Diseases of the tomato in Louisiana

Claude Wilbur Edgerton

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DISEASES OF THE TOMATO IN LOUISIANA

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DISEASES OF THE TOMATO IN LOUISIANA.

By C. W. Edgerton and C. C. Moreland.

THE TOMATO INDUSTRY IN THE STATE.

During the past few years, the importance of the tomato industry has been increasing rapidly in the State of Louisiana. This has been due to a number of things, some of which are as follows: (1) the injury to the cotton crop by the boll weevil causing the farmers to turn to other crops which could be grown satisfactorily; (2) the interest taken in the work by the canning clubs, especially by the girls; (3) the increased interest in trucking in various parts of the State. All of these factors have had their effect on the tomato industry, increasing it from a few acres up to several thousand. At present, in many sections, tomato growing ranks among the important industries, and it seems probable that the industry will enlarge during the coming years rather than decrease.

Tomatoes are raised principally for two purposes in the State, either for shipment to the Northern markets or to be used in local canning plants. In certain of the trucking sections where no canning plants have been installed, the Northern markets form practically the only outlet for the tomatoes raised. A few of the farmers have apparatus for home canning, but only a small amount of the product may be utilized in this manner. These people are practically dependent upon the Northern market as to whether their crop is, from a financial standpoint, a success or not. The early crop usually sells well, but frequently the later fruits that develop go to waste in the fields.

However, in sections where canning plants have been installed, farmers have two outlets for their tomato crop. Usually the first crop is shipped to the Northern markets, because the price is higher than the canning plants are able to pay, while those that ripen later are canned.

Two or three different types of tomatoes are usually planted, these being represented by such standard varieties as the Earliana, the Acme, and the Stone. The Earliana is a very early
and quite prolific tomato, though its other qualities are not of high standard, and is adapted for early shipment to the Northern markets. The Acme is a magnificent tomato for market purposes, but it is not as early as the Earliana or prolific as some of the other varieties. The Stone is a tomato of deep red color and solid fruit, and is of the type most used for canning. Generally a farmer divides up his acreage among these different types and does not depend on one alone.

THE TOMATO DISEASES.

During the past few years, the appearance of several tomato diseases in the State, resulting in a considerable loss, has caused some alarm among the farmers. Formerly when tomatoes were only grown on a small scale either for local consumption or for small shipments to the North, there was not much chance for the spread of diseases. The fields were isolated and small, and the tomatoes were usually grown in different fields in different years. But, of late years, conditions have been much better for the development and spread of the diseases on account of the larger and more numerous fields. An increase in the acreage of a crop is quite often accompanied by outbreaks of diseases or infestations by pests that had not been noticed before.

There are several different tomato diseases in the State at the present, and these are being studied by the Experiment Station in the hope that satisfactory remedies may be found for their control. While the study of these troubles is far from complete, it seems wise at this time, on account of the numerous requests for information from growers to publish a bulletin that describes the different diseases and gives the best known remedies for their control. It is essential that the tomato growers should be able to recognize any diseases that they may have and to know what may be done to protect their plants.

At the present time most of the farmers do not distinguish between the different diseases. They know that something is wrong, and they content themselves with saying that their plants have the wilt, blight, or rot; but they must learn to differentiate between the different diseases before they can properly deal with them, as some require very different treatment from others.
Not until they know what disease or diseases are present will they be able to treat the plants properly. And they must also be able to tell whether there is more than one disease present. Frequently two or more of the diseases are present at the same time, and if only one disease is treated, the result will not be satisfactory.

There are ten diseases of the tomato known to be in the State at the present time. The common names for these and also the organisms which produce them are as follows: (1) Tomato wilt (*Fusarium lycopersici*); (2) Early blight (*Alternaria solani*); (3) Sclerotium wilt disease (*Sclerotium rolfsii*); (4) Root knot (*Heterodera radicicola*); (5) Blossom end rot (cause not definitely proven); (6) Leaf mold (*Cladosporium fulvum*); (7) Anthracnose (*Gloeosporium fructigenum*); (8) Southern tomato blight (*Bacterium solanacearum*); (9) Leaf curl (caused by a rapid change in the moisture content of the soil); (10) Damping off (*Rhizoctonia sp.*). These diseases all affect the grown plants with the exception of the damping off disease, which only affects the young plants in the seed beds or cold frames. Some of the diseases, as the tomato wilt and the early blight, are very serious in the State, while others, as the anthracnose and the Southern blight, do only a small amount of damage. There are at least two other serious diseases of the tomato which have not yet made their appearance in the State, these being the late blight and the Septoria leaf blight. The former, the late blight, will probably never do much damage in Louisiana, on account of our high mean temperature in the summer months, but there seems to be no reason known at present why the Septoria leaf blight would not be serious if it were introduced.

