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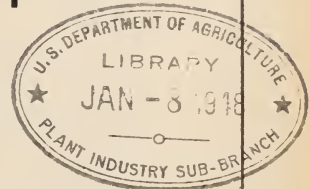
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THE PLANT DISEASE REPORTER

Issued By



THE PLANT DISEASE SURVEY



Division of Mycology and Disease Survey

BUREAU OF PLANT INDUSTRY, SOILS, AND AGRICULTURAL ENGINEERING

AGRICULTURAL RESEARCH ADMINISTRATION

UNITED STATES DEPARTMENT OF AGRICULTURE

SUPPLEMENT 171

TOMATO LATE BLIGHT IN THE WARNING SERVICE AREA IN 1947

Supplement 171

December 15, 1947



The Plant Disease Reporter is issued as a service to plant pathologists throughout the United States. It contains reports, summaries, observations, and comments submitted voluntarily by qualified observers. These reports often are in the form of suggestions, queries, and opinions, frequently purely tentative, offered for consideration or discussion rather than as matters of established fact. In accepting and publishing this material the Division of Mycology and Disease Survey serves merely as an informational clearing house. It does not assume responsibility for the subject matter.

PLANT DISEASE REPORTER SUPPLEMENT

Issued by

THE PLANT DISEASE SURVEY
DIVISION OF MYCOLOGY AND DISEASE SURVEY

Plant Industry Station
Supplement 171

Beltsville, Maryland
December 15, 1947

TOMATO LATE BLIGHT IN THE WARNING SERVICE AREA IN 1947

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TOMATO LATE BLIGHT IN THE WARNING SERVICE AREA IN 1947

Plant Disease Reporter
Supplement 171

December 15, 1947

FOREWORD

Paul R. Miller and Jessie I. Wood

The Late Blight Warning Service

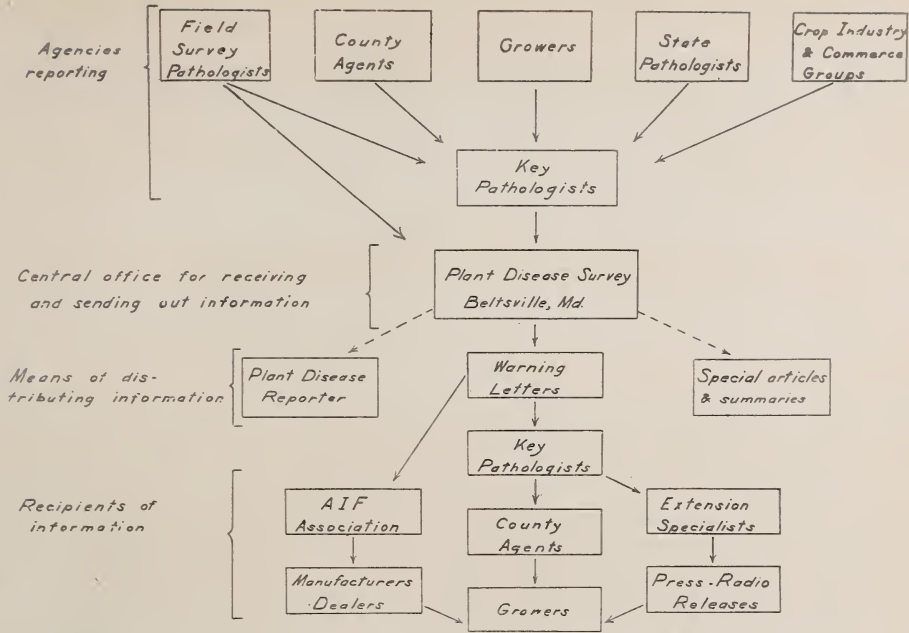
Last year's unprecedented outbreak of tomato late blight (Phytophthora infestans) in the eastern part of the country (PDR Supplements 164, 165, 1946) led to the establishment of the late blight warning service described in the Reporter (PDF 31: 14C-143, Apr. 15, 1947). As shown graphically on the accompanying chart, the service operates primarily through key pathologists designated to work with it in each cooperating State and in Canada.

This report is concerned with the development of tomato late blight in 1947 in the area included in the warning service, i. e., the States east of the Mississippi River, and Minnesota, Iowa, Missouri, Arkansas, Louisiana, and Texas, and Provinces of Canada as far west as Manitoba.

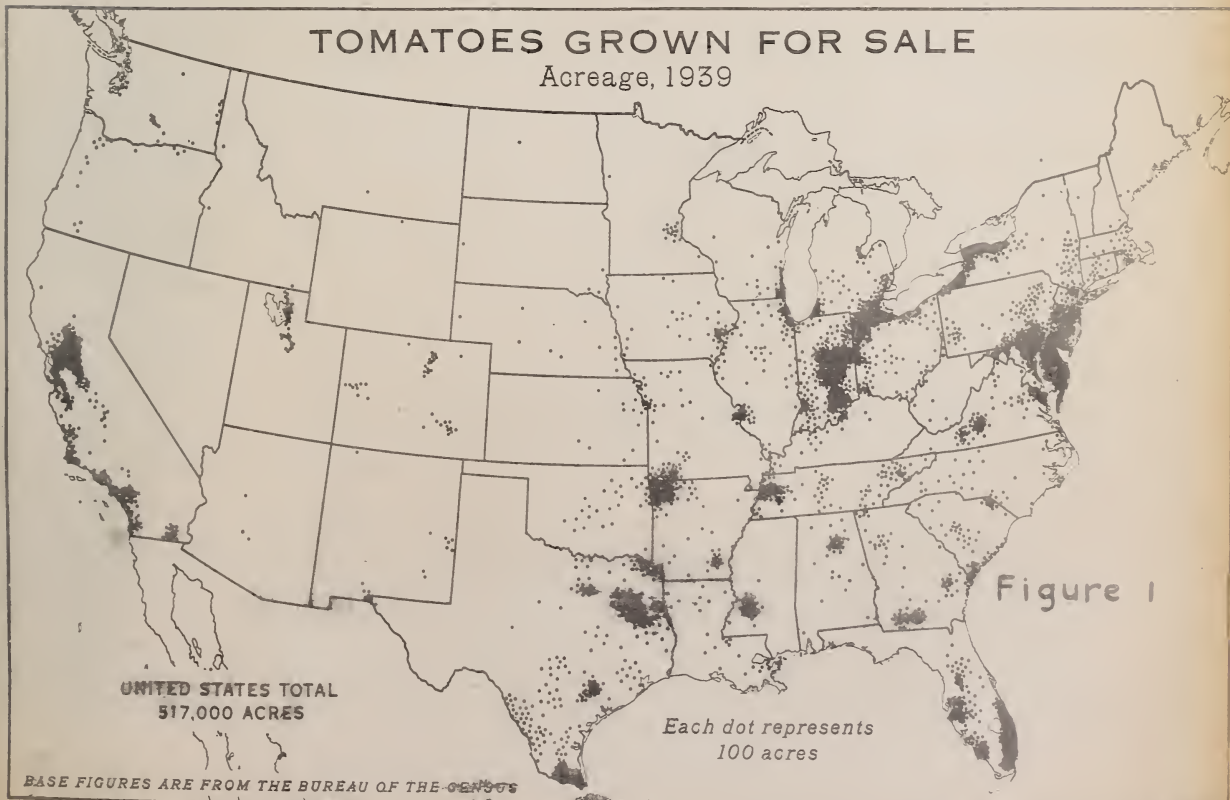
Acknowledgment

The Plant Disease Survey takes this opportunity to express its appreciation to persons and organizations concerned in the activity of the late blight warning service. The individual State Key Pathologists are the mainstay of the service and the major part of the credit for effective operation belongs to them. Dr. S. P. Doolittle of the U. S. Bureau of Plant Industry, Soils, and Agricultural Engineering contributed much time and effort on constructive ideas and helpful criticism. Dr. C. M. Mahoney of the National Cannery Association, Dr. R. J. Haskell of the U. S. Extension Service, and Mr. H. P. Barss of the U. S. Office of Experiment Stations encouraged and supported the establishment of the warning service. The cooperation of the Agricultural Insecticide and Fungicide Association, through Mr. Lea S. Hitchner, insured proper allocation of control chemicals.

Reporting Service
as conducted by
The Plant Disease Survey



TOMATOES GROWN FOR SALE
Acreage, 1939



Distribution and Importance of Tomato Late Blight in the Warning Service Area in 1947

Distribution of late blight in 1947 as reported on tomato and potato in the area included in the warning service in this country and in Canada is shown in Figures 2 and 3, respectively. Figure 4 indicates the extent of the loss to the tomato crop as estimated this year, with more specific information as to importance and areas affected in the different States compiled in Table 1. For comparison, the losses due to last year's extraordinary outbreak are shown in Figure 5. Figure 1, which shows the commercial tomato acreage in the United States, is included as a standard by which the reader may judge the effects of varying incidence in different parts of the country in the two years.

The reports and estimates of loss show that tomato late blight was much less widespread in 1947 and caused less loss than in 1946 (Figures 4, 5). In most of the southern and western parts of the area hot, dry weather was said to be responsible for the absence or negligible amount of late blight. In the part of the Central Atlantic section where the attack of the disease was general and severe control applications kept loss down (Table 2). In some States where weather was not conducive to serious general occurrence, fungicidal treatment was believed to have been an important factor in preventing severe local outbreaks. Notably this was so in Delaware, New Jersey, and Maryland (see Table 2).

A third factor reported as influencing the amount of tomato late blight was the presence or absence of the tomato strain of Phytophthora infestans, which was of particular interest this year since southern-grown transplants were not infected and could not have been responsible for direct introduction into northern fields. Extensive carry-over in Pennsylvania is reported by W. D. Mills, who stated (PDR 31: 230, June 15, 1947) that 13 out of 25 isolates of P. infestans from potato tubers grown in 9 Pennsylvania counties were of the tomato strain. Lincoln and Samson (PDR 31: 145-146, Apr. 15, 1947) reported that the tomato strain was isolated by them from potatoes grown in Northern Indiana and, surprisingly, in Idaho. On the other hand, behavior of late blight on tomatoes in Rhode Island, Massachusetts, and Southwestern Virginia indicated that this strain was either not present or else did not appear until late in the season. Remarks comparing occurrence on potato and tomato in other States suggest that strains may be involved or that the two hosts furnish different micro-environments.

The late blight season began unusually early. The disease was already established in the southern East Coast region of Florida early in November, on potatoes and tomatoes. In the Everglades section very heavy rains interfered with the control program and the fall potato crop suffered heavy loss. Even under these conditions, however, good equipment, proper timing, and frequent applications of Dithane controlled the disease. Early in December blight appeared on potatoes and

