-
ize plants liberally so as to
give them a vigorous start.

Sore-shin,
stem-rot

Fusarium vasinfectum Atk.
A mild infestation was found late
in the season on Mebane cotton in
one field east of Maud. The fungus
remains several years in the soil.
There was no root knot in this
field, so wilt resistant varieties
should be grown with ample fertili-
zation to produce vigorous plants.

Wilt

HIBISCUSH. esculentus OKRA

Phyllosticta hibiscina (Ell. & Ev.) Leaf-spot
 Caused slight damage on the Mammoth
 Long Pod variety in one garden. As
 yet, control measures are unnecessary.
 New host record for Oklahoma.

HORDEUMH. vulgare BARLEY

Colletotrichum graminicolum (Ces.)
 Wils. Anthraenose

Of minor importance on Missouri
 Beardless barley in the North
 Canadian valley. Only plump seeds
 should be used and those treated
 with formaldehyde or organic mercury
 dust.

Helminthosporium sativum Pam. Spot-blotch
 Quite frequently found but damage
 was negligible. May be controlled
 by treating seed with organic-mercu-
 ry dust, using hot water, formalde-
 hyde, and resistant varieties.

Puccinia graminis Pers. Stem-rust
 More common in 1938 than in follow-
 ing years. Late in the 1940 season,
 after heads were mature, infection
 sometimes reached 80%, but too late
 for damage. Plant early maturing,
 resistant varieties for control.

Ustilago hordei (Pers.) Kell. & Sev. Covered smut
 Not over 10% infection in any
 single field, but all are uniform
 in showing as much as 4% average
 loss in Missouri Beardless barley
 due to this most serious disease.
 During three years the average loss
 was about the same. Formaldehyde
 seed treatment or dusting with
 organic mercury dust will hold it
 in check.

U. nuda (Jons.) Kell. & Sev. Loose smut
 Not as easily seen as *U. hordei*,
 and therefore the damage is often
 overlooked. Not as serious as the
 former, but the estimated loss was
 1% for each of the three years.

Treat seed with organic mercury dust or hot-water for control.

IPOMOEA

I. batatas

SWEET POTATO

- Erwinia carotovora (E.F.S.) S.A.B. Soft-rot
Primarily a storage disease entering through wounds. Frequently seen and causing an estimated damage of 2%. Careful handling, proper temperature and air circulation during storage, with prompt removal of diseased material will aid control.
- Ceratostomella fimbriatum (E & H.) Sacc. Black-rot
Frequently found during 1938 and 1939 with destructive effect in one field of Porto Ricos northeast of Maud in 1939. Easily seen as dark spots of various sizes. These potatoes should be destroyed. The best control comes from careful preparation of seed-bed, selection of healthy seed potatoes and crop rotation. Estimated loss of 2%, mostly during storage.
- Fusarium hyperoxysporum (Woll.) Stem-rot or wilt
A field disease found southeast of Konawa on Porto Rico where entire plants were killed in 1938. Loss estimated at 2% for county. Control is primarily the same as for Ceratostomella fimbriatum. Some varieties are resistant, notably, Big Stem Jersey.
- Rhizopus nigricans Ehr. Ring-rot, soft-rot
There is more storage loss from this fungus than from any other, averaging 5%, with some bins showing 20% infection. Rough handling during the wet harvest season of 1939 was partially to blame for outbreak. Spores are produced only through wounds. No resistant varieties were found. Careful handling, removal of diseased potatoes, and proper storage conditions will help control the fungus.

Sclerotium rolfsii Sacc.

Found locally in a seed bed of Porto Rico during the spring of 1940 with 50% infection. Taubenhau suggests control by careful, frequent inspection of the seed bed, pulling up and destroying diseased slips and saturating the ground with a 1:7 solution of copper sulphate.

Southern
blight

IRIS

I. sp.

IRIS

Didymellina Iridis (Deam.) V. Hohnel

Prevalent in one garden in the northwest corner of county in 1940. No control is as yet necessary even though 100% infection was seen here.

Leaf-spot

JUNIPERUS

J. sp.

JUNIPER, CEDAR

Alternaria sp.

One evergreen shrub near Sasakwa, attacked, probably as a secondary infection after physiological trouble.

Leaf-spot

LACTUCA

L. sativa

LETTUCE

Alternaria sp.

50% infection in one garden of Early Curled Simpson. The crop was almost mature, so slight damage resulted. Control is unnecessary so far. New host record for Oklahoma.

