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Eugene Chapel Tims

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CORTICIUM LEAF BLIGHTS OF FIG AND THEIR CONTROL

BY E. C. TIMS AND P. J. MILLS

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BY E. C. Tims AND P. J. Mills

INTRODUCTION

The fig is one of the more important fruits grown in Louisiana. There are few large orchards, but numerous plantings consisting of from one to a dozen trees are found around homes in the yards or gardens. This is especially true in the southern part of the State where the fig is the most widely grown fruit. It is one of the very few fruits that can be grown successfully in this area. Most of the figs, both fresh and preserved, are consumed locally, but there are a few small canning factories where the fruit is put up for shipment.

Fig trees are easy to grow and in many places are comparatively free of serious diseases and insect pests. But there are a number of diseases which affect them and the most important of these we call "Corticium leaf blights."¹ Many trees may be so badly defoliated as to cause an almost complete failure of the crop. There are three apparently different fungi which cause very similar types of leaf blight. Two of these forms are well known, Corticium stevensii, which causes "thread blight" on a number of different plants, and Corticium (Rhizoctonia) microsclerotia, the cause of "web blight" of bean and other plants. The third form which we call Corticium sp. is similar in many respects to the common soil fungus, Corticium solani.

Not many published reports have been found on the control of fig leaf blights, but some control measures have been reported from Florida, Louisiana, and Texas. Bordeaux mixture has been recommended in Texas and Florida, but did not prove effective in early tests in Louisiana. However, under our conditions an arsenite mixture applied during the dormant season gave satisfactory control of the leaf blights.

The results reported in this paper include studies of the fungi which cause leaf blights and methods for their control.

DISTRIBUTION AND ECONOMIC IMPORTANCE

Corticium leaf blights of fig have been reported from Florida by Burger (2)² and Weber (18), in Louisiana by Tims (13), and from Texas by Taubenhaus (12). The diseases are widely scattered over the south-

¹ The name "Corticium leaf blights" is used throughout this article to include "thread blight" caused by Corticium stevensii, as well as leaf blight caused by Corticium microsclerotia, and by a Corticium sp. The Rhizoctonia stage of these fungi causes most of the injury to the fig trees.
² Reference is made by number to "Literature Cited."
eastern portion of this State, causing severe damage in some sections and none in others. Along the lower Mississippi River, Bayou Lafourche, and in some of the Florida parishes the diseases are most prevalent, while in the southwestern part of the State, from Opelousas and Lafayette west to the Texas border there is comparatively little infection. Just why the diseases are quite severe on one group of trees, while another group close by remains entirely healthy, has not been determined. But observations made over a period of more than ten years indicate that blights usually do not spread very rapidly unless the trees are rather close together. However, *C. microsclerotia* forms large numbers of small sclerotia which may be readily scattered by wind, splashing rain, or even by birds and insects. This fungus has recently appeared on fig trees in a number of places where they had previously been free of blight.

Once a fig tree has become infected it usually shows the disease in varying degree of severity for many years. Since only the leaves and fruit are severely damaged by the leaf blighting fungi, a tree may remain infected for years without showing any apparent ill effects, except the annual defoliation. Some infected fig trees have been observed for as long as nine years. If sprayed properly such trees will yield a good crop of figs.

The severity of *Corticium* blights varies much with the season. When excessive rains come during late June and early July, before the fig fruit ripens, the damage may be severe. Under such conditions, the trees being partially defoliated, the fruit is exposed to the hot sun and most of it does not ripen. Many of the figs may also be attacked just before maturity, after which they either rot or dry out and hang on for some time.

**HISTORY OF THE FIG LEAF BLIGHT FUNGI**

1. The thread blight fungus, *Corticium stevensii* Burt.

Lack of uniformity in nomenclature makes the history of *Corticium stevensii* somewhat uncertain. Apparently the first description of the fungus in the United States was by Stevens and Hall (10) in 1909. They called the fungus *Hypochnus achroleucus*, which name was later changed to *Corticium stevensii* by Burt (3). Thread blight studies reported by Weber (18) and Wolf and Bach (21) caused some confusion. The former called the causal fungus *C. stevensii* (Burt) and the latter authors considered it to be *C. koleroga* (Cooke) v. Höhn (the causal fungus of the koleroga disease of coffee in the tropics). Other workers (1, 5, 16) compared the thread blight fungus with the coffee disease organism and concluded that they were distinct organisms. For the sake of clarity the name *C. stevensii* will be used throughout this paper to denote the common thread blight fungus prevalent in the southern United States, which is characterized by the presence of brown sclerotia and hyphal threads on the host.