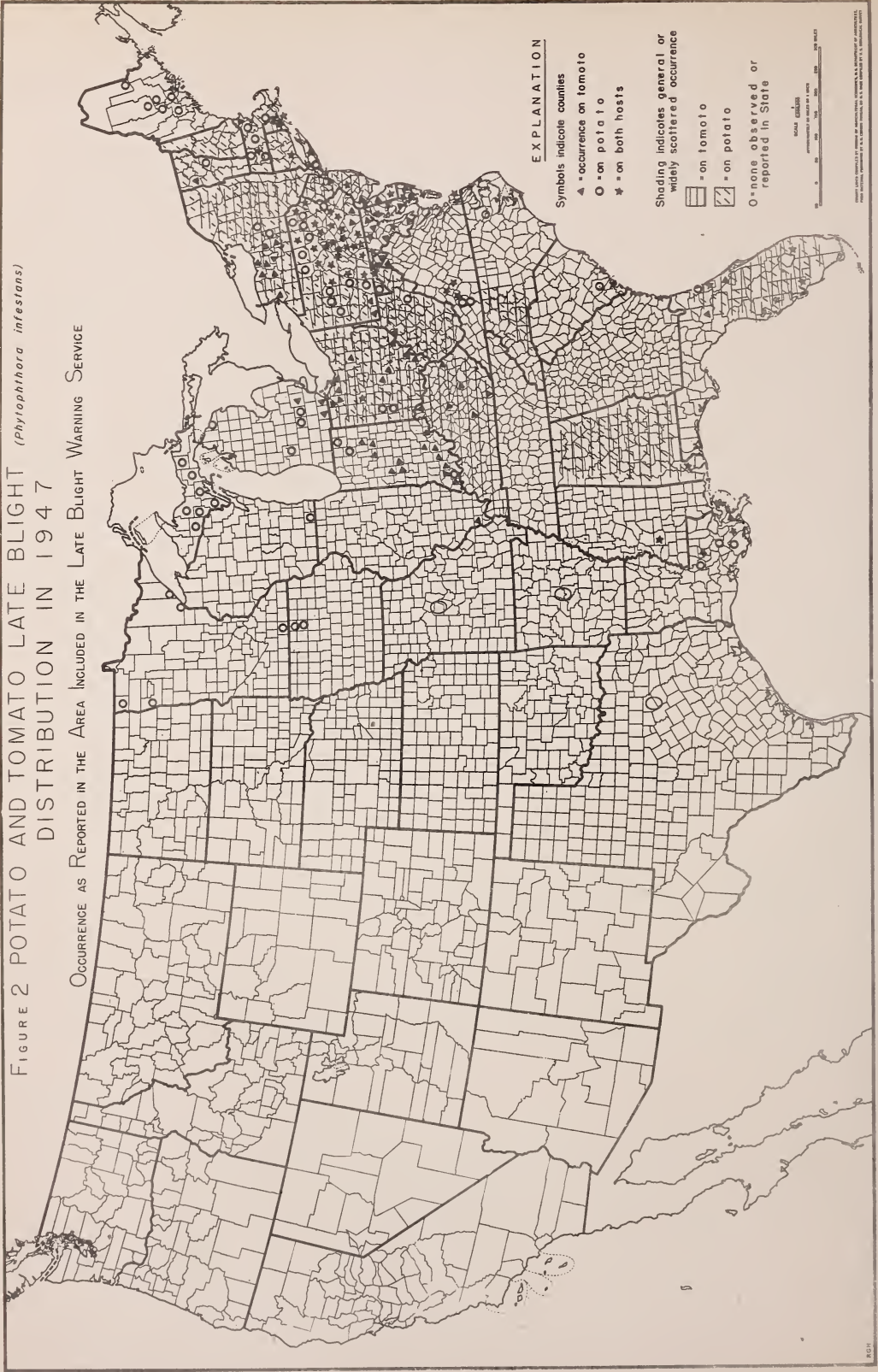
Table 1. Losses reported from tomato late blight in 1947.

State	Loss reported
Florida	: Widespread, but loss not estimated. Control used generally.
Louisiana	: Slight; some loss in Plaquemines Parish.
Mississippi	: 25-30% in one field; light infection in another; these only fields in which disease was observed.
Alabama	: Not serious; scattered infection throughout State.
Georgia	: None observed during tomato season.
South Carolina	: Negligible; very local occurrence.
North Carolina	: None in eastern part; present but loss not estimated in mountain area.
Kentucky	: No estimate made; general and destructive in home gardens on early tomatoes.
West Virginia	: 25-30%; mostly from central mountain area eastward
Virginia	: 15-20% in Southwestern Virginia, with up to 75-100% in some cases. In Eastern Virginia 3%, confined to one small area on Eastern Shore.
Maryland	: 20% Western Maryland; 1-5% North-central; 2% Southern; 1% northern Eastern Shore; none in central Eastern Shore; 30% in Worcester, none in other counties of southern Eastern Shore.
Delaware	: 1%
Pennsylvania	: 20%; if not controlled would have been double. Worst in Central and Northern where 50-90% of untreated fields had blight. In the vicinity of Philadelphia 1-10% loss. Western Pennsylvania about as bad as 1946 (15-50%).



FIGURE 2 POTATO AND TOMATO LATE BLIGHT (*Phytophthora infestans*)
 DISTRIBUTION IN 1947

OCCURRENCE AS REPORTED IN THE AREA INCLUDED IN THE LATE BLIGHT WARNING SERVICE



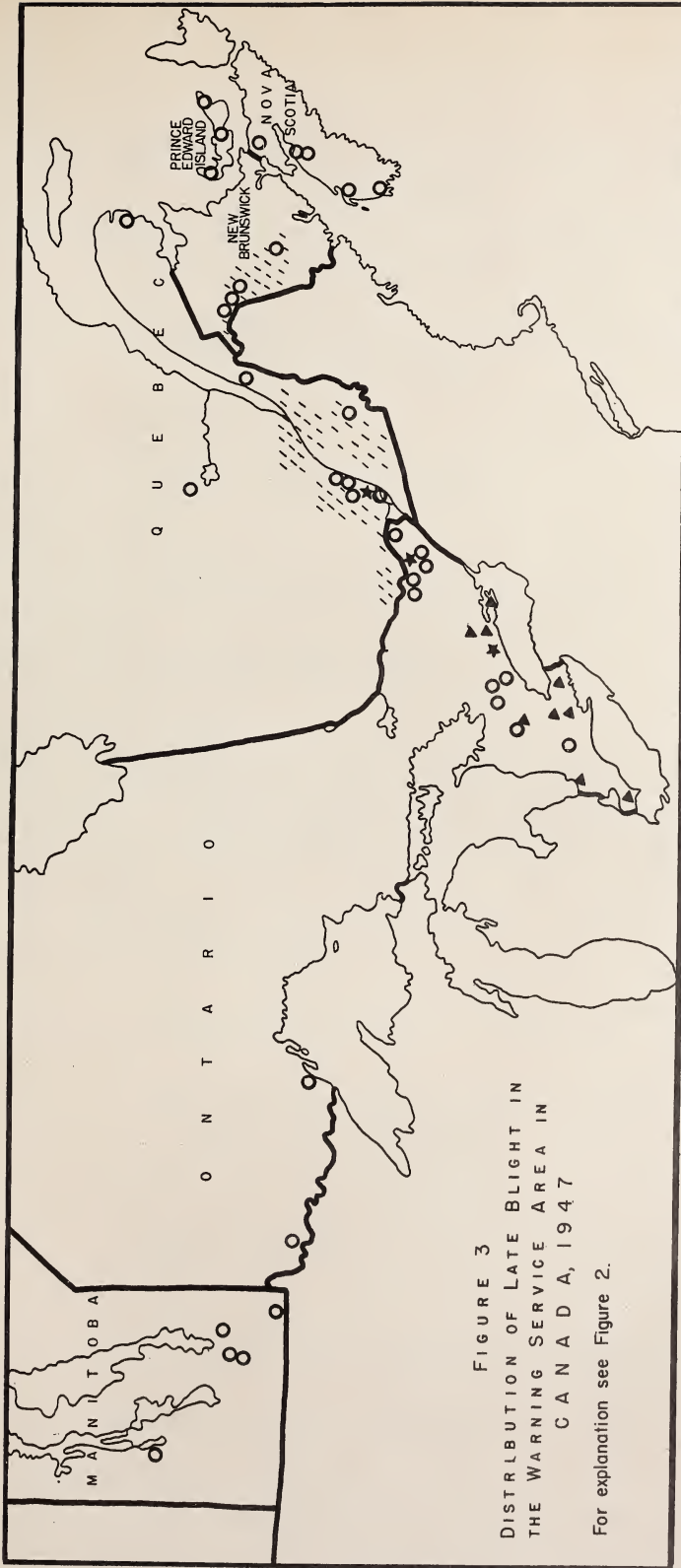


FIGURE 3
 DISTRIBUTION OF LATE BLIGHT IN
 THE WARNING SERVICE AREA IN
 CANADA, 1947

For explanation see Figure 2.

Table 1 conc.

State	Loss reported
New Jersey	: Much less important than in 1946.
New York	: 7-10%; worse year for blight than 1946 but control kept loss lower.
Connecticut	: No consequence.
Rhode Island	: Traces, loss negligible.
Massachusetts	: Trace
Vermont	: No estimate; less than last year.
New Hampshire	: Less than many years.
Maine	: Traces.
Ohio	: No estimate; small loss in staked tomato area of Southeastern Ohio; commercial canning crop in Northwestern part late and early frosts killed it before late blight damage,
Indiana	: Severe in restricted areas, elsewhere traces. : No estimate.
Illinois	: Only one field noted; disease disappeared in it later.
Michigan	: Less than 1%. Only noted in 3 counties in Southeastern Michigan.
Wisconsin	: None observed on tomato.
Minnesota	: None on tomato.
Iowa	: None on tomato.
Missouri	: No late blight observed on either host.
Arkansas	: No late blight observed.
Texas	: No late blight observed.

Table 2. Effectiveness of control against tomato late blight in 1947.

State	Control Materials, effectiveness, extent of use
Florida	: Dithane-zinc-lime, Copper A, others not specified. : Use very general; results good where applications : thorough and according to schedule.
South Carolina	: Mostly 6% fixed copper dust; few growers used Dithane : Z-78 dust. Better dust program in Charleston and : Beaufort areas than in 1946. Little damage even to : untreated fields.
North Carolina	: In mountain area some dusting in small plantings re- : duced losses, especially to fruits.
Kentucky	: Copper A spray, or C.C.C.S. dust saved commercial : plantings of early crop when used. Cuprocid dust : not effective. Disease destructive in untreated : home gardens on early tomatoes.
West Virginia	: Copper in Bordeaux or fixed form mostly used. Many : growers have not realized importance of fungicides.
Southwestern Virginia	: Spraying and dusting considerably increased from last : year; however disease was less severe even where : no control measures were used.
Eastern Virginia	: Some spraying, 2 to 5 applications, did not affect : outbreak in Eastern Shore area because stopped too : soon, before blight developed.
Maryland	: Fixed copper compounds most widely used; some Dithane : and some Zerlate; dusts more than sprays. Regular : treatment program seemed better than occasional ap- : plications timed on basis of weather. Control good. : More treatment than last year, about half on aver- : age of acreage received regular program, even more : treated at least once. Some use of air dusting, in : 2 northern Eastern Shore counties this method used : more than ground dusting.
Delaware	: About 75% of acreage treated, all of loss from late : blight in untreated fields. Fruit infection in un- : treated fields increased in spite of unfavorable : August weather.

Table 2 conc.

State	Control Materials, effectiveness, extent of use
Pennsylvania	: Cooper fungicides recommended; dusting less effective : than spraying. At least 25 tomato spray rings : operated. Loss would have been double without control. :
New Jersey	: Much more copper and other fungicides used than last : year. Weather greatest factor in small loss but : general use of treatment probably prevented serious : local attacks. :
New York	: Copper sprays or dusts used; hardly a gardener who : did not make some applications. Even one did some : good; with 5 or 6 applications crop almost free of : rot. Spray rings organized; airplanes used in a : few instances. Season was more favorable even than : last year when loss was 50% or more, but control : reduced loss this year to average of 7-10%. :
Vermont	: Easily controlled in fields sprayed or dusted before : July 23; heavy loss in unsprayed. :
Ohio	: Crop so late that fungicides were not used in many : fields, but about 10% of commercial growers used : spraying, ground dusting, or airplane dusting. In : experimental plots recommended schedules gave good : control, while 75% of the plants were killed in un- : treated checks. :
Michigan	: About 700 acres dusted twice from air with Dithane; : no late blight in these fields although some in : area. :

tomatoes on the West Coast, and by February it was reported in the Hastings potato-growing region of the upper East Coast. The general use of fungicides such as Dithane-zinc-lime and Copper A kept spread slow in infected fields, although severe loss occurred in some untreated fields and plant beds.

During the second week in February severe freezes killed practically all potato and tomato plants throughout Florida except in some West Coast areas, as well as in other Southern States. This event must surely have been a factor in subsequent late blight development, not only in Florida but in other sections as well. It put back the progress of the disease at least a month, since infection did not reappear in replanted fields and plant beds in the northern East Coast region until the middle of March. It is easy to speculate on the relation of this setback to the absence of infection in Georgia tomato plant beds and the consequent lack of transmission to northern areas with these southern-grown plants.

Aside from Florida, the area in which tomato late blight became most generally prevalent and important in 1947 was in part of the Central Atlantic region, from New York to Delaware on the east and New York to West Virginia and Southwestern Virginia on the west. The area is described in this manner because occurrence in Maryland and Virginia was scattered or local. Late blight was reported in most of this region a month or so later than last year. Subsequent development varied in details in different parts of the area but in general hot dry weather during August checked the disease from Southeastern Pennsylvania southward, while northward and westward August weather was more favorable and spread continued.

1947 was said to be potentially a worse year for tomato blight than 1946 in New York, but because of the practically universal application of sprays or dusts, even in home gardens, the resulting loss averaged 7 to 10 percent as compared with 50 to 70 percent in 1946. In Pennsylvania also losses would have been twice as much as the 20 percent estimated if it were not for the efforts made to keep the disease under control. In the central and northern parts of the State losses in untreated fields ranged from 50 to 90 percent. In both these States control obviously gained a real triumph over the disease.