Leaf-spot

LATHYRUS

L. odoratus

SWEET PEA

Phytophthora lathyri Manns. & Taub.

Locally found with 25% infection. Control by soaking seed for ten minutes in weak lysol or formalin.

Streak

LYCOPERSICON

L. esculentum

TOMATO

Phytophthora exitiosa (Gard. & Kend.)
S.A.B.

Trace of infection aided by warm,

Bacterial
spot

wet weather in late spring. Slight damage in the Marglobe and Earliana varieties. Control by treating seed with mercuric chloride.

Phytophthora michiganense (E.F.S.)
S.A.B.

Bacterial
canker

Loss of 1%, mostly on the Earliana variety. Commonly found, with as much as 35% infection in one garden. No control measures evolved other than sanitation and rotation of crops.

Phytophthora solanacearum (E.F.S.)
S.A.B.

Bacterial
wilt

Generally found, but not any more so than the preceding bacterial diseases. Prevalent in plants in coarse sand or gravel during wet, cool weather as in the spring of 1940. The Sensation and Garden King varieties were susceptible. To control rotate crops with cereals and keep down weeds. Use northern grown seed if possible.

Colletotrichum phomoides (Sacc.)
Chester

Anthracnose

A new host record for Oklahoma. Excessive moisture, more so than in the preceding two years, favored this disease by causing growth cracks. The appearance was similar to the disease due to *Phoma destructiva*. Any measures to help reduce too rapid growth of the fruit will aid control.

Fusarium lycopersici Sacc.

Wilt

Not as common in the county as generally reported over the state. Average loss was 1%. Found in one field west of Wewoka in 1940 that had never before been in cultivation. Develops late because the optimum temperature of 85°F. is not here reached early. The Beefsteak variety was very susceptible. The best control lies in using resistant varieties. Isolated seed-beds on clean soil and long crop rotations will help eliminate the causal organism.

Macrosporium tomato Cke. Nailhead-spot
 Locally found in Konawa on the Garden King variety. Slight damage, which may be controlled by field sanitation and Bordeaux spray.

Heterodera marioni (Cornu) Goodey Root-knot
 Locally found southwest of Seminole in 1940 in a light, sandy plot that frequently had excessive moisture. Rotate crops with non-susceptible hosts and keep down weeds to control the disease.

Abnormal water supply Blossom-end rot
 General, with 4% loss. Some relief is afforded by wide spacing and frequent cultivation.

MALUS

M. sylvestris APPLE

Erwinia amylovora (Burr.) S.A.B. Fire-blight
 Found in two orchards in 1939 and in three in 1940. The original infection came from diseased pears close by. The trees have not been completely killed. Red Delicious and Winesap varieties are very susceptible. Prompt, severe pruning and a weak spray of Bordeaux mixture (2-2-50) at blossoming time offers best control.

Phytoplasma tumefaciens (E.F.S. & Town.) Crown-gall
 Found frequently on poorly grafted, transplanted nursery stock. Hairy root form was more common than gall form. Estimated loss was 3%. Control may be helped by careful handling of nursery stock to avoid injury, by wrapping union of root and scion, deep planting to protect from frost, removal of diseased trees and rejection of diseased nursery stock.

Cytospora leucostoma Sacc. Die-back, canker
 Locally observed, southwest of Konawa, as a secondary infection on twigs and causing little direct damage.

- Myxosporium corticolum Edg. Surface bark
Commonly found but damage is canker
slight. No control necessary.
- Pestalozzia sp. Stem-spot
First report for Oklahoma. Local
infection southwest of Seminole on
first year trees. Slight damage,
with no control necessary.
- Phyllosticta solitaria Ell. & Ev. Blotch
This host is only of minor impor-
tance in Seminole County, and this
is its more serious disease. No
group of trees was found where all
were free of the fungus. Jonathan
showed more varietal resistance
than did Ben Davis or Winesap.
Most noticeable on fruit which
causes a lower market value. A
large percentage of affected fruit
dropped prematurely. Loss did not
exceed a 6% average for three years.
Control by Bordeaux spray and cut-
ting out infected twigs.
- Physalospora malorum (Pk.) Shear Black-rot;
Locally found southwest of Konawa frog eye
on twigs, leaves, and fruit, pro-
ducing a loss of 2%. Often con-
fused, during early stage on
fruit, with brown-rot. Lowers
yield from tree and market value
of fruit. Ben Davis was most
susceptible. This disease, too,
may be controlled by Bordeaux
spray.
- Venturia inequalis (Cke.) Aderb. Scab
Only a trace found, and undoubtedly
not as serious as other diseases on
this host. Ben Davis showed slight
degree of resistance. Control is
certain by the use of a spray pro-
gram. Destruction of fallen leaves
in fall will lessen the primary in-
fection. Spraying the ground around the
trees in the spring will reduce prim-
ary infection.