*Corticium stevensii* is widely distributed over the southern portion of the United States and has been reported on more than 30 different host
plants. The fungus is known to have caused severe damage to a number of plants in the sections of the South where favorable conditions of high humidity and temperature obtain during portions of the summer. The fungus was for several years the most destructive parasite of orchards in Florida and Georgia (11). Severe injury was reported on fig in Louisiana (13). *Corticium stevensii* has also caused some defoliation of tung trees and minor injury to several other plants in this State.


This fungus was first described by Matz in Florida (6, 7) where it caused a leaf blight of fig. The distinguishing character of the fungus in nature was the abundant production of small brown sclerotia (.2 to .5 mm. in diameter) superficially attached to the petioles and twigs of the host. Matz also found a basidial stage which he connected with *R. microsclerotia* but the Corticium stage was not actually named until 1939 by Weber (19). The fungus is known in many tropical countries but has only been reported in the southern portion of the United States, where it attacks a wide variety of host plants.

3. Undetermined Corticium.

The undetermined Corticium was first reported by Tims and Mills (17) in 1938 as causing a leaf blight of fig. Later observations indicated that the fungus produced a basidial stage on fig leaves. This form differed from the other two leaf-blighting fungi in the absence of sclerotia or hyphal threads on the host, as well as in certain cultural characters.

Rogers (9) has recently (1943) renamed a number of Corticiums, putting them into the genus *Pellicularia*. He changed the name of the thread blight fungus *Corticium stevensii* to *Pellicularia koleroga* Cooke. Another of the fig leaf blight fungi, *Corticium microsclerotia*, was grouped with the very common *Corticium solani*, under the name of *Pellicularia filamentosa* (Pat.) Rogers. However, the familiar names will be retained for the fig leaf-blight fungi discussed here.

**SYMPTOMS**

All three of the leaf blighting fungi produce somewhat similar symptoms on the fig leaves, but they can usually be distinguished by other characters. In southern Louisiana, lesions usually appear on the leaves during late May or early June and may continue to develop until late fall. Typical infection begins at the base of the leaf and spreads in a fan-like manner (Fig. 1, A), with semicircular, necrotic, brown discolored areas on the basal portion of the leaf, while the upper part may remain green. If temperature and humidity are high, infected leaves may be completely destroyed within 48 hours. Diseased fig trees can usually be identified during the summer by the presence of scattered patches of dead
Figure 1. Fig leaves showing different types of infection by the blight fungi. A. Typical basal type of infection which may be associated with any of the blight organisms. B. Early infection, showing the irregular shaped brown spots on the leaf. C. The shot-hole effect that is quite commonly associated with the undetermined Corticium. D. Basidial mat of the Corticium sp. on healthy portion of ragged leaf.
shriveled leaves. The contact between healthy and diseased leaves often results in rapid spread of the fungus. Fig fruit may be attacked at the same time as the leaves, after which they shrivel and die.

When conditions are not conducive to rapid destruction of the leaf tissue, the basidial mats of *C. stevensii* or the undetermined *Corticium* (basidial stage of *C. microsclerotia* has not been found on fig in Louisiana) may develop on the lower surface of uninjured leaves or the healthy portions of diseased leaves, on the fruit, and occasionally on the leaf petioles and small twigs. The basidial mat appears as a thin powdery white layer when young, becoming slightly pink to light brown with age. The mats consist of masses of vegetative hyphae on which are borne unicellular basidia with four sterigmata and four basidiospores.