In Delaware and New Jersey tomato late blight became widespread but was much less severe, mostly because of generally unfavorable weather after the initial spread took place. Nevertheless, fungicidal treatments in these States also were believed to be an important factor in the small loss. In Delaware 75 percent of the acreage was treated and all of the slight damage that occurred was suffered by untreated fields. In New Jersey general use of fungicides probably prevented serious outbreaks in many fields where local conditions were favorable to the disease.

Figure 4. Loss from tomato late blight in 1947

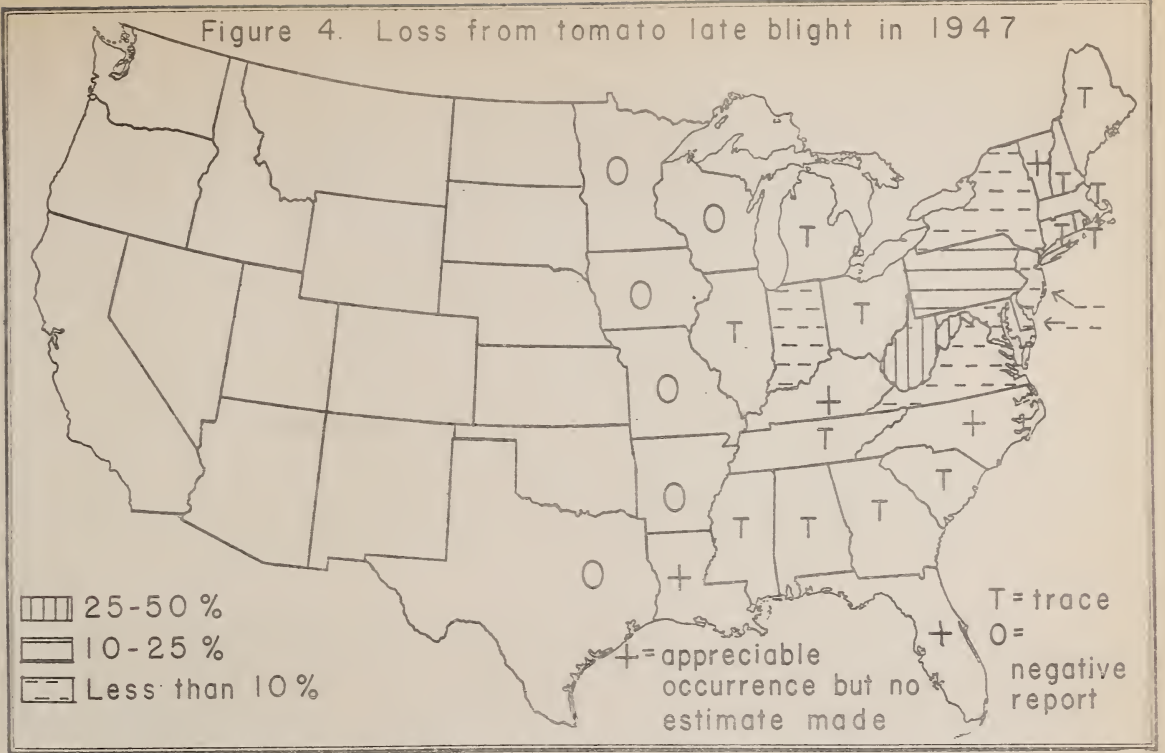
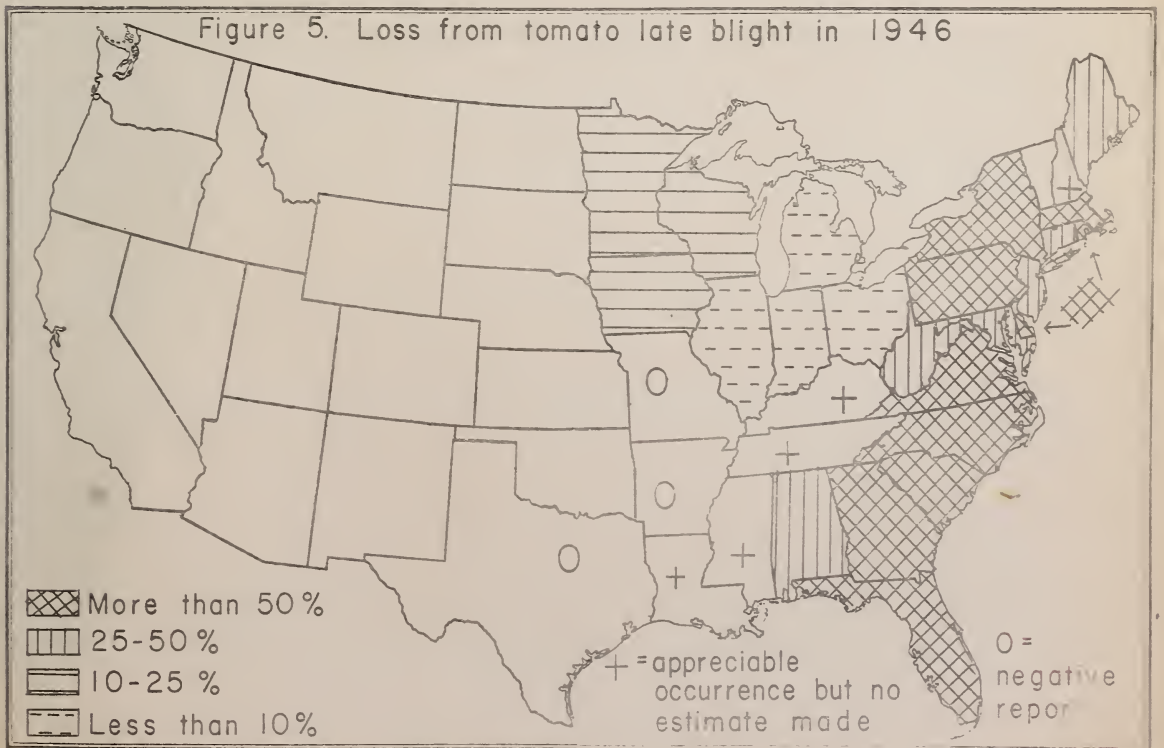


Figure 5. Loss from tomato late blight in 1946



Developments on the Delmarva peninsula were particularly interesting. The disease appeared in Worcester County on the southern Eastern Shore of Maryland in the middle of July after a short period of favorable weather. By the middle of August it was general in Worcester County. Half of the acreage was affected and 30 percent loss resulted, in spite of the fact that 70 percent of the acreage received at least one treatment and half of it was given a regular fungicidal schedule. In the upper part of the Virginia Eastern Shore in northern Accomac County a brief but severe outbreak occurred during a favorable period for two weeks at the end of July and the beginning of August; by August 9 weather had again checked the disease and by the middle of the month it had disappeared. In Delaware spread of blight started July 22 and by the 31st the disease was general throughout the State in untreated fields, but absent or scarce in treated plantings. Late blight did not appear in the southern part of the Virginia Eastern Shore, and did not become established in the central counties of the Maryland Eastern Shore.

Some significant local observations may be mentioned briefly. In New York tomato varieties that did not develop infection until late in the season last year were infected as early and as severely as other varieties this year. In Maryland the disease was found on a new host, Solanum dulcamara. In Delaware it was observed that fruit infection increased in untreated fields during the first half of August in spite of unfavorable weather, suggesting the existence of favorable temperature and moisture conditions within the confines of the plant. In Maine the fungus was found sporulating in a potato field when the temperature was 88° F, with 99 percent humidity (PDR 31: 370. Oct. 15, 1947). Similar observations of activity on potato and tomato under conditions not generally considered favorable were reported from Florida (PDR 31: 309-310. Aug. 15), and occurrence in a potato field in Louisiana in December 1946 is believed to indicate that the organism must be able to carry through the summer weather in that State (PDR 31: 6-7. Jan. 15)

Statements of the Key Pathologists regarding the effectiveness of control measures and the extent to which they were used have been compiled in Table 2.

State summaries contributed by the Key Pathologists are given below. During the season their current reports were published in the Reporter.

Summary

Outstanding features of the occurrence of late blight on tomatoes in the warning service area in 1947 are the early appearance and general establishment of the disease in Florida, the February freeze that killed most of the potato and tomato plants in much of Florida as well

as in other Southern States, the absence of infection of southern-grown plants in contrast to the prominent role of this source of inoculum in 1946, the limited area of real damage as compared with the destructive sweep of the disease throughout the eastern part of the country last year, and the demonstrated effectiveness and importance of spraying or dusting for late blight control.

DIVISION OF MYCOLOGY AND DISEASE SURVEY

STATE REPORTSLATE BLIGHT IN FLORIDA IN 1947

W. B. Tisdale

Late blight appeared in the southern part of the State in the vicinities of Homestead and Belle Glade in plant beds and fields early in November, 1946. From that date until February 1, rains were frequent and in the Everglades some were heavy. This made conditions unfavorable for spraying or dusting, and favorable for development of late blight. As a result, spraying or dusting could not be done at the proper time and many plant beds and fields were abandoned. Some growers who had good equipment and sprayed at the right time controlled the disease with Dithane when it was applied every 3 to 5 days. In fields that were too wet to follow a regular spray program or where no fungicide was used potato vines were dead by November 25.

Townsend estimated that the fall potato crop in the Belle Glade area was reduced by about 75 percent. No estimate of loss due to blight alone was made for the Homestead area.

Late blight was reported on potatoes on the West Coast in the vicinity of Ft. Myers about December 1, 1946 and a few days later slight infection was found on tomatoes in that area, and near Punta Gorda. Early in January, 1947, late blight was found on tomatoes at Bradenton, Sanford, and about two weeks later at Leesburg. It was reported in the Hastings area on February 4. The disease spread slowly in these areas during January, except in certain fields where severe loss was experienced in fields and plant beds where no fungicides were used. Spraying with Dithane-zinc-lime, Copper A, and others held the disease in check where applied thoroughly according to schedule.

During the period February 8 to 15 practically all potato and tomato plants in all areas except Bradenton and Ft. Myers were killed by cold weather. In the latter areas the disease had been generally controlled by spraying or dusting.

Tomato plants started after the freeze and potato plants which came back in the Homestead and Hastings areas showed no signs of late blight until about the middle of March. It was generally distributed in the West Coast areas where the plants were not so badly damaged by the cold, but it was not severe. Most growers continued to spray, mostly with Dithane and Copper A. The general consensus was that lack of favorable conditions helped to hold it in check, as with return of more favorable conditions during the middle of March the disease grew more serious and widespread. About this date it appeared on potatoes in the Hastings area

and on tomatoes in the Sanford area. During April it became prevalent in all of these areas, but not serious. Prevailing warm, dry weather seemed largely responsible for preventing serious development. In most other parts of the State late blight never appeared as it did in 1946. No signs of the disease were observed in the vicinity of Gainesville until about the last of May. This general, but light infection developed during and following a week of daily rains and relatively high temperatures.

Under the prevailing conditions it seemed impossible to estimate the loss due to late blight, and so far as I know no one in the State except Townsend made an estimate.

FLORIDA AGRICULTURAL EXPERIMENT STATION, GAINESVILLE

LATE BLIGHT IN LOUISIANA IN 1947

C. W. Edgerton

Late blight made its appearance early. The fall of 1946 was comparatively warm and no killing frost occurred until late in December. Differing from what had been observed in previous years, late blight was found on the fall crop of potatoes in the middle of December. How the disease lived over the previous summer has not been explained. During the winter of 1946-47 the late blight was observed on tomatoes in the greenhouse from time to time. Late blight was first observed in the spring on potatoes in Terrebone Parish in the southern part of the State on April 7. In the following week the disease was found in a number of localities, though the infection was still light. During the next three weeks a general infection developed. During the early part of May the blight was checked by warm dry weather. Another short period of spread occurred during the latter part of May. Losses were rather heavy in the southern part of the State, possibly as high as 25 percent. Some fields were a total loss. Further north in Pointe Coupee Parish the losses were less. Some spraying and dusting was carried on in the southern part of the State and considerable in Pointe Coupee Parish. The spraying and dusting in general gave satisfactory results.

Losses on tomatoes were slight. There were some losses in Plaquemines Parish south of New Orleans. In other parts of the State, the disease was checked by the warm dry weather.

No blight has as yet (November) been observed on fall tomatoes or potatoes in the fall of 1947.