MEDICAGO

M. sativa

ALFALFA

- Phytophthora insidiosa (McC.) S.A.B. Wilt
Commonly found causing a dwarfing of plants in small areas in fields. Gradual increase since 1938 with an average loss of 3%. Do not cut or move equipment from one field to another while wet. Substitute the more resistant varieties such as Ladak and Hardistan.
- Phytophthora medicaginis (Sack.) S.A.B. Bacterial stem blight
Disease was scattered throughout county. Most noticeable after several heavy frosts and in first cutting only. Best control is to clip frosted alfalfa as soon as danger is past. However, present loss does not warrant rigid control measures.
- Gloeosporium medicaginis Ell. & Kell. Anthracnose
Commonly found causing a leaf spot and partially defoliating lower stem. Loss is slight and warrants no control.
- Uromyces striatus Schroet. Rust
Several fields showed 100% infection during 1939 while others had only a trace. Loss is slight except during wet weather when a 1% loss was estimated. A conspicuous disease but not as yet important enough for control.
- Virus Alfalfa mosaic
Occasionally seen in a mild form during 1939 but not serious enough for more than slight damage. Heaviest infection was 30%.

MELILOTUS

M. alba

WHITE SWEETCLOVER

- Bacillus lathryi Manns. & Taub. Bacterial streak
One field infected south of Sasakwa. Only a trace present, causing slight damage. No control necessary as this host is of minor importance. A new host record for Oklahoma.

Cercospora davisii Ell. & Ev. Leaf-spot
 A trace was found locally along the roadside south of Sasakwa. Of slight importance and no control necessary. A new host record for Oklahoma.

Mycosphaerella lethalis R. E. Stone Stem-spot
 This, too, has never been reported in Oklahoma. Merely a slight infection was found that apparently did no noticeable damage.

PHASEOLUS

P. spp.

BEAN

Alternaria fasciculata (Cke. & Ell.) Leaf-spot
 L. R. Jones & A. J. Grout
 Widely found in most gardens during late season when the leaves had been injured. Heavy rainfall favored a 75% infection in some cases. Attack too late to be of more than slight importance. Never before reported in Oklahoma.

Phytophthora phaseoli (E.F.S.) S.A.B. Bacterial blight
 Wherever beans were grown this disease was found. Estimated average loss was 5%. More serious in 1938 and 1939 than 1940. No marked resistance was found among varieties. Red Valentine and Tennessee Green Pod were heavily attacked. Control by using clean seed and treating it with mercuric chloride. Northern grown seed is usually free from the disease.

Colletotrichum lindemuthianum (Sacc. & Magn.) Briosi & Cav. Anthracnose
 Wet, cool springs favor this disease. Estimated loss of 2% throughout county. Stringless Green Pod and Lima are susceptible. Cultivate when plants are dry, use clean seed, and resistant strains.

Fusarium martii var. phaseoli Burk. Dry root-rot
 Almost all gardens show some infection, with a decrease in plant vigor. 2% loss and 30% infection in

one garden northeast of Maud.
Change to non-susceptible crops
for several years to gain control.

Virus

Rarely found, and causing slight
damage. Use healthy seed for
control. Red Valentine and Wax
show a degree of resistance and
new resistant varieties have
recently been developed in Idaho and
Michigan.

Bean-
mosaic

Heterodera marioni (Cornu) Goodey
One location only, but 40% of this
garden was infected. Several vari-
eties were grown and all were
equally attacked. For control
rotate crops with non-susceptible
hosts and keep down weeds.

Root-knot

PISUM

P. sativum

GARDEN PEA

Phytophthora pisi (Sack.) S.A.B.
A minor garden crop with an average
loss of 2%. Infection during past
three years has gradually been in-
creasing. The Alaska variety was
very susceptible. Rotate crops
and take care in cultivation to
avoid wounding. Use resistant var-
ieties.

Bacterial
blight

Erysiphe polygoni DC.
Prevalent during continued damp
weather of 1940. As much as 50%
in a single garden, mostly on the
Telephone variety. Attack came
too late for more than slight damage.
In severe outbreaks Bordeaux spray
or sulphur dusting may be used for
control. A new host record for
Oklahoma.