Before taking up these different diseases in detail, it may be well to tabulate the different characters of the different ones. In the table below are given the appearance of each part of the plant when affected by the different diseases that attack the plants in the field. By referring to this table after examining the plants, one should be able to tell readily what diseases are present, at least if any of the serious ones are present.
TABLE 1.
EFFECT OF THE DIFFERENT DISEASES ON THE DIFFERENT PARTS OF THE TOMATO PLANT.

<table>
<thead>
<tr>
<th>DISORDER</th>
<th>ROOTS</th>
<th>STEMS</th>
<th>LEAVES</th>
<th>FRUIT</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tomato wilt.</td>
<td>Rotten or black on inside.</td>
<td>Outside normal, inside black.</td>
<td>Turn yellow and die.</td>
<td>Ripen prematurely.</td>
</tr>
<tr>
<td>Blossom end rot.</td>
<td>Normal.</td>
<td>Normal.</td>
<td>Normal.</td>
<td>Large black or pink spots or water-soaked areas, especially near the end.</td>
</tr>
</tbody>
</table>

THE TOMATO WILT (*Fusarium lycopersici*).

The tomato wilt is the disease which seems to be doing the most damage in the State at the present time, though the early blight disease, to be described later, is a close second. The wilt is well scattered throughout the State. Specimens have been seen from the parishes of East Baton Rouge, East Feliciana, Tangipahoa, Caddo, Calcasieu, and from reports it is evidently present in most of the other parishes. This disease absolutely prevents the growing of ordinary tomato varieties in some fields in some sections and cuts down the yield materially in many of them. The disease is produced by a fungus which lives over
from year to year in the soil, and after a field is once badly infected, it is difficult to grow tomatoes there for a number of years.

Appearance of Diseased Plants.

The effect of this disease usually becomes noticeable at about the time the plants are coming into flower or a little later. The lower leaves of the plants turn yellow and finally die. The whole plant also becomes more or less stunted and has a more or less sickly appearance. As the disease progresses more of the leaves die and fall off, and finally the whole plant dies. Usually a few fruits develop on the plants, but they do not grow very large, and as the leaves of the plants have been shed they cannot ripen normally. They gradually color up on the dead or dying plants, though they are not normal in size or flavor. During the last stages of the disease the dead plants hang limp on the stakes, the leaves have fallen or dried up, the stems are black, and the prematurely ripened fruit gradually rots. A plant that becomes infected late often ripens a few fairly good fruits before it dies, but a plant that becomes infected early usually dies before any first-grade fruit develops. Plants infected with the wilt may be scattered through the field, or the infection may be general; that is, with practically all of the plants infected.

Appearance of the Stems and Roots.

If a plant that is affected with the wilt disease is pulled up and the stem cut across with a knife, the interior of the stem (Fig. 1) will be seen to be wholly dark colored, or else there will be black areas in it. If a longitudinal section is made of the stem, these black areas (Fig. 1) will be seen to extend from the roots up to the leaves and sometimes even out into the petioles. An examination of the interior of the stems forms the best method of diagnosing the tomato wilt disease. A positive determination of this trouble can always be made in this manner, and it also forms a very easy method.

The roots of the diseased plant are also discolored on the inside, and many of the smaller roots and often some of the larger ones will be seen to be rotten. This disease is primarily a root
and stem trouble, and all of the damage is done in these parts. The leaves only show the effect of the disease after the stems and roots are badly diseased and are unable to function as they should.

The Cause of the Disease and Its Course of Development.

The tomato wilt disease is caused by a very small microscopic fungus, which is known technically as Fusarium lycopersici. This fungus is very closely related to the one which causes cotton wilt. The cotton wilt disease, perhaps better known to the Louisiana farmer than any other wilt disease, has a very similar appearance to the tomato wilt. Its presence in a diseased cotton plant is told by the same method; that is, by cutting open the stem and examining for the dark discoloration. However, the two diseases are distinct and the tomato plant cannot become infected from cotton or the cotton plant from tomatoes.

The tomato wilt fungus lives in the soil, and will grow and develop there on the dead organic matter for some time even if
there are no tomato plants in the field, though it will gradually
decrease from year to year, if tomatoes are kept off the ground.
The fungus apparently attacks the young roots of the plants
and then grows up through them and into the stems. The tubes
in the stems, in which the water is carried from the roots to the
leaves, become plugged with the fungus mycelium and the water
supply is shut off. This shutting off of the water supply, com-
bined with the damage done to the roots, results in the wilting
and the death of the whole plant.