LOUISIANA STATE UNIVERSITY, BATON ROUGE

SUMMARY REPORT OF LATE BLIGHT IN MISSISSIPPI

Douglas C. Bain

The writer was unable to make periodic surveys over the State and therefore had to depend on the cooperation of Plant Board Inspectors and County Agents to obtain information outside of Copiah County. No reports were received, hence, it is assumed that either there was no late blight on tomatoes or potatoes or if there was it did not amount to much.

Late blight was first observed in Copiah County in two garden patches of potato on May 16. Most of the tops were eventually killed but the crop was made. The fungus did not spread to tomatoes in several large fields within a half-mile radius.

The disease was next found on June 4, in a two-acre field of tomatoes at least six miles away from the infected potato patches. The disease was uniformly spread over the entire field. Judging from the general distribution of the disease and the fact that the plants were brought in from out-of-State, it was assumed the fungus came in on the plants. It was roughly estimated that the yield was reduced 25 to 30 percent.

On June 12, a light infection was found in another field (three to four acres) about three miles from the field reported above. The plants were home grown, and were nowhere near diseased potatoes. Tomatoes were not grown in this field last year but were grown just across the road. The source of infection can not be explained except possibly the grower accidentally brought the fungus in from the heavily diseased field. The grower owned both fields.

Late blight in Mississippi this year was not widespread and caused no damage to tomatoes (except in one small field) or potatoes. There was no comparison at all to the years 1944-45 with respect to damage. No comparison can be made to 1946 because the writer did not see the situation that year; however, reports indicated considerable losses in tomatoes last year.

MISSISSIPPI TRUCK CROPS EXPERIMENT STATION, CRYSTAL SPRINGS

LATE BLIGHT IN ALABAMA IN 1947

Coyt Wilson

Late blight was not a serious problem in Alabama during 1947. In January Mr. Frank Garrett at the Gulf Coast Substation, Fairhope, Alabama, reported the finding of a tomato plant infected with Phytophthora infestans. It is assumed that the fungus had survived the fall and winter on living hosts in that vicinity. However, all tomato and potato plants in southern Alabama were killed by a rather severe freeze that occurred in February.

Late blight was not found again until about the middle of April when it appeared in a field of Sebago potatoes near Bon Secour. Soon afterwards the disease was found in several different fields scattered throughout the southern part of Baldwin County. Apparently each of these infection centers had developed from diseased seed potatoes. The disease spread slowly from these centers and, except for those fields that were damaged by hail in late April, there was very little damage.

The total damage from late blight in Baldwin County was about 5 percent. Scattered infections of late blight occurred throughout Alabama on both potato and tomato but the disease never became serious. After May 1 the weather was mostly unfavorable for late blight development.

Copper dusts, applied with tractor dusters, proved to be reasonably satisfactory. The effectiveness of airplane dusting varied. Some growers were well pleased; others, with small fields surrounded by trees or other obstructions, found that better coverage could be obtained with ground equipment.

Dithane spray appeared to be very effective when applied with proper equipment. Some zinc ethylene bisdithiocarbamate dust was used, but there was no opportunity to compare its efficiency with the copper dust.

ALABAMA AGRICULTURAL EXPERIMENT STATION, AUBURN

NO LATE BLIGHT IN SOUTH GEORGIA

Edward K. Vaughan

I did not see any late blight infections at all during the 1947 season on either the tomato seedlings grown for shipment to the North, or toma-

atoes grown for shipment of "green wrap" fruit to northern markets, nor did anyone report the presence of this disease to me during the entire season. Frequent observations were made in many fields and if the disease had been present I am sure it would have been found.

A number of potato fields were also kept under observation. No late blight infections were seen and none were reported to me.

For the season of 1947, no losses due to late blight (Phytophthora infestans) were sustained by either tomatoes or potatoes in South Georgia.

Formerly with UNITED STATES BUREAU OF PLANT INDUSTRY, SOILS, AND AGRICULTURAL ENGINEERING, DIVISION OF FRUIT AND VEGETABLE CROPS AND DISEASES, TIFTON, GEORGIA

LATE BLIGHT IN NORTH GEORGIA

Julian H. Miller

The county agents in the southeastern counties found no blight as Dr. Vaughan reported. One of the state inspectors did discover some leaf infections on seedling tomato plants in a field of remnants after the plant shipping season was over.

In north Georgia I found some heavily blighted potato fields in Rabun County in July. This is one of the mountain counties where one can find Phytophthora every year on potatoes, but I did not see any on tomatoes in nearby patches. Recently, during the first week in November, I have collected it on tomatoes on the Horticultural Farm at Athens. There was none on the summer crop and it is unusual for it to appear now. This must be a holdover from last year of the same strain. Last year was the first time I had seen it in this region.

UNIVERSITY OF GEORGIA, ATHENS

LATE BLIGHT IN SOUTH CAROLINA - 1947

William M. Epps

Late blight on tomatoes and potatoes was only of very minor significance in South Carolina in 1947. It appeared early in May on pota-

toes and early in June on tomatoes, but because of hot dry weather following the initial appearance, no significant loss resulted to either crop.

Blight was first found on potatoes in the Edisto Island section of Charleston County on May 8, 1947. The farm on which it first appeared was in the same community as that farm where blight was first found in 1946. It was obvious from the extent of spread of the disease that at least one and possibly two secondary infection cycles had occurred prior to May 8. A rapid search of the same field on April 29 failed to reveal any blighted leaves. The disease spread slowly into the adjoining counties of Beaufort and Colleton and across from Edisto Island to the mainland and to adjacent islands in Charleston County. The hot dry weather retarded its spread and restricted the damage to the potato crop to less than 1 percent for the area as a whole. Only on a few farms was there a measurable loss and even there it was not severe.

Late blight did not appear on tomatoes until early in June. Tomatoes are not grown commercially in the vicinity of Edisto Island, where blight first appeared on potatoes. Blight appeared on tomatoes in the Charleston and Beaufort tomato areas about a month after its original appearance on potatoes on Edisto Island. No appreciable damage was caused because of the hot weather that followed the initial appearance. Some growers attribute control to the use of fungicides, but untreated fields on neighboring farms also suffered no measurable damage. No reports of the occurrence of late blight have been received from the inland counties of Orangeburg and Dillon that suffered so heavily in 1946. The Piedmont section of the State experienced a very dry season and no late blight developed.

In general a better dust program was followed in Charleston and Beaufort Counties than was followed in 1946. Most of the inland tomato farmers, however, were not equipped to apply fungicides and many of them either reduced their acreage or cut out tomatoes altogether rather than purchase the equipment necessary to dust the crop. A 6 percent fixed copper dust was used most extensively for blight control both on tomatoes and potatoes. A few growers used a Dithane Z-78 dust on all or part of their acreage. There was no opportunity to compare the two materials.

Late blight reappeared at Charleston late in July on some summer tomatoes in the breeding plots at the experiment station. It spread throughout the plot area in spite of the warm weather and caused considerable defoliation. No commercial tomatoes are grown in coastal South Carolina during July and no report of blight in home gardens was received.

LATE BLIGHT SUMMARY FOR NORTH CAROLINA, 1947

J. H. Jensen

The first report of late blight on potatoes was on the Coastal Plains on June 6 when scattered amounts occurred as digging operations began. With the exception of one or two irrigated fields where complete defoliation and some tuber rotting appeared no appreciable damage occurred. The advent of warm weather and the maturity of the vines held up progress of the disease.

In the mountain area late blight occurred as usual. Dry weather served to reduce the extent of infection on both tomatoes and potatoes in the early portion of the season. Some dusting of small tomato plantings was effective in reducing losses, especially to fruits, but there were heavy losses on tomatoes in home gardens. It was not possible to estimate total losses in the mountain area on either tomatoes or potatoes.

UNIVERSITY OF NORTH CAROLINA, RALEIGH

LATE BLIGHT SEVERE ON EARLY TOMATOES IN KENTUCKY

W. D. Valleau

Following the first outbreak of late blight on tomatoes late blight became general over the State and destroyed a large part of the early tomatoes in home gardens. Very few plantings escaped.

According to J. S. Gardner, commercial plantings of early tomatoes were saved when sprayed with Copper A, or dusted with C.O.C.S. dust. Cuprocide dust, he reports, was not effective. Late tomatoes and second crop potatoes got by whether sprayed or dusted or not.

UNIVERSITY OF KENTUCKY, LEXINGTON

LATE BLIGHT SUMMARY FOR WEST VIRGINIA--1947

H. L. Barnett

As was the case in most States, late blight of both potatoes and tomatoes did not cause the widespread destruction that was experienced in 1946. The disease appeared rather early (June 10) and had the appearance of duplicating the course that it took in 1946, but the spread did not materialize. Late blight was first found occurring on potatoes in Randolph County, and then was reported in rather rapid succession from a number of other counties in the State. However, the intensely hot and dry period that developed shortly after June 20 and continued on until about July 8 is believed to have been the greatest single factor in the limitation of late blight this year. Soon after July 4, reports of the occurrence of late blight ceased to come in and the Extension Pathologist had difficulty in finding an active case of late blight in the State.

Late blight of both tomatoes and potatoes did not reappear in any appreciable amount until around the 1st of August. At that time, it was found causing considerable loss in a commercial tomato field in Morgan County. Incidentally, the tomato plants in this planting were southern-grown plants, but other factors present could well have been responsible for the severity of the disease. The soil was exceptionally rich in organic matter and additional applications of nitrogen had been made. The plants were rank and growing vigorously but were planted at distances of 3 x 3 feet which, coupled with the growth of the plants, made for an almost solid mat of foliage. When this field was first examined, it looked perfect, but on going into the field and turning over some of the foliage, most of the under leaves were already diseased. Within ten days the field was practically a total loss. This instance was not duplicated in any of the other fields seen, even where southern plants were used. It is believed that the chief reason why other growers escaped such loss was due largely to the fact that the general planting distances this year were either 3 1/2 x 5 1/2 or 3 x 6 feet.

Generally speaking, the disease was not so destructive as it was in 1946, but it did cause considerable damage, especially in home gardens where an adequate spray or dust program was omitted. The area of the State most severely attacked this year was that of the central mountainous region and from thence eastward to the eastern limits of the State of West Virginia. The disease was found in scattered areas in other parts of the State but not in any great amount. The percentage loss of tomatoes for the whole State due to late blight was around 25 to 30 percent and for potatoes about 15 to 20 percent. The losses in potatoes were less, chiefly because a better disease control program is practiced

on that crop. Late blight of tomatoes is so recent that too many of the growers have not yet realized the importance of spraying or dusting.

Some cultural practices were suggested for the control of late blight; and copper, in bordeaux or fixed form, was the chief fungicide in use.

No information regarding the presence of strains of the fungus is available.

The above information has been summarized by Mr. C. F. Bishop, Extension Pathologist.

WEST VIRGINIA UNIVERSITY, MORGANTOWN

LATE BLIGHT OF TOMATOES IN WESTERN VIRGINIA

S. B. Fenne and S. A. Wingard

In the western part of Virginia, late blight in 1947 was first reported from Bedford County on July 10. On July 22, it was found on tomatoes and potatoes in Roanoke and Botetourt Counties. Numerous tomato fruits had been destroyed. In all cases where late blight was found on tomatoes, the crop was being grown adjacent to potatoes. On July 23, late blight was observed on tomato fruits in Bedford County. In one garden, about 50 percent of the fruits were infected. Weather conditions during July appeared to be ideal for the development of late blight: cool nights and warm days with frequent showers and high humidity.

During the period from July 22 to August 12, late blight apparently became fairly general over the State. Yet, because of the unusual weather conditions, wet and cool in some areas and exceedingly dry in others, late blight did not reach epiphytotic proportions except in a limited section of the Virginia Eastern Shore (reported by Dr. H. L. Cook, PDR August 1). Many reports concerning late blight were received from growers during this period, but upon checking these reports it was usually found that the trouble was due to blossom-end rot or some disease other than late blight.

On August 20, late blight could be found in practically every tomato and potato field visited in the mountain area of Southwest Virginia, but in most cases it appeared too late in the season to cause very serious losses. However, in individual cases, 75 percent to 100 percent losses occurred.

On the whole, tomato late blight was much less injurious this year than in 1946, with a probable reduction in yield in Western Virginia of

from 15 to 20 percent. We are at a loss to account for this great difference in the amount of late blight this year as compared to last on the basis of prevailing weather conditions and control measures employed.