Powdery
mildew

PRUNUS

P. spp.

CHERRIES

Erwinia amylovora (Burr.) S.A.B.
40% infection in one orchard north-
west of Wewoka. Spread from pear
and apple trees nearby in 1940.
Prompt, severe pruning offers best
control. Never before reported in
Oklahoma.

Fire-blight

Phytomonas pruni (E. F. S.) S.A.B. Bacterial spot
 Most severe cherry disease.
 Easily seen because of "shot-hole" leaf appearance on the few trees in the county. Estimated loss of 2%. Proper pruning, cultivating and fertilization, especially nitrogen, give best control results.

P. sp.

PLUM

Phytomonas pruni (E.F.S.) S.A.B. Bacterial
 Observed more frequently than on cherry. Most serious disease on this major fruit crop, causing a loss of 2% with some orchards showing 100% infection. Same control as for cherry.

Phytomonas tumefaciens (E.F.S. & Town.) S.A.B. Crown-gall
 One diseased tree killed outright near Wewoka. Same control as for apple crown-gall.

Sclerotinia fructicola (Wint.) Rehm. Brown-rot
 Scattered throughout county and re-diseased fruits easily seen hanging on the trees near ripening time. Most loss came after the fruit was picked. Frequent showers aided spread of fungus during 1940. Not so prevalent during 1938 and 1939. For control measures see peach brown-rot.

PSEDERA

P. sp.

VIRGINIA CREEPER

Gloeosporium sp. Leaf-spot
 Locally found east of Konawa, but causing little damage.

PYRUS

P. communis

PEAR

Erwinia amylovora (Burr.) S.A.B. Fire-blight
 Increasing every year until in 1940 four orchards are contaminated. No trees have as yet died. Most of the infection is around Wewoka. For control see apple fire-blight.

QUERCUS

Q. spp.

OAK

Coryneum sp.

Twig-blight

A new disease for Oklahoma in 1940. The only symptoms were twig spots accompanied by gradual browning of the leaves and total death of young trees, mostly post oaks. On older trees the lower limbs were killed. No control measures are known. The estimated loss was 5%.

ROSA

R. spp.

ROSE

Botrytis sp.

Bud-blight

One record in the county for 1939. No control is necessary other than cutting and destroying infected blossoms.

Coniothyrium sp.

Canker

Found infrequently at scattered points where it had entered through bark wounds. Control can be gained by promptly removing all diseased growth and building up the vigor of the plants. Only clean nursery stock should be used.

Sphaerotheca pannosa (Wallr.) Lev.

Powdery-mildew

Local infestation noticed in 1940. Doubtless others were present due to extreme rainfall and warm weather following a cool, early spring. Control measures include improvement of growth conditions, sanitation, treatment with fungicides, and the growing of resistant varieties. Dusting with sulphur is a highly effective direct measure.

RUBUS

R. sp.

BLACKBERRY

Mycosphaerella rubi E. W. Roark

Leaf-spot

Common in practically all vineyards. Several showed 100% infection. 3% average loss came from leaf-spot decreasing the vigor of the plant by destroying needed photosynthetic surface. Prevalent in all three

years on Dallas and Robinson varieties. Bordeaux spray will render satisfactory control.

Plectodiscella veneta (Speg.) Burk. Anthracnose
Not quite as common as the leaf-spot, but caused a loss of 2% for the three year average. Less infection in 1940. Control as for leaf-spot, and in addition, all vines, both old and young, should be cut off close to the ground and burned after the crop is harvested.

R. sp. DEWBERRY

Mycosphaerella rubi E. W. Roark Leaf-spot
Less infection than on blackberry. Control measures are the same.

Plectodiscella veneta (Speg.) Burk. Anthracnose
The same as on blackberry, with a 1% estimated loss. Control as for the same disease on blackberry. The Austin variety was susceptible.

R. sp. YOUNGBERRY

Mycosphaerella rubi E. W. Roark Leaf-spot
The same as on the two preceding hosts with approximately the same loss. Control as for the above.

RUMEX

R. sp. DOCK

Colletotrichum sp. Anthracnose
Locally found southwest of Seminole on exceedingly wet ground. The spread to nearby garden plants by rain splashed spores was possible since this was located in a fence row. Other mechanical means might also serve to spread the disease. A new host record for Oklahoma.

SOLANUM

S. tuberosum POTATO, IRISH

Erwinia carotovora (L. R. Jones) S.A.B. Wet-rot
Common, entering through wounds and prevalent on market potatoes.