The three fungi may be distinguished on the fig trees by certain characteristic structures. *Corticium stevensii* develops oblong to round, flattened sclerotia (3-4 mm. in largest dimension), usually in groups of two to several, connected by hyphal threads, on one and two-year-old twigs. The immature sclerotia are white and quite soft and cottony (Fig. 2, B). As they mature they turn brown and become hard and compact (Fig. 2, A). The hyphal threads are white when young and become more brown with age. They extend along the small twigs, up the petioles, and on to the bases of the leaves where they divide and gradually become invisible to the naked eye. The leaves may be rapidly killed and become brown and shriveled. In many cases the dead leaves hang by the fungous threads for indefinite periods (Fig. 3). The basidial mats develop on certain leaves which may remain green and apparently healthy for two or three weeks. The

**Figure 2. Corticium stevensii** on fig twigs. A. Mature brown sclerotia. B. Immature white sclerotia and hyphal threads.
basidial stage is usually found on the leaves during most of the summer except during prolonged dry periods.

Leaves infected by *C. microsclerotia* and the *Corticium sp.* often differ somewhat from those attacked by *C. stevensii*. Some leaves are infected at the base with brown discoloration spreading in a fan-like manner. But infection is often followed by the appearance of brown necrotic spots, varying much in size and shape (Fig. 1, B). These spots often spread and involve the entire leaf causing a rapid killing, or the dead tissue in the spots may fall out leaving a shot-hole effect (Fig. 1, C). The small, brown sclerotia of *C. microsclerotia* are usually formed in large numbers on infected leaves, twigs, and fruit. Figure 4 shows the sclerotia on twig, leaf petiole, and young fig fruit. They are superficially attached and are readily detached by wind and rain. Basidial mats have not been observed in connection with this fungus, but they are usually found associated with the undetermined Corticium. The basidial mats are often formed on the lower surface of healthy portions of ragged leaves that have been partially killed (Fig. 1, D). Such healthy portions of some leaves may remain alive with the basidial mats on the lower surface for comparatively long periods. The undetermined Corticium may be distinguished from the other leaf blighting forms by the absence of sclerotia or hyphal threads on the host.

**SEASONAL DEVELOPMENT**

The Corticium leaf blights usually begin to develop in southern Louisiana during the latter part of May or early June, depending upon weather conditions. Prolonged periods of wet weather in June or early July often cause partial defoliation of the trees before the figs ripen. The three leaf-blighting fungi apparently live over on the fig trees. *Corticium stevensii* develops from the sclerotia formed the previous year. The new hyphal threads can be traced back to the sclerotia. Just how the other two forms overwinter is not clear, since there are no sclerotia visible on the twigs during the winter and spring. But the blight fungi apparently live over in the small cracks and crevices in the bark of the fig branches. The very earliest infections appear where the young leaves are in contact with small branches, and definite connection can be traced between the lesion on the leaf and the surface of the twig. As many as twenty such infection centers have been found on one fig tree early in June.

The spread of the disease from leaf to leaf on one tree and from tree to tree has been studied. Most of the spread within the tree takes place in two ways: contact between healthy and diseased leaves; and, in the case of *C. microsclerotia*, scattering of the small sclerotia by wind, rain, and possibly insects. Dead leaves fall upon healthy ones and cause new infections. The presence of *C. microsclerotia* can often be determined when no sclerotia are visible by the appearance of numerous small spots on the leaves below an old infection center. The sclerotia fall on the leaves below and produce the numerous small brown spots.
The possible role of basidiospores in the spread of leaf blight has also been studied. The evidence so far indicates that the spores are probably of little or no importance in dissemination of the leaf blight fungi. Careful observations have been made over a period of several years on this phase of the disease development. The thread blight fungus, *C. stevensii*, produces large numbers of basidiospores all during the summer, but practically no new infections develop on surrounding leaves that cannot be traced back to sclerotia on the twigs or to contact with diseased or dead leaves. Numerous inoculation tests were made with basidiospores from *C. stevensii* and the undetermined Corticium under conditions favorable for blight development, but in no case was the disease produced by such means.
VARIETAL REACTIONS

The Celeste is the predominant fig variety grown in the State. There are a few trees of some of the varieties with larger fruit, such as the Brunswick and Brown Turkey. No definite experimental data have been obtained on the resistance of the other varieties to leaf blights. However, where they are grown along with the common Celeste trees, no significant differences in amount of disease have been noted.