This is especially true in the vicinity of Blacksburg, where the weather conditions appeared to be ideal for the development of the disease several weeks before it was first observed and continued so for several weeks thereafter. In spite of this, late blight did not reach epiphytotic proportions until very late in the season, actually just before a killing frost occurred in late September. There seemed to be some factor other than temperature and humidity responsible for the small losses sustained by tomato growers. While it is true that spraying and dusting was considerably increased over the past year, this cannot be given credit for the comparatively small losses sustained, because the disease failed to develop in such major proportions as last season even where no control measures were employed. Perhaps we did not have the tomato strain of the late blight fungus present in Virginia this season.

VIRGINIA POLYTECHNIC INSTITUTE, BLACKSBURG

SUMMARY OF LATE BLIGHT IN EASTERN VIRGINIA IN 1947

Harold T. Cook

Late blight was not important in Eastern Virginia in 1947. A trace occurred on the early crop of potatoes late in the season but caused no damage. Damage to tomatoes was confined to a small area at the northern end of the Eastern Shore. It is doubtful if blight would have received much notice this year if people had not been looking for it because of the epiphytotic in 1946.

The weather during the early part of the season was very unfavorable for late blight. Precipitation in May was 1.95 inches below normal and 4.64 inches less than in 1946. In June, it was 0.33 inches below normal and 0.67 inches less than in 1946.

The weather forecasting charts in May and June indicated that conditions were unfavorable for late blight and forecasts were issued to that effect on May 15, 22, 29, and June 5.

Two potato leaves affected with blight were found in a low sheltered corner of an irrigated experimental field on June 9. Other plants in that protected corner of the field became infected gradually but the spread was very slow and the rest of the field remained entirely free from the disease.

Fairly general foliage infection occurred in a few potato fields in Princess Anne County on June 24. These fields were located on lowlands and were surrounded by pine forests. This outbreak was associated with an average mean temperature of 71° F. and a 1.2-inch rain during the period of June 15 to 27. The potatoes were being dug at that time and there was neither reduction in yield nor tuber rot.

Light foliage infection was general on the potato crop in the northern end of the Eastern Shore during the latter part of July, but was not severe enough to attract the attention of the growers or to cause any reduction in yield.

A few specimens of tomato fruit affected with late blight were received from Princess Anne County on July 17 and 18. One lot was from a home garden located on low land. The tomatoes were growing alongside a row of blight-infected potatoes. The others were from a quarter-acre commercial planting that was also located on low wet land.

Light foliage infection was found in most tomato fields in Princess Anne County on July 28 and severe foliage and fruit infection was found in one commercial field. High temperatures in August checked this outbreak and even the severely infected field recovered and produced a large number of good quality fruit.

Tomato fruit infection was reported from the vicinity of Temperanceville in the northern end of the Eastern Shore on July 25. A survey on July 29 showed that late blight was epiphytotic in a six-mile wide belt across the Eastern Shore between Temperanceville and Nelsonia. Foliage infection was general from Temperanceville to the Maryland line (six miles), but the disease disappeared rapidly south of Nelsonia. The outbreak was associated with mean temperatures below 75° F. from July 24 to 30 and a very heavy rainfall at the beginning of the period. The Temperanceville-Nelsonia area also had a number of heavy local rains.

A survey on August 9 showed that the disease had been checked by high temperatures and that tomatoes were being picked even in the fields that had been severely infected. Fruit infection apparently had been confined to the Temperanceville-Nelsonia area. Blight had disappeared almost completely by August 18.

No blight was found in the lower three-fourths of the Eastern Shore or in the counties west of Chesapeake Bay.

It is estimated that 90 percent of the Virginia tomato crop was entirely free from blight and that severe damage was confined to less than 7 percent of the crop. Since blight was severe for only a short period, the reduction in yield probably amounted to not more than 3 percent.

There were numerous reports of late blight during the 1947 season, but except for those cited above, they were all erroneous. Blossom-end rot and buckeye rot were frequently mistaken for late blight infection of the fruit. In one case, a severe infestation of red spider was mistaken for late blight. Yellowing of the leaves as the result of the fertilizer leaching out was also mistaken for blight. More recently tuber worm damage to the potato tops has been mistaken for blight.

Tomatoes were remarkably free of fruit damage from anthracnose and bacterial spot. There was some Alternaria and some Septoria foliage infection, but it did not reduce the yields or the quality of the fruit.

The 1947 tomato crop was exceptionally good this year. There were exceptionally high yields and the fruit was remarkably free of defects. Canning factories were having difficulty in handling the crop toward the end of the season.

No spraying or dusting experiments were conducted by this Station. Experiments in previous years have shown that spraying or dusting does not pay in Eastern Virginia in an average year. However, one of the large canning companies persuaded some of the growers to spray or dust. A considerable number of those using fungicides happened to be located in the Temperanceville-Nelsonia area where late blight caused damage. These growers had made from two to five applications. Blight was equally as bad on fields that had been treated as those that had not. The treatments had been made earlier in the season when the weather was unfavorable for blight. No treatments had been made during the two weeks preceding the outbreak because at that time the plants were too large to treat without considerable wheel damage.

Spraying or dusting was recommended by this Station after the outbreak at the end of July. Some growers did dust by plane, but most of them did not treat because of the advanced stage of the crop and a temporary drop in price.

Spraying or dusting for such isolated outbreaks that occur in July and August will not be recommended in the future. A study of the weather records show that favorable weather for the blight does not last more than about seven days at that time of the year and that the disease will be checked by higher temperatures before sprays or dusts can take effect.

VIRGINIA TRUCK EXPERIMENT STATION, NCRFOLK

LATE BLIGHT IN MARYLAND IN 1947

Carroll E. Cox

Late blight of tomatoes was first observed in Maryland in 1947 on July 2, at two widely separated points. One was in a home garden near Hagerstown, in the western part of the State, and the other was in a small field near Federalsburg in the central part of the Eastern Shore. In both cases the tomatoes were growing adjacent to potatoes and evidence indicated that the pathogen had overwintered in potato tubers. In the Hagerstown garden both tomatoes and potatoes were affected by late blight in 1946 and volunteer potato plants came up in the garden in 1947 from tubers left in the ground over winter. In addition to tomatoes and potatoes, Solanum dulcamara L., growing as an ornamental in the same garden, showed late blight lesions on July 10. Inoculum from foliage lesions on all three species was capable of causing infection of tomato and S. dulcamara foliage in the laboratory. There may have been some spread of the disease from this initial outbreak, in Hagerstown, into nearby plantings before the disease was brought under control. The Federalsburg outbreak soon disappeared following the application of a fungicide and with the occurrence of warm dry weather there were no further outbreaks in that area during the season.

From July 10 to 15 weather favoring the development and spread of late blight prevailed throughout much of Maryland. Immediately thereafter, late blight appeared on potatoes in Western Maryland and on potatoes and tomatoes in the extreme southern part of the Eastern Shore. It also made its appearance on tomatoes in Carroll, Baltimore, and Harford Counties in the north-central part of the State. These three outbreaks apparently resulted from air-borne inoculum.

During early August, late blight was found at several places in Maryland near Washington, D. C. and in Kent County at the northern end of the Eastern Shore. It continued to spread in western and northern Maryland, especially in Washington and Carroll Counties, and in Worcester County on the lower Eastern Shore. Elsewhere the disease spread very little.

By the middle of August late blight was general in Worcester County and rather widespread in parts of Washington and Carroll Counties. It did not appear in the southern Maryland counties of the western shore until September. Late blight never became established in the central counties of the Eastern Shore where large acreages of tomatoes are grown. In contrast with 1946 there was no time during 1947 when late blight was truly epiphytotic throughout Maryland.

Overall losses from late blight were very light, in spite of severe damage in small areas. Early blight probably caused heavier losses

Table 1. Estimated occurrence and losses from late blight, and use of fungicides in commercial tomato and potato growing areas in Maryland in 1947

Area	:Percent of :total acreage :infected		:Loss as per- :cent of total :yield		:Percent of :total acreage :treated with :fungicide at :least once		:Percent of :total acreage :receiving :regular spray :or dust :program	
	:Tomato:	:Potato:	:Tomato:	:Potato:	:Tomato:	:Potato:	:Tomato:	:Potato:
WESTERN	:	:	:	:	:	:	:	:
MARYLAND	:	:	:	:	:	:	:	:
Chiefly	:	:	:	:	:	:	:	:
Washington:	:	:	:	:	:	:	:	:
County	: 15	: --	: 20	: --	: 95	: --	: 90	: --
Chiefly	:	:	:	:	:	:	:	:
Garrett	:	:	:	:	:	:	:	:
County	: --	: 8	: --	: 1	: --	: 50	: --	: 90
NORTH-CENTRAL	:	:	:	:	:	:	:	:
AREA	:	:	:	:	:	:	:	:
Carroll	:	:	:	:	:	:	:	:
County	: 50	: --	: 5	: --	: 75	: --	: 50	: --
Other	:	:	:	:	:	:	:	:
counties	: 3	: --	: 1	: --	: 90	: --	: 50	: --
SOUTHERN	:	:	:	:	:	:	:	:
MARYLAND	:	:	:	:	:	:	:	:
(Western	:	:	:	:	:	:	:	:
Shore)	: 2	: --	: 2	: --	: 5	: --	: 1	: --
NORTHERN	:	:	:	:	:	:	:	:
EASTERN SHORE	: 2	: --	: 1	: --	: 20	: --	: 10	: --
CENTRAL	:	:	:	:	:	:	:	:
EASTERN SHORE	:	:	:	:	:	:	:	:
Caroline	:	:	:	:	:	:	:	:
County	: --	: --	: --	: --	: 60	: --	: 20	: --
Other	:	:	:	:	:	:	:	:
counties	: --	: --	: --	: --	: 1	: --	: 0.5	: --
SOUTHERN	:	:	:	:	:	:	:	:
EASTERN SHORE	:	:	:	:	:	:	:	:
Worcester	:	:	:	:	:	:	:	:
County	: 50	: 10	: 30	: 2	: 70	: 50	: 50	: --
Other	:	:	:	:	:	:	:	:
counties	: --	: --	: --	: --	: 35	: 75	: 30	: 70

than late blight this year.

The extent to which fungicides were applied varied greatly in different parts of the State, but a larger percentage of the acreage was sprayed or dusted this year than in 1946 (see table).

The fixed copper compounds were the most widely used fungicides. Some Dithane was applied on the Eastern Shore and some Zerlate, especially in the north central part of the State, before late blight appeared. Growers in areas where late blight occurred seem to be generally agreed that a regular spray or dust program was better than attempting to time occasional applications on the basis of weather conditions. Most of them felt that the fungicides gave good control of late blight but inadequate control of early blight.

Dusters were used more extensively than sprayers, especially on the Eastern Shore. Some acreage was dusted with airplanes and helicopters, but only in the two northern counties of the Eastern Shore did the acreage dusted from the air exceed that treated with ground equipment. In areas where late blight occurred this year it is expected that about the same number of growers will apply fungicides again next year. In the areas where late blight did not appear in 1947 fewer growers apparently are planning to apply fungicides next year.

In about half of the commercial acreage of tomatoes wider spacing of plants was used than in previous years. Present indications are that more growers will use wider spacings next year.

Weather conditions together with the more widespread application of fungicides probably operated to reduce the amount of inoculum, retard establishment of the disease and thus to limit the severity of late blight in 1947 as compared with 1946.

The accompanying table summarizes estimates of the acreage infected and losses from late blight as well as estimates of the acreage protected by fungicides in commercial tomato and potato growing areas in Maryland in 1947.

There was general approval of the operation of the late blight warning service.

UNIVERSITY OF MARYLAND, COLLEGE PARK

LATE BLIGHT OF TOMATOES IN DELAWARE--1947

J. W. Heuberger

Late blight disease caused a negligible loss (1 percent) to the tomato crop in 1947, and the loss that occurred was entirely in untreated fields. The fact that approximately 75 percent of the tomato acreage was treated with a fungicide, coupled with generally unfavorable weather during August and early September for late blight spread and development, served to keep the disease in check.

Late blight was first found on June 26 in one field in Kent County; this remained the only case until July 22. The source of infection is not known. (In 1946, late blight was first found on May 29 in two fields planted with southern-grown plants). No further cases of late blight were found until the period July 22 to 31; on July 31, the disease was widely scattered over the State in untreated fields whereas it was not present, or difficult to find, in treated fields. This period coincided with the report by Dr. H. T. Cook (PDR 31 (9): 335-337) of an epiphytotic in the northern half of Accomac County on the Eastern Shore of Virginia. (In 1946, the first wave of infection occurred the first week of July. This period coincided with a period of heavy foliage and fruit infection on the Eastern Shore of Virginia.)