After the plant dies of the wilt disease, the fungus grows out
to the surface of the stems and roots, and there produces the
spores, which are the fruiting bodies of the fungus.

While the life history of this disease in the plants is com-
paratively simple when compared with many other plant dis-
eases, the location of the fungus in the ground and in the in-
terior of the plant makes the disease a very difficult one to
combat.

The Spread of the Disease.

A question of much importance in the study of a disease of
this nature is the methods that the fungus uses in spreading
throughout the field, and especially from field to field. There
are many fields in the State that have the disease in only seat-
tered places, and also there are many fields which do not have
the disease at all at present. It is important that we know how
the disease is apt to get established in these fields so that we may
guard against any infection. The spread of the disease in the
field, or from one field to another, is accomplished in several
ways. These may be taken up separately.

By growing through the soil. The fungus may spread in the
field by means of the fungus mycelium growing through the soil
from a diseased plant to a healthy one. This, however, is one
of the least important methods as the fungus grows slowly in the
soil.

By old diseased material that is left in the field. If the old
diseased and dead plants are left in the field during the fall and
winter, an excellent opportunity is afforded for the spread of the
disease. The pieces of the dead plant with the disease still in
them are blown around the field by the wind or are carried from
place to place by various agencies, or are scattered about in plowing. Wherever these pieces find lodgment, the disease is liable to develop the coming season.

*By the scattering of the spores.* When the plants die, spores of the fungus which causes the disease, develop abundantly on the stems. These spores are very light and they are easily blown about the field by the wind, or they may be carried by men or animals that walk through the field and brush against the diseased plants.

*By planting seed from diseased plants.* While it has never been proven, it would seem possible at least for the disease to be transplanted to a field by spores which might have found lodgment on the seed in the field. It is probable, however, that this is not a very important method of the spread of the disease.

*By planting the seed in infected seed beds.* One of the most important ways in which the disease finds its way into new fields is by means of infected seed beds. In many places in the State, truckers use their seed beds or cold frames year after year without changing the soil, or at least not all of it. In many places these are filled with infected dirt or the disease later finds its way into them. When young plants are grown in such places, they become infected before they are set in the field. They do not show the disease at the time of transplanting, but later they show it in the field. Often a grower will ask why he had this disease in a field where he had never grown tomatoes before, not realizing that he put it there himself when he set out his plants.

All of these factors have their influence on the spread of this disease and should be considered; though perhaps the most important ones are the leaving of the old plants in the field and the setting out of plants in the field that had already become infected in the seed beds or cold frames.

**The Control of the Disease.**

As the disease is one that is confined to the soil or to the interior of the plants, none of the ordinary treatments, such as spraying, will have any effect on it. In order to control this disease, we must keep it from infecting the soil, or if it is already present, we must try to eradicate it, or we must grow plants that will not become infected by the fungus. The important
points which should be considered in the control of this disease are perhaps as follows: (1) Keeping the disease out of a field that is not infected, or at least only has a small amount of the disease; (2) the rotation of crops; (3) the growing of resistant varieties.

**Keeping the Disease Out of the Field.**

By looking at the methods of infection of this disease, as given on a previous page, we see that the disease is admitted to a field by pieces of old diseased plants, by spores of the fungus, by transplanting diseased plants from the cold frames, and possibly by planting seed with the disease on them. A great deal can be accomplished in checking this trouble by taking steps to prevent the introduction of the disease in the field. In the first place, all of the old infectious material should be destroyed. As the plants die from this disease they should be pulled up and piled and then burned as soon as they are dry enough. This will prevent the spread of the disease by the spores, which are produced on the dead plants, being blown around by the wind, and also from developing from the old diseased material in the soil in the coming year.

Then particular care should be taken to keep the disease out of the cold frames or seed beds. Soil for these should only be obtained from fields that have never grown tomatoes, and it is questionable whether the same soil should be used for more than a year. If the disease can be kept entirely out of the field by a little care in this matter and a little extra work, more has been accomplished than can be done in any other way. There is no question but what many fields become infected by setting out diseased plants from the seed bed or cold frame.

While it has not been proven that the disease is carried on the seed, it is possible that it can be carried in this manner, and it would probably be well to disinfect seed before planting. Tomato seed will stand short exposures to strong disinfectants without injuring their germinative power. Some experiments were tried to see what effect some different disinfectants would have on the germinative power of tomato seed. The seed were soaked in the different solutions and then, without drying, were tested for germination. In the following table the results of this test are given:
TABLE 2.