CULTURAL STUDIES ON THE LEAF BLIGHTING ORGANISMS

Representative cultures of the following leaf blight fungi were used in making the cultural studies: (1) Corticium stevensii from sclerotia on tung and fig twigs; (2) C. microsclerotia from fig leaf; and (3) Corticium sp. from a diseased fig leaf. For comparison with the latter fungus a culture of the Corticium solani type from an infected cauliflower stem was used. Each of the cultures used was considered typical of the species after considerable study in which large numbers of cultures were grown and compared. There was considerable variation in the growth characters of single basidial cultures of the undetermined Corticium. However, when cultures of C. stevensii, C. microsclerotia, and Corticium sp. were obtained from sclerotia or bits of diseased leaf tissue, they did not show such variation.

1. Temperature Relations.

Small, uniform pieces of agar from actively-growing plate cultures were transferred to petri dishes containing fresh string bean agar plates. The plates were incubated at 10, 15, 24, 28, 30, 32, and 36° C. The temperatures remained almost constant during the test period, the fluctuation being about one degree C. above or below the indicated temperature. The results of three different tests are summarized in table 1.

<table>
<thead>
<tr>
<th></th>
<th>Average daily increase in diameter of colonies in mm.</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>at the indicated temperatures</td>
</tr>
<tr>
<td></td>
<td>10° C.</td>
</tr>
<tr>
<td>C. stevensii:</td>
<td>Trace</td>
</tr>
<tr>
<td>C. microsclerotia:</td>
<td>0.0</td>
</tr>
<tr>
<td>C. solani:</td>
<td>Trace</td>
</tr>
<tr>
<td>Corticium sp.:</td>
<td>3.0</td>
</tr>
</tbody>
</table>

Corticium stevensii grew much more slowly than the other forms. This fungus has always been a distinctly slow-growing form when compared
with other species. In these tests, *C. solani* grew somewhat faster than the cultures from fig. All three of the faster-growing forms grew best at about 28° C.

![Figure 4. Corticium microsclerotia on fig branch. The small sclerotia appear on the twig, leaf petiole, and immature fig fruit.](image)

2. Cultural Characters.

The four Corticiums were studied on a variety of solid media and several liquid media, but only a brief mention of these observations is included here. All the forms could be distinguished readily on most of the media. They grew well on string bean and potato dextrose agar slants. The characteristic feature of each form was the type and location of the sclerotia on the slant cultures.
Corticium stevensii produced small, loosely-formed sclerotia as the cultures aged. They appeared first as white, mycelial aggregations which slowly became more compact and turned light brown in color. The sclerotia never attained the size or compactness of those produced on twigs of the hosts. Corticium microsclerotia produced from one to several white sclerotia on the surface of the medium. The sclerotia were larger than those produced by the other forms and assumed a deep brown color with age. The undetermined Corticium from fig rarely produced definite sclerotia on the surface of the medium, but instead developed masses of small sclerotia on the sides of the tube just above the agar. These sclerotial masses were white when first formed and became dark brown as the cultures grew older. Corticium solani formed sclerotial masses on the sides of the tubes opposite from the medium.

The four Corticiums were grown at 28° C. on poured plates of five different agar media: fresh string bean, potato dextrose, prune, onion, and Czapek's. Only C. microsclerotia and C. stevensii produced definite sclerotia in these plate cultures. Corticium solani and the undetermined Corticium formed masses of sclerotium-like aggregations on the medium and on the sides of the petri dishes. These sclerotium-like masses were irregular in shape and more flattened than the sclerotia of C. stevensii and C. microsclerotia. All the forms grew well on the five media, although potato dextrose agar appeared to be more favorable than the others.

3. Inoculation Tests.

Numerous inoculations were made on fig leaves during the course of these studies. In the early tests some inoculations were made by fastening freshly infected leaves to the lower surface of healthy leaves with paper clips or small strips of paper tape. Infection took place readily when inoculations were made in this way. In general, the tests made under greenhouse conditions during the winter did not prove satisfactory, so most of the inoculations were made on trees growing outside.

A standard method of inoculation was developed after a number of different trials had been made. Inoculum from a pure culture of the fungus was spread over the lower surface of the fig leaves without wounding them. The inoculated leaves were wrapped in moist paper, a paper bag was put over the wet mass, pulled back and tied tightly around the branch on which the leaves were attached. In this way a satisfactory moist atmosphere was kept around the inoculated leaves. The paper bags and moist paper were removed after from 24 to 48 hours.