Very little spread and development of late blight occurred after July 31 as the weather from then on, particularly the first half of August, was generally unfavorable. Of interest, however, was the fact that fruit infection increased in untreated fields during the first half of August in spite of unfavorable temperature and rainfall conditions. This may indicate that the temperature and moisture conditions within the confines of the plant were favorable even though the external conditions were not.

The late blight disease was not a problem on late potatoes. It was found in the southeastern corner of the State in late August in fields on low land. It made little progress for the remainder of the season. (In 1946, the disease was epiphytotic on late potatoes). In view of the heavy tuber infection in 1946, it was anticipated that the fungus would carry over-winter in infected tubers in fields that were not harvested. However, examination of volunteer potato plants in these fields in the spring of 1946 revealed that none showed late blight and that all the plants came from healthy tubers. Thus, the infected tubers must have rotted during the winter, probably being destroyed by soft rot bacteria.

The outstanding features of the late blight situation in 1947 were three in number:

1. Infected tubers left in the ground apparently rot during the winter.
2. The extensive control program followed by the growers.
3. The fact that the first general wave of infection in Delaware seems to be correlated with epiphytotics on the Eastern Shore of Virginia.

AGRICULTURAL EXTENSION SERVICE, UNIVERSITY OF DELAWARE, NEWARK

1947 PENNSYLVANIA TOMATO LATE BLIGHT SUMMARY

R. S. Kirby

Tomato late blight in 1947 was about three-fourths as severe as it was in 1946. If no sprays or dusts had been applied the loss in Pennsylvania in 1947 would have been about 40 percent. However, spraying and dusting reduced the average loss to about 20 percent.

Factors that reduced the amount of late blight loss in 1947 were the late appearance of the late blight organism and the period of hot weather which started in August. In 1946, late blight was first found on tomatoes on May 28 and on potatoes on June 8. In 1947, late blight was first found on tomatoes on July 9 and on potatoes on June 27. Surveys of several hundred tomato fields indicated that no late blight came into the State on plants. It appeared that the tomato form of late blight wintered over on potatoes in Pennsylvania and spread from potatoes to tomatoes.

The loss to tomatoes was most severe in the central and northern parts of the State where 50 to 90 percent of undusted and unsprayed tomatoes had blighted. In the area around Philadelphia, the loss in 1947 was from a trace to 10 percent, while in 1946, it ranged from 33 to 70 percent. In the western part of the State, late blight was nearly as heavy as in 1946. Near Lake Erie late blight did not appear until in October and then caused only a moderate loss.

The period of hot weather which started early in August checked most of the late blight in southeastern Pennsylvania, but further to the north and west where it was slightly cooler, late blight continued to spread.

A spray information service on tomato blight was conducted. Spraying or dusting with copper was recommended. At least twenty-five tomato spray rings were in operation. Spraying, where timely and properly applied, prevented and stopped late blight. Dusting was observed to be less effective than spraying.

PENNSYLVANIA STATE COLLEGE, STATE COLLEGE

LATE BLIGHT OF TOMATOES IN NEW JERSEY IN 1947

C. M. Haenseler

Late blight on tomatoes in 1947 was far less important economically than in 1946. The disease was present in the State as early as April 25 on greenhouse-grown plants and remained in an active condition throughout the summer and until after heavy frosts in the fall but at no time during this period was there a very destructive development of the disease on tomato fruits over an appreciable area.

The history of the advance of the blight disease in 1947 was about as follows: On April 25 the disease was observed on young plants in a greenhouse in Burlington County into which a few infected plants had been brought late in the fall of 1946 and kept all winter for production of fruit for table use. A few blight-infected fruits were still on these old diseased plants after the young tomato plants were potted and the old plants were not removed until after there was evidence of infection on some of the 6-inch tall potted seedlings. It was evident therefore that the blight in this case had overwintered on the old plants and had spread from these to the seedlings. All of the obviously diseased potted plants were discarded and the remainder sprayed repeatedly with copper fungicides and no further trouble from blight was reported from this source.

The next case of Phytophthora infection was detected on July 3 on potatoes, also in Burlington County. This was in no way associated with the greenhouse case on tomatoes observed on April 25 but seemed rather to have originated from diseased refuse from a pile of blight-infected potatoes which had been temporarily stored in the field the previous fall.

Tomatoes growing near this infected potato field showed no blight on July 3 but by July 11 the disease had spread to, or developed independently on tomatoes close to the infected potatoes. This was the first field infection (July 11) observed on tomatoes in 1947. By July 15 the blight had been observed in small amounts in three counties; -- Burlington on July 11, Salem on July 14 and Middlesex on July 15. Soon after July 15 the disease was detected in field after field and before August 1 there was evidence that blight had become statewide in distribution. In some cases infection was very conspicuous on the foliage but almost absent on the fruits, and in general, blight was less prevalent on the fruit than on foliage this year.

Phytophthora infection was also widely scattered here and there over the State on potatoes but despite the fact that the disease started on July 3, which is unusually early for potato blight in New Jersey, the disease did not become severe in many fields. In some

cases blight could be found in an active state in a particular potato field week after week and still affect only a plant here and there. This continuous presence of the disease but failure to attack a large percentage of the plants also occurred on tomatoes. The infection pattern therefore seemed to be very similar in both potatoes and tomatoes.

The cause for the small amount of tomato blight in 1947 as compared to 1946 in New Jersey may be due to several factors. It was quite obvious that the most important of these factors was weather conditions. Even in fields where blight became established early in the season and where no fungicides were applied it was observed that new infections occurred during every brief damp period but the lesions would dry up and sporulation cease again within a few days when weather conditions became less favorable for the blight. At no time were temperature and humidity conditions highly favorable for sporulation and infection over long periods of time such as occurred in 1946.

There were other factors operative which no doubt helped materially in preventing an epidemic of tomato blight in New Jersey this year. In 1947 we received no blight-infected plants from the South whereas in 1946 infected southern-grown plants were known to have been sent north in large quantities, and while no conspicuously diseased plants were received in New Jersey, there was evidence that incipient infection in certain lots had occurred before they arrived here.

In 1947 New Jersey also used much more copper and other fungicides on tomatoes than in 1946. While this can not account for light infections in unsprayed fields the general use of fungicides no doubt prevented serious outbreaks of blight in many fields where conditions were highly favorable for development of the disease.

In all cases where direct comparisons could be made between plants treated with fungicides and comparable plants that had received no fungicides it was again evident that late blight of tomatoes can be successfully controlled by the use of copper and certain other fungicides.

No observations were made this year on varietal susceptibility.

NEW JERSEY AGRICULTURAL EXPERIMENT STATION, NEW BRUNSWICK

LATE BLIGHT IN NEW YORK STATE 1947

Charles Chupp

On Potatoes. The estimate of the total loss in the State, as

presented by the potato inspection service, is 20 percent. Fifteen percent of this loss is due to reduced yield and 5 percent is the result of tuber rotting. This seems rather a large loss during a year when much spraying was done. First, it probably was the worst year for blight ever recorded in the State. The blight came early and was able to spread almost the entire season. Secondly, nearly all the spray rings accepted a maximum number of acres to spray. Then it rained continuously so that the spray operator could not make any applications at critical times, or came so late that infection had taken place. In order to cover the acreage, the operator was tempted to drive the tractor too fast, and to neglect adjusting or cleaning nozzles. There still are many growers of garden plots or small acreages who did not spray at all.

On Tomatoes. Although 1947 was a worse year for blight than was 1946, the total tomato crop loss was much less. Conservative estimate for 1946 was a 50 percent loss; some placed it as high as 70 percent. Nearly every tomato-growing county was visited in 1947, and approximately 200 people were interviewed in regard to the losses for the present season. Some growers reported no blight, while a few said their crop was a total loss. But the average of the combined reports was slightly over 7 percent. It, therefore, would seem justifiable to suggest 7 to 10 percent as the loss in the tomato crop.

The great reduction in loss from that of 1946 was due to early and frequent warnings over the radio, in news articles, and to county agricultural agents, that the crop should be sprayed or dusted with copper. There was hardly a gardener who did not attempt making some applications. Canning companies and county agricultural agents organized spray rings and in a few instances airplanes were used. Even one application of copper did some good and where five or six applications were made, the crop was almost free of blight rot.

Late in the season some growers became alarmed because their copper-sprayed plants were dying. They thought blight was the cause, but in all the instances observed by the extension specialist, this late infection was caused by Cladosporium leaf mold.

All indications are that throughout the entire State the greatest virulence obtainable of the fungus on tomatoes was present during the entire season, so that tomatoes became infected as early as the weather permitted development of Phytophthora.

There was a distinct difference of susceptibility of tomatoes the previous year when some of the Phytophthora inoculum could affect only the more susceptible tomato varieties, and do this as readily as it could cause infection in Green Mountain potatoes. Still other varieties of tomatoes were almost immune until late in 1946. But in 1947 all were susceptible.

TOMATO LATE BLIGHT NOT IMPORTANT IN CONNECTICUT

James G. Horsfall

We do not feel that late blight of tomato amounted to anything of consequence in Connecticut in 1947. We did find some of it occasionally in a garden or two but this is more or less normal in this State.

Late blight of potato appeared to be of as much consequence in 1947 as it was in 1946, but late blight of tomato certainly was not.

CONNECTICUT AGRICULTURAL EXPERIMENT STATION, NEW HAVEN

LATE BLIGHT IN 1947 IN RHODE ISLAND

John B. Rowell

In Rhode Island during the past season, late blight was widespread on potato foliage while only a trace of this disease was found on tomatoes. Late blight was first observed on potatoes on July 21 in the area around Kingston, Washington County. The disease apparently became established during the cool, moist period of July 19 to 20. The source of the primary inoculum was not determined. The weather from July 19 to July 24 was especially favorable for the disease and during this period it spread throughout the potato-growing areas of the State. The disease was very destructive in poorly protected fields; 90 percent defoliation was observed in several such fields on July 28. Additional outbreaks of the disease occurred during the favorable weather of August 16 to 18 and September 14 to 16.

The disease was adequately controlled in those fields sprayed weekly with a 10-5-100 Bordeaux mixture at a rate of 150 gallons per acre. Fields in Newport County that were dusted with neutral copper had a higher percentage of infection early in the season than nearby Bordeaux-sprayed fields.

The importance of late blight on the potato crop for the past season is difficult to evaluate. For poorly protected fields, this was a severe blight year as evidenced by their early defoliation. However, most growers were influenced by losses of last year to follow the Experiment Station recommendations. Late blight was effectively checked in their fields. An overall loss of 10 percent is estimated for this State.

Only traces of late blight on tomatoes were observed in Rhode Island during the past season and losses were negligible. The disease was reported on this crop in Newport County on July 30, and in Washington County on August 8. These fields were carefully observed but little spread of the disease was noted, even during the periods of favorable weather in which this disease was highly active on potatoes.

RHODE ISLAND STATE COLLEGE, KINGSTON

POTATO AND TOMATO LATE BLIGHT SUMMARY FOR MASSACHUSETTS, 1947

O. C. Boyd

This year, the weather for June and July was not far from normal. The mean temperature for July was 2.4° F. above normal and total precipitation 1.36 inches below normal, but the number of rainy days was 3 above normal. The occurrence of late blight on potatoes during those two months was about what we usually find, that is, scattered primary infections on cull piles and in poorly sprayed or unprotected fields, with limited secondary spread during the latter part of July.

This year in only one section of the State, did the disease make appreciable headway on potatoes during July even in unsprayed fields, namely in Bristol County where weather conditions are likely to be conducive during July in any year. During the first week of August, a few scattered light infections were observed on potatoes in the Connecticut River Valley. But so far, not a single confirmed case of late blight on tomato had been reported.

The weather for August turned out to be abnormally warm and dry with a mean temperature at Amherst of 73° F. (normal 68.6°) and 1.67 inches of rainfall (normal 4.08). In fact, the warm weather continued until September 15. The mean temperature for September 1 to 15 was 72.9° F. With light rains on August 16 and 20, and heavy rainfall August 26 and September 2 (0.95 and 1.21 inches respectively), late blight made only slight headway anywhere in the State during that comparatively warm, dry period from August 1 to mid-September. Nevertheless, the fungus did remain active in some sprayed and unsprayed potato fields and it even spread considerably in certain fields with abnormally heavy vine growth. Still, the disease had not appeared on tomatoes even on thickly matted (tomato plants) vegetable cull piles located in sections where late blight was present on potatoes during the latter half of July.