Estimated loss of 1%. Control as for soft-rot of onion. Triumph and Irish Cobbler were susceptible.

Actinomyces scabies (Thax.) Gus.
Only a trace of infection found each year, probably because of excess moisture and temperatures which were usually below the optimum of 72°F. Triumph was more susceptible than the Cobbler. Treat seed tubers with corrosive sublimate, hot formaldehyde, or "Semesan," for control.

Scab

Alternaria solani (E. & M.) Jones & Grout

Early-blight

Common during the latter part of the season and associated with physiological tip-burn. The attack was too late for damage in 1940. Control includes eradication of susceptible weeds, rotations of three to five years and spraying with Bordeaux mixture.

Corticium vagum B. & C.

Stem-rot
Rhizoctonia

Rarely found and caused little damage, due to scarcity of rainy weather in 1939. Very little field control can be practiced. Treat seed tubers before planting as for scab.

Fusarium eumartii C. W. Carpenter
Storage decay of slight importance, mostly on Triumph. Proper storage conditions, proper temperature and air circulation will give control.

Dry-rot;
end-rot

Fusarium sp.

Wet end-rot

Corresponds to the above only the rot was jelly like. The same control measures apply.

Fusarium oxysporum Schl.

Wilt

Loss did not exceed 1%. This disease occurs commonly but not to a serious degree in any field. The causal organism is soil borne and at present, until immune varieties are developed, control includes long rotations, and the use of clean seed.

Non-parasitic

Tip-burn

Commonly found as a primary injury followed by *Alternaria solani*. Present in most fields shortly prior to digging in 1940.

SORGHUMS. halepense

JOHNSON GRASS

Bacterium sp.

Leaf-spot

Most serious disease causing the death of lower leaves. Southeast of Konawa, 100% infestation was seen in a large area. No control measures have been evolved.

Cercospora sorghi Ell. & Ev.

Leaf-spot

Like the bacterial leaf-spot, slight loss results although 100% infestation was seen in some places. Never serious enough for control. A new host record for Oklahoma.

Helminthosporium turcicum Pass.

Leaf-blight

Scattered throughout county. No serious loss resulted. Not heretofore reported in Oklahoma.

Sphacelotheca sorghi (Lk.) Clint

Smut

First report for Oklahoma made by author in 1938. Never serious although infestation gradually increased each year.

S. vulgare

SORGHUM

Phytomonas andropogoni (E.F.S.)

S.A.B.

Stripe

Trace of infection without much loss in 1939. Almost 100% infestation in one field near the northwest border of the county.

Helminthosporium sp.

Leaf-Spot

Caused a reddish spotting of leaves on numerous plants in various fields but did not seem to impair yield.

Puccinia Purpurea Cke.

Not commonly found, and damage was slight. No control measures have been formulated.

Rust

Sphacelotheca sorghi (Lk.) Clint
Serious along the North Canadian valley in 1939. Estimated loss of 2% with local infestation of 20%. May be controlled by using formaldehyde or "Ceresan" to disinfect the seed.

Covered
kernel smut

S. sudanensis SUDAN GRASS

Helminthosporium sp.

Frequently observed, but little loss resulted.

Leaf-spot

SPINACIA

S. oleracea SPINACH

Cercospora sp.

A trace was seen in one garden on spinach in 1940. Not serious enough to need control. A new host record for Oklahoma.

Leaf-spot

SYRINGA

S. sp. LILAC

Gloeosporium sp.

Found on one hedge with 50% infection, but seemingly caused slight damage. Not previously reported for Oklahoma.

Leaf-spot

TRITICUM

T. vulgare WHEAT

Phytomonas translucens undulosum
(E.F.S.) S.A.B.

Found scattered where wheat was grown in the North Canadian valley. Not much damage. Maximum infestation was 5%. Seed may be treated for bacteria in and on them.

Black chaff

Gibberella saubinetii (Mont.) Sacc.

Causes little damage and only a trace found locally on the

Seab

northwest side of the county. Tenmarq was susceptible. Plant only plump seeds, treat with "Ceresan," and rotate crops for control.

Helminthosporium sativum Pam., King
& Bak.

Foot-rot

Serious in one field with 30% of the plants affected. Not observed elsewhere. Selection of clean seed and hot-water treatment give the best control.

Puccinia graminis tritici Eriks. &
Henn.