When favorable conditions prevailed, that is, relatively high summer temperatures and relative humidities, all the four forms were capable of killing fig leaves. The fast-growing forms, C. solani, C. microsclerotia, and the undetermined Corticium caused a rapid killing of fig leaves. If conditions were especially favorable, large full-grown leaves were completely destroyed within three days after inoculation. Under very humid condi-
tions *C. microsclerotia* formed numerous small sclerotia on the affected leaves within a week after inoculation. No sclerotia were formed on the branches or leaves inoculated with *C. solani* or the Corticium *sp.* The latter form produced the basidial stage on the lower surface of some leaves, while in no case were basidia or spores formed on leaves inoculated with *C. microsclerotia.*

*Corticium stevensii* developed somewhat more slowly than the faster-growing Corticiums on fig leaves in most of the tests. But in one series of inoculations made with a number of single basidiospore cultures infection spread over the leaves rapidly, and within three days some leaves were completely killed. The basidial stage developed on uninjured portions of some leaves within a week after inoculation, and in many cases typical hyphal threads and sclerotia were produced on the twigs to which the inoculated leaves were still attached.


During the early summer the basidial stages of *C. stevensii* and the undetermined fig Corticium are usually quite prevalent on the leaves of infected fig trees. The basidial mats are usually on the lower surfaces of the leaves. Such mats have only been observed on healthy leaf tissue. In the case of *C. stevensii* usually the entire lower surface of the leaves was covered by the basidial layer. The leaves affected by the fig Corticium *sp.* were often very ragged in appearance, the healthy portions covered with the basidial mat, the other parts having been killed by the fungus mycelium.

When such infected leaves were suspended within the covers of poured agar plates, within a few hours numerous spores usually fell to the surface of the agar. In this way it was an easy matter to obtain cultures of these Corticiums from germinating spores. By making spore dilutions in string bean agar and picking out single germinating spores, numbers of monosporous cultures of *C. stevensii* and the undetermined Corticium were obtained.

Measurements were made of the basidiospores of *C. stevensii* and the undetermined Corticium from fresh fig leaves. Isolations were made from the same material to confirm the identity of the fungi concerned. In all cases the cultures obtained from material identified as *C. stevensii* were typical of the cultures obtained from sclerotia of this fungus.

The average size and range in size of the basidiospores of *C. stevensii* and the undetermined Corticium are given in table 2. The measurements for each form are in close agreement. The spores of *C. stevensii* were longer and slightly narrower than those of the other Corticium. The average sizes of the two forms are apparently different enough to distinguish them as separate species.
TABLE 2. Basidiospore Measurements of Corticium stevensii and Corticium sp. from Fig Leaves. Each Lot of Spores Came from a Different Collection.

<table>
<thead>
<tr>
<th>Name of fungus</th>
<th>Number of spores measured</th>
<th>Basidiospore measurements in microns</th>
<th>Check cultures from</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Average</td>
<td>Range</td>
</tr>
<tr>
<td>Corticium sp..........</td>
<td>60</td>
<td>4.5 by 7.7</td>
<td>3.4-6.3 by 6.3-9.0</td>
</tr>
<tr>
<td>Corticium sp..........</td>
<td>100</td>
<td>5.0 by 8.4</td>
<td>3.4-6.6 by 6.3-10.0</td>
</tr>
<tr>
<td>Corticium sp..........</td>
<td>48</td>
<td>5.5 by 8.7</td>
<td>3.4-6.3 by 6.6-10.4</td>
</tr>
<tr>
<td>Corticium sp..........</td>
<td>100</td>
<td>4.9 by 7.5</td>
<td>3.1-6.3 by 6.3-10.1</td>
</tr>
<tr>
<td>Corticium stevensii</td>
<td>100</td>
<td>4.6 by 10.8</td>
<td>3.1-6.3 by 7.5-13.6</td>
</tr>
<tr>
<td>Corticium stevensii</td>
<td>100</td>
<td>4.3 by 10.4</td>
<td>3.1-5.3 by 8.2-12.0</td>
</tr>
<tr>
<td>Corticium stevensii</td>
<td>100</td>
<td>4.8 by 10.8</td>
<td>3.1-6.3 by 8.9-12.6</td>
</tr>
</tbody>
</table>

a—single basidiospores.
b—mass basidiospores.
c—leaf tissue.