Following the rainy period of September 13 to 16 (0.79 inches), the weather suddenly turned and remained cooler, and late blight really

"came into its own" until plants were killed by freezing temperatures on September 27 and 28. The mean temperature for the period September 16 to 26 was 55.4° F. Late blight increased rapidly in potato fields where protection had not been maintained and it showed up generally around September 22 to 26 on unprotected field and garden tomatoes that had not been staked or trellised.

In general late blight behaved on potatoes as one might expect it to during the kind of season that prevailed. The situation on tomatoes suggests that either the tomato strain simply was not present until late in the season (which situation is the normal one here), or that the weather was not sufficiently cool and moist from mid-July to mid-September for it to develop even on unstaked and untrellised tomato plants.

Losses from late blight in Massachusetts this year might be rated as a trace on tomatoes and about 0.5 percent on potatoes.

With the kind of weather conditions that prevailed generally, late blight on potatoes was readily controlled even by dusting programs.

MASSACHUSETTS STATE COLLEGE, AMHERST

LATE BLIGHT IN VERMONT, 1947

Thomas Sproston

The first appearance of late blight of potato in the State was on July 7 in the north-central potato-growing section. This was the earliest date on record for the appearance of late blight, according to several who have worked in the State for many years. By August 1 to 10 late blight was general throughout the northern part. Unsprayed fields showed complete death of vines by August 15. The disease was more severe this year than last on vines, but because of dry weather in September very little tuber rot was reported or observed.

Late blight on unsprayed tomatoes was observed in the Lake Champlain Valley at Shelburne on July 23. As in other unsprayed garden plots the crop was a total loss in ten days time. The disease was easily controlled this year in fields that were sprayed or dusted before the above date. Late blight appeared east of the Green Mountains in the potato-growing section at the same time that it appeared west of the Green Mountains in the Champlain Valley. This is of interest because late blight was severe on potatoes east of the Green Mountains long before its appearance on tomatoes. Also, there are no potatoes grown, except in home gardens, in the Champlain Valley. Although there was

severe blight on potatoes east of the Green Mountains, the disease was easily controlled on tomatoes this year by spraying.

Tomatoes were planted late this year. Total rainfall for June was 4.84 inches and for July 4.9 inches. Frequency of rains and temperatures were favorable for blight development on tomatoes during July but infection was not so heavy nor so general as it was last year.

UNIVERSITY OF VERMONT, BURLINGTON

LATE BLIGHT ON POTATOES AND TOMATOES IN NEW HAMPSHIRE FOR 1947

M. C. Richards

The incidence of late blight in New Hampshire for 1947 was spotted. In the northern part of the State a few moderate outbreaks occurred. No tomatoes are grown commercially in this area and as most commercial potato growers follow adequate spray or dust programs, tuber rot was held to a minimum. In the southern part of the State the weather was favorable for blight development during July. A few farms reported moderate leaf infection, but here again the spray and dust programs plus unfavorable weather for blight development in August and September resulted in excellent blight control. The weather was so unfavorable for blight development in the Durham area that untreated plants in the fungicide test plots were free from disease. During August only 0.62 inches of rain fell as compared to over 8 inches for 1946, and during September and up to the present time, October 17, during the harvest season, one of the longest dry spells in the history of the State has occurred.

Losses from late blight on tomatoes and potatoes will be lower in New Hampshire this year than in many years.

NEW HAMPSHIRE AGRICULTURAL EXPERIMENT STATION, DURHAM

LATE BLIGHT UNIMPORTANT IN MAINE

M. T. Hilborn

Late blight was relatively unimportant in Maine in 1947. The weather during the latter part of the growing season was not favorable for its development. Only a few scattered instances were found on tomatoes, and no commercial loss occurred.

On potatoes the disease was not causing much loss at digging time. In the central part of the State (Piscataquis County) late blight was fairly common and in some fields losses up to 10 percent were estimated. In Aroostook County the area around Fort Fairfield, Caribou, Presque Isle, and Mars Hill (central Aroostook) had very little late blight. South of Mars Hill the disease was quite general, but losses at digging time were light. However, many growers were digging while the vines were green and some storage losses can be expected.

MAINE AGRICULTURAL EXPERIMENT STATION, ORONO

SUMMARY OF LATE BLIGHT IN OHIO, 1947

T. H. King

Late blight was reported as present in commercial tomato plantings in 17 counties in Ohio, first making its appearance on tomatoes July 17 in Meigs and Washington Counties. However, it was also reported on potatoes on July 11 in Miami County.

The disease has been universally reported on both potatoes and tomatoes in small garden plots throughout the State. Although the disease was first reported on tomatoes in the southeastern corner in the staked tomato area, it did not spread from the original fields and caused no appreciable loss in the rest of the staked tomato area. In the commercial canning area in the northwestern part of the State it has been impossible to make an estimate of the amount of loss caused by late blight this year, since the crop was very late in its development and was largely destroyed as a result of the early frosts. However, the disease was reported as universally present in the canning areas just prior to the killing of the tomatoes by the frosts.

In contrast to last year there was no infection of young plants at setting time by the late blight disease, and in no case were southern transplants found to be infected with the disease.

Spraying, ground dusting, and airplane dusting were all practiced in Ohio this year for the control of late blight. One airplane company reported dusting 3000 acres of tomatoes. The results of our experimental plots indicated that the recommended spray schedules gave excellent control, whereas in the non-treated checks 75 percent of the plants were destroyed by the late blight disease. Approximately 10 percent of our commercial growers attempted control measures this year. Many others were prepared to spray or to dust if conditions became favorable for the development of late blight in fields where the tomatoes had progressed sufficiently to warrant the expenditure. It must be under-

stood that the commercial tomato crop was a month late in development this year and in many cases fields were not sufficiently developed to warrant expenditure for fungicidal applications for disease control.

Generally speaking, after the plants were set in the field weather conditions were unfavorable for the development of the disease this year during most of the growing season. Favorable weather conditions for late blight development did not occur until September at which time wet, cool weather prevailed. There was an immediate increase in prevalence and distribution of late blight, but the crop was destroyed by frosts before the disease could take its toll.

OHIO STATE UNIVERSITY, COLUMBUS

LATE BLIGHT ON POTATOES AND TOMATOES IN INDIANA IN 1947

R. W. Samson

Late blight developed to a limited extent on Indiana tomatoes in 1947 wherever rains during July kept vegetation luxuriant. Locally severe damage occurred in a few fields in southwestern, central, and, in a restricted area, in northeast-central Indiana. Elsewhere, the disease could mostly be considered as a trace.

Blight-infected very early potatoes seem the most likely source of inoculum for the southern and central occurrences of the disease. Blight-infected tomato transplants from the Lower Mississippi Valley area are suspected as the most likely source of the disease in northeast-central Indiana, and probably elsewhere.

Except for a period of relatively limited rainfall from about June 10 to July 12, the season from early May to August 3 was favorable for tomato late blight. Delayed setting and limited plant growth during this period were considered a deterring factor.

Initial sources of the disease and opportunities for build-up were obviously much less for this period in 1947 in Indiana than for the same periods in 1945 and 1946. Above-normal August temperatures generally checked the disease, except apparently in the limited northeast-central area.

Limited development of blight on very early potatoes occurred during late May and early June in southern Indiana, with a few locally quite severe cases. Very limited rainfall occurred throughout the commercial, muck soil potato area of northern Indiana during July, August, and much of September. Only two reports of late blight on potatoes have been

recorded from that area.

In chronological order, the Indiana late blight situation this past season was about as follows:

May 23: Late blight was reported on very early potatoes in Warrick County in southwestern Indiana. Temperatures and rainfall during May in this area were favorable for the disease, particularly where early and heavy foliage growth augmented the general humidity level.

May 23-June 12: Rains seriously delayed setting of the canning tomato acreage.

June 12-June 21: Late blight was anticipated in late July and early August if weather then should duplicate that of the same period in 1945.

Contributing factors: (1) Above-normal rainfall and below-normal temperatures during May and to about June 12. (2) Possibility of limited but rather widespread introduction of the disease on tomato transplants shipped to many sections of the State from western Tennessee and Kentucky during early June. However, there is no record of late blight intercepted in Indiana on plants from those areas. (3) Anticipated heavy vegetative growth of many late-set and direct-seeded tomato fields.

July 14-July 22: Tomato late blight was noted in Vanderberg (southwestern) and Hendricks (central Indiana) Counties. Limited plant growth and restricted rainfall were considered unfavorable for the disease in much of the State.

July 22-July 30: Specimens and confirmed reports of tomato late blight were received from Dubois, Jefferson, Putnam, Montgomery, and Huntington Counties, apparently associated with a period of showery weather subsequent to July 12. Blight development was suspected wherever rains during July kept general vegetation luxuriant over sizeable areas.

July 30-August 15: Additional reports of late blight came from Warrick County, and first reports from Howard, Jackson, Washington, Orange and Pike Counties.

Temperatures subsequent to August 2 were above-normal and checked any additional blight throughout the State, except possibly in Howard and Grant Counties.

August 15-September 2: Several severely blighted tomato fields were observed on August 30 in southern Grant County. The disease here was associated with (1) woods breaking prevailing winds from the south-

west; (2) heavy fertilization and consequent rank vine growth; (3) tall corn fields almost entirely surrounding the tomato fields.

September 2-September 24: Reports were received of destructive late blight in a limited area in Howard and Grant Counties. Local rains kept pastures and general vegetation luxuriant in this area during August.

September 24: Late blight was found in abundance in one potato field in Kosciusko County, adjacent to a large lake. No damage resulted, as frost and herbicides were killing the vines. No tuber infection was found, but the field was in danger if heavy rains should occur before complete death and dessication of the vines.

October 20: Two blight-infected potato tubers were received from LaGrange County, a dry area during August and September.

October 20-October 31: Late blight damage was suspected on July-planted potatoes in the Ohio River counties, but no reports were received.

PURDUE UNIVERSITY AGRICULTURAL EXPERIMENT STATION, LAFAYETTE

PRACTICALLY NO LATE BLIGHT IN ILLINOIS

M. B. Linn

Following his discovery of late blight on tomatoes in Union County, Illinois, on July 30, Mr. G. H. Boewe of the State Natural History Survey revisited this area later without finding any evidence of spread to other plantings. By August 19, the fungus could not be seen even in its original location.

Between July 1 and October 1, both Boewe and I visited at one time or another practically every tomato canning area in the State. At no time did we find any trace of late blight. Inspection of potato fields in the northern part of the State during August and September did not reveal any late blight infections. In most years we have been able to find at least traces of late blight on potatoes in the northern tier of counties. We were told that late blight was present in a potato field in Whiteside County but we were unable to find any.

There is little doubt but that weather conditions were more favorable throughout most of the State for late blight development in the spring and early summer of 1947 than they were in 1946. On the other hand, the weather was less favorable during July and August of 1947

than during the same period of 1946. Late blight on potatoes was widespread in Adams and Madison Counties in 1946 but was not present in these areas in 1947 despite more favorable weather for blight. Perhaps lack of infected planting stock is the sole explanation. Weather was more favorable for blight on tomatoes in the Vermilion County area in May and June of 1947 but the disease did not appear. Again, perhaps this is due to blight-free potatoes in the vicinity plus the absence of Phytophthora on southern-grown tomato plants.

Early in the season, arrangements for late blight reports were made with 12 canners' field men or responsible growers in strategic locations throughout the State. None of these reported the presence of the disease. Therefore, we are reasonably sure that late blight was not serious enough in 1947 -- with the one exception cited above -- to be noted in Illinois. We did not see the disease at any time on southern-grown transplants.

UNIVERSITY OF ILLINOIS, URBANA

POTATO LATE BLIGHT IN MICHIGAN DURING 1947

L. Carl Knorr

This report of potato late blight in Michigan during 1947 is based upon the observations of various potato specialists, all of them qualified in the recognition of late blight. To these, appreciation is herewith expressed for assistance during the 1947 Michigan survey; they include: Professor D. L. Clanahan, Professor Henry Moore, Dr. J. H. Muncie, Dr. Ray Nelson, Mr. H. A. Riley, Dr. J. R. Vaughn, and Professor Ernest Wheeler.