Stem rust

Heavy infestation in all fields each year about the time the crop is mature. Estimated 2% loss, which would be greater if infection came earlier. All varieties observed were susceptible. Early maturing varieties help avoid the disease.

Puccinia rubigo-vera tritici (Eriks.
& Henn.) Ca.

Leaf rust

Epidemic with 30% loss during 1938. Later years produced only 4%. Fultz and Tenmarq were attacked. The best control lies in the use of resistant varieties such as Kawvale and Mediterranean.

Septoria tritici Desm.

Speckled
leaf-blotch

Trace of infestation caused very little loss in a local area where it was observed. The disease in 1940 was favored by cool weather in the early spring. Control includes seed treatment, crop rotation, and seed selection.

Ustilago tritici (Pers.) Rostr.

Loose smut

The most serious disease exacting an annual toll of 5%. The high relative humidity of 1940 during the blooming period, aided the spread of the disease. No resistant varieties were seen. Control may be had by a hot water seed treatment, or by planting Kawvale which has never been found infected.

ULMUS

U. sp.

ELM

Gloeosporium inconspicuum Cav.
Observed throughout the southern portion of the county during 1940. Not seen in 1938 and 1939. Winged Elm was a susceptible variety. Has never been serious enough to demand control.

Leaf-spot

VIGNA

V. sinensis

COWPEA

Phytophthora phaseoli (E.F.S.) S.A.B.
Occasionally found during 1939, but not nearly as serious as on bean. Plentiful moisture and low temperatures aided infection in 1940. Black-eye was susceptible. Use clean seed and treat with mercuric chloride.

Bacterial blight

Phytophthora vignae (Gard. & Ken.)
S.A.B.

Bacterial spot

More common than the preceding disease, causing a 1% loss. Seen often on the Crowder variety during 1939. Control includes the use of healthy seed, resistant varieties, and crop rotation.

Colletotrichum lindemuthianum (Sacc. & Maga.)

Anthracnose

Not nearly as serious on this host as on others. The worst infection was in Whipporwill during the wet, cool spring of 1940. Not commonly seen and consequently slight damage results. Successful control comes through using clean seed, resistant varieties, and cultivating only when the plants are dry.

Fusarium vasinfectum tracheiphilum
(E.F.S.)

Wilt

Not common during 1938 and 1939 due to lack of sufficient soil saturation. The Crowder and Black-Eye

varieties were most susceptible but the loss was not more than a trace. Resistant varieties will aid control.

Virus

Never a serious trouble but each year showed a slight infestation. One field of Crowder, southeast of Konawa, during 1940, showed the most infestation.

Mosaic

VITIS

V. sp.

GRAPE

Guignardia bidwellii (Ell.) Viala & Ravaz

Black rot

Increasing in importance each year. An estimated 4% loss, mostly on Concord, during 1938, with slightly more in 1939. To this date in 1940, it seems that as much as 9% of the crop will be destroyed. Some vineyards have 100% infection. Control measures involve the use of Bordeaux spray.

ZEA

Z. mays

CORN, MAIZE

Phytophthora stewartii (E.F.S.) S.A.B.
Heavy infestation found locally in one field west of Sasakwa in 1940 on the Oklahoma Silver Mine variety. Heavy rainfall during and following the planting period aided the pathogene. Healthy seed should be procured and treated with mercuric chloride.

Bacterial wilt, Stewart's disease

Aspergillus niger Van Teigh.
A very common ear rot but causes slight loss. As yet no control measures necessary.

Ear mold

Diplodia zeae Lev.
The most serious storage decay on both yellow Dent and Silver Mine varieties. Loss estimated at 1%. Clean seed should be used along with field sanitation and crop rotation.

Dry-rot

Fusarium moniliforme Sheld.

Ear-rot

Almost as serious as Diplodia zeae during storage. Pink fruiting growth was observed on grains. More important on Yellow Dent. Control as for above disease and in addition use resistant varieties.

Puccinia sorghi Schw.

Rust

A conspicuous disease that caused slight damage, less than 1%. Found scattered throughout the county in 1938 and 1939. Not important enough to warrant control measures.

Ustilago zeae (Beckm.) Ung.

Smut

Most serious disease on this major crop. No varieties showed marked resistance. Annual loss of 3%. In 1938 and 1939 infection showed commonly in the head. In 1940 numerous leaf symptoms were seen. One field in southwest corner of county had a 25% infection and severe loss. Moisture aids germination of the spores. Eradication of diseased material in the field provides the best control.

TYPIST: Donna Mae Morgan