*Both Corticium sp. and C. microsclerotia were isolated from this material.

Studies previously reported (15) indicated that the thread blight fungus, C. stevensii, was probably homothallic. Numerous cultures obtained from sclerotia of this fungus from several different host plants have all been quite similar in cultural characters, as well as in pathogenicity on fig leaves. Single-basidiospore cultures obtained from fig leaves were also quite uniform in type and in all cases were similar to cultures obtained from sclerotia or from spore masses. When inoculated on fig leaves the monosporous cultures produced basidial mats with typical basidiospores and some days later hyphal threads and sclerotia developed on the young twigs near where the infected leaves were attached.

**CONTROL MEASURES**

The literature on control of fig leaf blight has not been very extensive. In 1918, Matz (8) recommended destroying infected leaves and twigs for control of C. microsclerotia in Florida. Taubenhaus (12) claimed that Bordeaux mixture gave good control (in one test) of the same fungus on fig trees in Texas. Bordeaux mixture was recommended by Weber (18) and Wolf and Bach (21) for the control of thread blight (C. stevensii) of pear, apple, and grapefruit. Control measures for thread blight were developed in 1940 (14, 20). Tims (14) demonstrated that one application of a copper sulphate-lime-arsenite mixture during the dormant season controlled the disease satisfactorily. This arsenite mixture was one of a large number of such mixtures which had been tested by Keitt (4) and his co-workers in Wisconsin for apple scab control. The use of Bordeaux mixture as a dormant spray for thread blight control as recommended by Weber (20) for Florida conditions was not effective in Louisiana.

The fig trees in this State are not planted in blocks as in most orchards, but are usually scattered around the house, garden, or farm buildings. They vary much in size and shape, and usually blight infection is not uni-
formly scattered over the different trees. A fig tree might be heavily infected with one of the Corticium leaf blights and the one next to it have little or none of the disease. For these reasons only selected trees known to be infected could be used in the spray tests.

The small numbers of infected trees available in one place and the variation in their size and shape made yield tests impracticable. Instead of using the yield tests as a measure of disease control, records were kept of the comparative numbers of early infections and of the estimated percentages of defoliation before the fruit was harvested. The latter gave a rough measure of the amount of loss suffered by the grower. The principal damage to the fruit was caused in two ways: (1) actual destruction of the figs by the leaf blight organisms, and (2) the exposure of the unripened figs to the direct rays of the sun and their failure to ripen as the result of the early death of the surrounding leaves.

We tested several of Keitt's arsenite mixtures on a small scale as dormant sprays for control of fig thread blight during the period 1935-38. Elgetol was also used at 1% strength for spraying the trees and for spraying the dead leaves beneath the trees. No control was obtained by the use of Elgetol, either when applied to the trees or to the soil around them. The mixture which gave practically complete control of thread blight (called “arsenite mixture A”) contained copper sulphate 1\(\frac{1}{2}\)%, lime 1%, zinc arsenite 1%, monocalcium arsenite 4%, and fish oil 1% (the percentages being by weight, except the fish oil, which was measured by volume). The amounts of chemicals necessary to make up 10 gallons of the mixture are:

- 21 oz. copper sulphate
- 14 oz. lime
- 14 oz. zinc arsenite
- 3\(\frac{1}{2}\) oz. monocalcium arsenite
- 14 oz. fish oil.

A single application of this spray mixture applied in December or January gave good control of thread blight.

The later spray tests (1939-42) were complicated by the presence of *C. microsclerotia* and the undetermined Corticium on the fig trees. The excessive rainfall in June and July during the past three years (1940-42) also made the leaf-blight much more severe than in normal years. The arsenite mixture kept the blight under control fairly well until most of the fruit was harvested—about July 25—but later in the summer there was considerable defoliation of the sprayed trees, principally by *C. microsclerotia* and the *Corticium sp.*

The results of the spray test at Union in 1939 are given in table 3. The trees were not in a compact group but were arranged roughly in one row. Tree No. 5 was somewhat isolated from the others, but most of the remaining trees were in contact with each other or at most only a few
feet apart. The spray mixture gave almost complete control of the blights until the fruit was harvested, while the unsprayed trees were badly diseased. Typical branches from sprayed and unsprayed trees are shown in Fig. 5. Later in the summer there was considerable defoliation of trees No. 6 and No. 14 on which *Corticium sp.* and *C. microsclerotia* were most prevalent.