EFFECT OF DISINFECTANTS ON TOMATO SEED

<table>
<thead>
<tr>
<th>Treatment</th>
<th>Germination, Per Cent.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Checks, not treated</td>
<td>70</td>
</tr>
<tr>
<td>Soaked in corrosive sublimate solution, 1 to 1000, for ten minutes</td>
<td>86.5</td>
</tr>
<tr>
<td>Soaked in corrosive sublimate solution, 1 to 1000, for fifteen minutes</td>
<td>88</td>
</tr>
<tr>
<td>Soaked in formalin solution, 1 to 300, for fifteen minutes</td>
<td>70.5</td>
</tr>
<tr>
<td>Soaked in formalin solution, 1 to 100, for ten minutes and then soaked in pure water for ten minutes, in order to wash off the poison</td>
<td>92.5</td>
</tr>
</tbody>
</table>

From this table it is seen that a soaking of the seed for ten to fifteen minutes in a 1 to 1000 corrosive sublimate solution does not hurt its germinating power. In fact, this treatment seems to help the seed, perhaps by killing the various rotting organisms that are normally on the seed. Corrosive sublimate solution is very easily obtained. It can be purchased at the drug stores in the form of tablets, each tablet to be dissolved in a pint of water making a 1 to 1000 solution. It would probably be well for a farmer to always disinfect his seed before planting. Not only this disease, but perhaps some of the others also may find their way into a field on the seed. Care should be taken, however, when this solution is used, as corrosive sublimate is very poisonous. It will not hurt the hands, but is very poisonous when taken internally. Porcelain vessels should be used to contain the solution.

Rotation of Crops.

Tomatoes should not be grown in the same ground for more than one year out of three. In old tomato sections, truckers have found that this is a rule which must be followed if tomatoes are to be grown successfully, and while the tomato industry is young in this State, we should start in right. If the tomato wilt disease is present in the ground, it will increase in severity rapidly from year to year if tomatoes are kept on the ground. However, if tomatoes are planted only every third year, much of the disease will die out during the two years when tomatoes are not on the ground.
Use of Resistant Varieties.

Perhaps the most satisfactory way of controlling this disease is by planting varieties or strains of tomatoes that will not become infected. Tomato plants do not all show the same susceptibility to this disease. In a badly infected field often plants will be seen which are perfectly healthy and will stand up through the season after most of the other plants are dead. Just why one plant will take the disease and another will not, is not known at present, but this is a point that is not important to the grower. What the planter wants to know is whether a particular strain which he is planting will take the disease or not.

Practically all of the tomato varieties which are on the market are susceptible to the disease, although some varieties wilt worse than others. The common Earliana tomato is very susceptible to the disease, perhaps more so than the Aeme and some others, but all of them are affected so badly that it is difficult to grow them in infected ground. The commercial seedmen and commercial breeders have not as yet put out wilt resistant varieties which are satisfactory.

**FIG. 2. WILT RESISTANT TOMATOES.**

Two rows on the left are ordinary tomatoes and are dead. The wilt resistant tomatoes on the right are perfectly healthy.
That it is possible to breed up wilt resistant varieties has been proven by a number of the experiment stations. At the Louisiana Station, at Baton Rouge, we have procured a strain by selection which is practically wilt resistant. This strain has been grown on a piece of land that has grown tomatoes for several years and on which no other strain will produce a marketable tomato. The illustration in Figure 2 shows the resistant strain compared with tomatoes which have not been selected for wilt resistance. The first two rows were planted with ordinary Acme seed. The plants are all dead and nothing but the bare stakes are seen. The rows adjoining these were planted with the wilt resistant strain and the plants are all seen to be green and loaded with fruit.

This wilt resistant strain which we have was selected originally from a resistaint plant of the Acme variety. The plant produces a fine fruit, but it is perhaps two weeks later than the ordinary Acme, which may be purchased on the market. The lateness of the tomato is its only bad quality. Of course, in common with the Acme, it is not as prolific as some varieties.