Potato late blight was first observed in Michigan this year the 23rd of July. Isolated plants in numerous fields of the Upper Peninsula's Luce, Schoolcraft, Delta, and Marquette Counties showed leaf infections on examination by Professor Moore. In a few low spots, infection was heavy, but in general it was of little significance. Later, dry weather inhibited the spread of late blight, and frost killed the tops before subsequent infections could make much headway.

Some 40 Upper Peninsula fields, most of them growing seed, were visited by Mr. Riley at digging time; in only two was any tuber blight observed. Losses were negligible. Previous to digging, Mr. Riley's survey of Upper Peninsula fields revealed leaf infections in the counties of Iron, Menominee and Delta, but these were slight and scattered except for several fields in Delta County which were completely down from leaf blight. No report of tuber loss has yet come to this office on

these fields. No infections, leaf or tuber, were observed from the Cooks area east to Newberry.

Professor Clanahan, also reporting for the Upper Peninsula, declares that while late blight got an early start in the fields of Delta, Marquette, and Dickinson Counties, the effect on vines was so slight that it is doubtful whether yields were affected. A few fields in this area showed tuber blight, but in no affected field did losses from tuber rot exceed 1 percent.

Potato late blight in the Lower Peninsula was first reported on July 28, when it was observed in Professor Wheeler's irrigated experimental plot at Pinckney (Southeastern Michigan). Its development in this area was halted by a late summer drought and heat wave and not until digging time did late blight weather set in again. Losses from tuber rot, if present, have probably been low, judging from the lack of questions coming to this office. However, one field has been reported as being affected with 25 percent tuber rot. While the affected field was sprayed regularly, the growth of vines on this muck farm was so rank that difficulty was encountered getting in with machinery for the later applications. Late blight was also present in East Lansing where Dr. Muncie noticed it on his dusted experimental plots. Ten percent of the tubers were late blight-affected.

Late blight was also reported on potatoes in the Grand Rapids area (northern part of Southwestern Michigan). Several fields with leaf blight came to the attention of the writer, and Dr. Nelson reports a small degree of tuber blight in his unsprayed rotation plots on muck.

Mr. Riley surveyed the Rogers City area (Northeastern Michigan) late in July and saw some leaf blight, but a survey of the same fields at digging time revealed no tuber rot whatever. In fact, none of the Lower Peninsula fields he visited at digging time -- and those totaled about 100 -- showed any sign of tuber late blight.

It is the consensus of potato specialists in this State that in 1947 potato late blight affected vines to a moderate extent in scattered fields throughout the State. This infection was slowed down or came to a halt because of dry hot weather the latter part of July, and loss in yield due to leaf blight was generally negligible. Favorable late blight weather again set in during the digging season, but with a few exceptions, tuber late blight was inconsequential.

MICHIGAN STATE COLLEGE, EAST LANSING

TOMATO LATE BLIGHT IN MICHIGAN, 1947

M. C. Strong.

August, 1947, was one of the hottest dry periods ever recorded at our local weather station, as well as in the entire southern portion of the State. No late blight appeared until mid-September, when it was reported from two fields in Oakland County and several points in Lenawee and Monroe Counties. The loss due to this disease is estimated at less than 1 percent of the crop. Killing frosts occurred within one week of the first appearance of the disease.

About 700 acres of tomatoes in Lenawee and Monroe Counties were dusted twice with Dithane by airplane. No late blight was reported from these fields.

One tomato field that showed considerable infection had been planted last season with potatoes, which had been blighted.

MICHIGAN STATE COLLEGE, EAST LANSING

POTATO LATE BLIGHT IN WISCONSIN

R. E. Vaughan

Owing to seasonal conditions of drought and high temperature in July and August, the late blight disease did no damage to the Wisconsin potato crop. Traces of blight lesions were found September 19 in Walworth County on a muck farm, on late Katahdin and Russet Burbank varieties only. Reports of traces in Marathon County have been received but have not been substantiated by specimens. I have been watching potato disease development in Wisconsin for the past 36 years, and have seen less blight this year than in any other in my memory.

Spray and dust applications were carried out by our Economic Entomology Department. Because of lack of blight infection in the plots no disease data are available. Applications of bordeaux mixture, tribasic copper sulfate, Dithane, and Parzate were made in combination with DDT as the insecticide. Yield data are not available at this time.

No late blight was seen or reported on tomato plants.

UNIVERSITY OF WISCONSIN, MADISON

LATE BLIGHT IN MINNESOTA -- 1947

C. J. Eide

Tomato

None was seen and none reported, as compared with an estimated loss of 10 to 20 percent in 1946.

Potato

Blight was a little more prevalent on potatoes than in 1946, when it was seen on only two peat fields. The 1947 situation may be summarized as follows:

1. First reports. Hollandale, July 9; Red River Valley, August 19; Two Harbors, about August 20; Duluth area, September 6; none was observed in North-central Minnesota except a trace at Grand Rapids, in September.

2. Severity. Hollandale: Infection was heavy in spots of poorly sprayed fields in July, but in general the disease was kept under control during the season.

Red River Valley: Blight was general, though light in most fields as far south as Nielsville, which is about 30 miles south of East Grand Forks. South of Nielsville there was less rain during the summer than there was further north. One field near Donaldson in Kittson County was 100 percent infected, and about 75 percent defoliated. This was the worst outbreak observed.

Duluth and Two Harbors: Blight was general, but severe only in a few spots. One field of Green Mountain was reported 50 percent defoliated.

Although blight caused appreciable foliage loss in very few places in Minnesota, it is too early to know how much tuber rot will result, and this is the most destructive phase of the disease. One carload of potatoes from Warren in the Red River Valley has been reported with 12 percent infected tubers. There will probably be more in fields harvested before the severe frost of September 21. A few blighted tubers were observed at harvest near Hollandale.

3. Source of infection. Blight was observed on volunteer plants from pitted potatoes near Hollandale. No infection was found on potato dumps in the Red River Valley, in spite of a careful search. Infection there probably started from seed. No observations were made of dumps in the Duluth area, so the source of infection is unknown.

4. Use of fungicides. Growers in the Hollandale area use Bordeaux or Dithane, and spray as often as seven times during the season. Control seems to be very effective. Most of the growers in the Red River Valley dust with slow soluble coppers, but apply those only about three times, usually too early to protect against blight. Some airplane dusting is done later in the season, but blight was not severe enough to prompt more than a few growers to do this in 1947.

UNIVERSITY OF MINNESOTA, UNIVERSITY FARM, St. PAUL

LATE BLIGHT IN IOWA IN 1947

W. F. Buchholtz

Late blight was found on potatoes in north-central Iowa, near Clear Lake and Fertile, for the first time on July 24. This occurrence probably was coincident with that in the Hollandale, Minnesota, area, which has been reported as first observed on July 9.

As a result of a regular spray program with Bordeaux mixture and continuous dry warm weather, there was very little further late blight development, although as late as September 11 there were some active, sporulating lesions on potato foliage near Fertile.

- All spring and early summer, there was cool, wet weather in Iowa, very favorable for late blight development. A heavy rain on the evening of July 4 abruptly terminated this condition and just as abruptly ushered in an extremely dry, warm period which extended at least to October 20, the date of this writing.

With the early occurrence of Phytophthora infestans on potato foliage in northern Iowa, the stage was set for an epiphytotic. Instead, because of the unfavorable weather of late summer and early fall, there was very little development and spread, and the potato crop loss for the season was estimated at a trace.

No tomato late blight was found in Iowa in 1947. Evidently southern-grown plants were not infected, and there was no observed development of late blight on potatoes in commercial tomato-producing areas.

Dr. W. J. Hooker concurs in these observations and in the presentation of this summary.

IOWA STATE COLLEGE, AMES

LATE BLIGHT IN CANADA

I. L. Conners

Late blight (Phytophthora infestans) was first observed on potatoes in Eastern Canada in 1947 at two widely separated points in Nova Scotia on July 17. During the next three weeks it was reported in Prince Edward Island (July 22), New Brunswick (August 8), Quebec (July 30 - August 2), and Ontario (July 28). At the north-western limit of the Warning Service area, late blight was not recorded until August 22, when it was found at Winnipeg, Manitoba.

A full account of the epidemiology of late blight for each of the provinces of Eastern Canada is not available. In Prince Edward Island, where rather complete observations were recorded, the disease was first reported in Queens County, near Charlottetown on July 22 following a week of humid weather. Later observations disclosed that the infection in one field was from a nearby cull pile and that eventually it spread over 14 other fields from this single source. Late blight was found in Kings County on July 30 and in Prince County on August 19.

Growers were advised to begin spraying for the control of blight on July 17 and, in the next two weekly bulletins, to continue their programme. The weather became dry early in August and continued quite dry during August and the first half of September. There was at times some spread of late blight in fields where the disease had become established earlier in the season, but blight was virtually absent in well-sprayed fields. In the experimental plots at Charlottetown a late blight epidemic was only established after repeated inoculations. Most fields of the late varieties were still so green at the end of the growing season that growers were advised to begin spraying with vine-killing sprays on October 1.

Late blight appears to have continued to spread in Nova Scotia, New Brunswick, and Quebec until about the middle of August. The disease had extended along the Saint John River Valley, New Brunswick, from Fredericton to St. Leonards by August 16, infection varying from slight to severe, and extensive blight development was predicted. By the same date late blight had been found in most potato-growing districts of Quebec and further blight development was expected. In Ontario, late blight had been reported from several widely scattered points as early as August 9.

After the above-mentioned dates the weather was generally dry, particularly in the coastal regions of Eastern Canada. Here and there, especially in Ontario and about Montreal in Quebec, late blight was occasionally active and continued to spread slowly. For instance, about Ottawa, in Carleton County, Ontario, late blight was absent from

well-sprayed fields, but many commercial fields, which at present are not usually sprayed for the disease, became heavily infected about mid-September. Killing frosts near the end of the month prevented further spread. During a bacterial ring-rot survey some late blight rot was noted in the bin.

Losses from potato late blight must have approached the minimum throughout Eastern Canada in 1947. In 1946, a more normal season, the disease caused little damage in Ontario and Quebec, but it was prevalent on the late crop in New Brunswick and Prince Edward Island and caused losses of 30 percent of the crop in some fields.

Late blight was first reported on tomatoes in Durham and Prince Edward Counties, Ontario, on August 7 and in Northumberland County on August 11, two weeks after its appearance on potatoes in a neighboring county. These reports of late blight may represent the northern limit of the late blight epidemic on tomato and potato, which began in Pennsylvania and then spread northwards over New York. Latterly late blight was reported in Norfolk and Brant Counties (August 26), at Peterborough (September 2), at Guelph (September 5), in Lambton County (September 11), the Niagara Peninsula (September 12), Essex and Carleton Counties (September 16) and in Laval County, Quebec (September 10). Most of the above reports recorded only the occurrence of the diseases. In two instances damage was severe. At the close of the season late blight lightly infected a few gardens about Ottawa, and some late blight developed on fruits picked before the killing frosts in September and placed in storage to ripen. In the Niagara Peninsula the disease was fairly general on field tomatoes and was present on one greenhouse crop. The negligible losses this year are in striking contrast to those of 1946, when late blight was very prevalent throughout the tomato-growing sections of Ontario, completely destroying fields in Essex, Kent, Elgin, Norfolk and Lincoln Counties.

DIVISION OF BOTANY AND PLANT PATHOLOGY, CENTRAL EXPERIMENTAL FARM,
OTTAWA, ONTARIO, CANADA

SOME NEGATIVE REPORTS

NO LATE BLIGHT IN TEXAS:

G. H. Godfrey

There was no late blight in either potatoes or tomatoes in Lower Rio Grande Valley fields this year; and in so far as I have been informed in any of the other tomato or potato areas, in Texas.

TEXAS AGRICULTURAL EXPERIMENT STATION, SUBSTATION NO. 15, WESLACO .

NO LATE BLIGHT IN ARKANSAS

V. H. Young

Although we were on the watch throughout the season and corresponded with men in the plant-raising areas of the State and in the green wrap area, we had no evidence whatsoever of late blight on either tomato or potato.

UNIVERSITY OF ARKANSAS, FAYETTEVILLE

NO LATE BLIGHT IN MISSOURI

C. M. Tucker

We have no records of the appearance of late blight on either potatoes or tomatoes in Missouri during the past season. Although the early part of the season had conditions favorable for the development of the disease, the latter part, beginning July 1, was exceedingly dry and warm.

UNIVERSITY OF MISSOURI, COLUMBIA