**Figure 5.** Fig branches showing effect of spraying for blight control. Unsprayed branch on left and sprayed on right.

**TABLE 3. RESULTS OF SPRAY TEST AT UNION IN 1939. ONE APPLICATION OF ARSENITE MIXTURE A MADE JANUARY 18. OBSERVATIONS MADE JULY 7, WHEN FIRST FRUIT WAS BEGINNING TO RIPEN.**

<table>
<thead>
<tr>
<th>Tree No.</th>
<th>Type of Blight</th>
<th>Treatment</th>
<th>Estimated amount of defoliation</th>
</tr>
</thead>
<tbody>
<tr>
<td>1, 2, 3, 4</td>
<td><em>Corticium stevensii</em></td>
<td>Sprayed 1939</td>
<td>Trace*</td>
</tr>
<tr>
<td>5</td>
<td><em>Corticium stevensii</em></td>
<td>Sprayed 1938†</td>
<td>Trace*</td>
</tr>
<tr>
<td>6</td>
<td><em>Corticium sp. and C. microsclerotia</em></td>
<td>Unsprayed.</td>
<td>65%</td>
</tr>
<tr>
<td>7</td>
<td><em>Corticium sp. and C. microsclerotia</em></td>
<td>Sprayed 1939</td>
<td>2%†</td>
</tr>
<tr>
<td>8</td>
<td><em>Corticium sp. and C. microsclerotia</em></td>
<td>Unsprayed.</td>
<td>60%</td>
</tr>
<tr>
<td>9</td>
<td><em>Corticium sp. and C. microsclerotia</em></td>
<td>Unsprayed.</td>
<td>25%</td>
</tr>
<tr>
<td>10</td>
<td><em>Corticium sp. and C. microsclerotia</em></td>
<td>Sprayed 1939</td>
<td>3%†</td>
</tr>
<tr>
<td>11</td>
<td><em>Corticium sp. and C. microsclerotia</em></td>
<td>Unsprayed.</td>
<td>40%</td>
</tr>
<tr>
<td>12</td>
<td><em>Corticium sp. and C. microsclerotia</em></td>
<td>Unsprayed.</td>
<td>20%</td>
</tr>
<tr>
<td>13</td>
<td><em>Corticium sp. and C. microsclerotia</em></td>
<td>Unsprayed.</td>
<td>20%</td>
</tr>
<tr>
<td>14</td>
<td><em>Corticium sp. and C. microsclerotia</em></td>
<td>Unsprayed.</td>
<td>25%</td>
</tr>
</tbody>
</table>

*Very little subsequent spread of blight on these trees.
†The trees were affected more severely later in the season.
‡One application of “arsenite mixture A” in 1938. None in 1939.
In the 1941 and 1942 tests there was some (as high as 10%) early defoliation on the trees that were sprayed in the winter with arsenite mixture A. This was the result of continued excessive rains over a period of four to five weeks before time for the fruit to ripen. Measures were taken to reduce this early defoliation. One application of Bordeaux mixture (4-4-50) applied about June 1 kept the disease under control until after the fruit was harvested. These results indicate that the one application of arsenite mixture A, during the winter when the trees are dormant, is sufficient to control Corticium blights under normal conditions. If excessive rains should come in late May and extend through June and if blight begins to show up on the sprayed trees, one application of Bordeaux mixture may be necessary to keep the trees in good condition.

**PRACTICAL CONTROL IN A SINGLE ORCHARD**

A group of seven large fig trees, six of them Celeste, the other variety unknown, at Farm A, was selected in 1938 for a test on practical application of control measures. Two of the trees were severely affected by *C. stevensii*, and all the others had some of the disease. The owner, who received considerable revenue from these trees, by canning the fruit and selling it at a good price to selected customers, had decided to destroy them because of their diseased condition. In the 1938 and 1939 seasons one application of arsenite mixture A was applied in January to all the trees. There was only an occasional blight infection on the two severely diseased trees before the figs were harvested, and none on the others. Excellent crops of figs were obtained both years. There was some severe freeze injury during the winter of 1939-40 and the fig crop was greatly reduced on most of the trees.

In 1940 *C. microsclerotia* appeared on some of the trees but caused little trouble. This fungus later spread to all the trees used in this test, but it has never caused much damage as long as the spray schedule has been kept up. The thread blight fungus (*C. stevensii*) has persisted on these trees throughout the five-year period that the experiment has been continued. But during the past two seasons, 1941-1942, there have been only scattered infections on the trees. Beginning in 1941 the dormant spray was not applied for two seasons. Instead of spraying the entire trees, Bordeaux mixture was applied on the portions of the trees where early infections began. When the leaves were covered with Bordeaux mixture for a distance of about two feet on all sides of the infection center, little further spread took place. The trees were examined twice during June and all infection centers were thoroughly covered with Bordeaux mixture. By this method the fig trees at Farm A were kept free of serious blight damage for two years, with comparatively little trouble or expense.

**SUMMARY OF CONTROL MEASURES**

The kind of control measure to be used depends upon (1) the type of blight, i.e., whether caused by *C. stevensii* (as evidenced by the presence of brown sclerotia and hyphal threads) or by either of the other fungi (*C.*...
microsclerotia or Corticium sp.) and (2) the severity of the disease. *C. stevensii* can be successfully controlled by one application of arsenite mixture A in December or January. The other types of blight can usually be controlled by the same spray mixture. But in wet seasons an application of Bordeaux mixture 4-4-50 in early June may be necessary. Spraying is not advised unless the trees are known to have blight. If the infection is light, as evidenced by small clumps of dead leaves or twigs devoid of leaves scattered over the trees in late May or early June, the dead areas and healthy leaves around them should be sprayed with Bordeaux mixture. This prevents the blight from spreading to other parts of the trees.

It is a good practice to remove the dead branches from the fig trees. Cutting out the small infected branches and destroying them after leaf-blilt begins in the summer may be helpful in keeping the disease under control.

**SUMMARY**

1. Corticium leaf blights cause serious damage to fig trees in Louisiana. Three apparently different fungi cause leaf-bliltng here. They are *Corticium stevensii*, *Corticium microsclerotia*, and an undetermined *Corticium*.

2. The three fungi produce leaf symptoms which are quite similar in most respects. However, *C. stevensii* produces distinctive brown sclerotia and hyphal threads; *C. microsclerotia* develops large numbers of very small sclerotia; and the undetermined *Corticium* has no definite sclerotial stage connected with it.

3. Leaf-blights begin to develop here in May or early June and may persist until fall.

4. The three causal fungi were studied in culture on a number of media and compared with *C. solani*. *Corticium stevensii* is a slow-growing form with an optimum temperature around 24° C., while *C. microsclerotia* and *Corticium sp.* are fast-growing forms with an optimum about 28° C. *Corticium stevensii* is apparently a homothallic form.

5. The undetermined *Corticium* is similar in many respects to *C. solani*.

6. Inoculation tests showed that the three blight fungi are capable of causing a rapid killing of fig leaves when conditions are favorable. The faster-growing forms usually killed fig leaves more rapidly than the slower-growing *C. stevensii*. The latter fungus produced typical hyphal threads and sclerotia on the inoculated twigs and basidial mats on some inoculated leaves. *Corticium microsclerotia* produced numerous sclerotia when moisture was abundant, but no basidial mats were formed. The *Corticium sp.* developed basidial mats on certain leaves, but no sclerotia were formed.

7. Basidiospore measurements showed that the spores of *Corticium stevensii* were distinctly different from those of the *Corticium sp.*
8. Control Measures. A single application of a copper sulphate-lime arsenite mixture made during December or January effectively controlled Corticium leaf blight caused by \textit{C. stevensii}. On trees infected with \textit{C. microsclerotia} and \textit{Corticium sp.} the arsenite mixture gave good control except in excessively wet seasons, at which times one application of Bordeaux mixture 4-4-50 applied early in June following the dormant spray gave satisfactory control.

9. The spraying of fig trees as a preventive measure, in the absence of any blight symptoms, is not advised.

10. If infection is light the leaf blights may be effectively controlled by applying Bordeaux mixture around the infected areas soon after symptoms appear.

11. Pruning out and destroying scattered branches known to be infected with the leaf blight fungi will reduce the amount of disease.

**LITERATURE CITED**