The experiment station will have a small amount of this seed for distribution the coming winter. We would like to have it tried out by planters who are having trouble with the wilt disease. We do not care, however, to send out this seed to persons who do not have the wilt disease, as the tomato has no superior qualities over the ordinary varieties when planted in soil free from the disease. If any one who reads this bulletin and believes that he is troubled with the wilt disease, wishes to try out this wilt resistant strain, and will answer the questions on the back page of this bulletin, a small package of this seed will be sent for trial. It should be said, however, that we only have a limited amount of this seed, and if the demand is too great the later calls for seed will have to be refused. These requests may be sent in any time, though the seed will probably not be sent out before early winter. This seed is sent out for the purpose of giving the variety a satisfactory trial, and at the end of the season we should like an expression from the growers who receive it in regard to its wilt resistant qualities, and also in regard to what they think of its other qualities.
The experiment station is also doing some work on crossing this wilt resistant variety to see if a variety can be obtained that it is not only wilt resistant but is also early and prolific. However, it is too early as yet to say what results will be obtained.

THE EARLY BLIGHT (Alternaria solani).

The early blight disease is another very serious disease of tomatoes in Louisiana. It probably stands as a close second to the wilt in destructiveness, and in many regions it is the all-important disease. During the past season in some localities where the farmers had gone into the tomato industry heavily, the loss due to this disease was very severe. This is the disease that did so much damage in the vicinity of Norwood, La., and Centerville, Miss. At Norwood, where there were over 200 acres in tomatoes, the loss due to this disease was estimated to be at least 50 per cent. This region had gone into the tomato industry heavily, many of the farmers investing all of the money they had. This region was visited by one of the writers about the first of June, when the disease was at the worst. At that time, some of the farmers had practically lost their early crop, while many of them had been injured very badly. This was the first crop of tomatoes for many of the growers, and the prospects for the future of the industry did not look very bright to some of them.

This disease was also very severe in the Baton Rouge section later in the season. The plants were killed or injured very badly just when they should have been in the middle of the bearing period. While an early crop was produced, the plants did not produce a later crop.

The Appearance of the Diseased Plants.

This disease may attack the plants at almost any stage in their development. The first sign of the disease is the presence of small brown or black spots on the leaves, especially the lower ones. These spots may be scattering and inconspicuous at first, but later increase in size and number. If the seasonal conditions are right, these spots finally cover the leaves and cause their death. As the disease progresses, the leaves are gradually killed, the lower ones first and later the upper ones. A bad-
The Bordeaux Mixture which is used for spraying is made of quick lime, copper sulphate (Bluestone) and water. Different proportions of these substances are sometimes used, but the 4-4-50 formula is the one that is generally used at the experiment station, and is perfectly satisfactory. The following amounts of the different substances are used in making this mixture:

Copper sulphate (Bluestone) ........ 4 lbs.
Quick lime ......................... 4 lbs.
Water .............................. 50 gals.

The copper sulphate is dissolved in twenty-five gallons of water in a wooden vessel. Do not use a metallic vessel, as the solution will be ruined by the action of the copper sulphate on the metal. Usually the copper sulphate is tied up in a cloth sack and this is suspended in the water. It will all go in solution in about twenty-four hours.

The lime is slacked slowly in a small amount of water. After it is completely slacked, enough water is added to it to make twenty-five gallons.

The copper sulphate and lime solutions will keep indefinitely as long as they are kept separate. They should not be mixed until the day the spraying is to be done.

The Bordeaux Mixture is obtained by mixing equal amounts of the above two solutions. They should be mixed in a wooden tub or barrel. The best mixture of these two solutions is obtained by pouring the two solutions at the same time into a third vessel. One man can have a bucket of the copper solution and another man a bucket of the lime solution. These two should be poured into the barrel at the same time. This will give a better mixture than if one solution is poured into the other. It is also necessary for the lime solution to be stirred just before mixing the two solutions.

The Bordeaux Mixture should be thoroughly stirred just before pouring into the spray pump. It should also be strained in order to get out any solid particles that might clog up the nozzle. There is generally a strainer on the spray pump, but if not, the solution can be strained through cheese cloth.
The Bordeaux Mixture should be sprayed upon the plants with some good spray pump. For staked tomatoes, it is probable that the knapsack type of spray pump will be the most satisfactory. The solution is put on in very fine spray. For the best results, every exposed surface of the plant must be covered. The spray must strike both the upper and the lower sides of the leaves.

The time for spraying will depend a great deal upon the weather conditions. A hard rain will frequently wash off a good part of the solution, and it will be necessary to spray again. If the bluish precipitate is kept constantly on the leaves, there should not be much trouble from this disease, but as soon as it is washed off there is a chance for infection.

**SCLEROTIUM WILT DISEASE.**

This disease attacks a large number of different plants in certain sections of the State, tomatoes sometimes being one of them. The fungus, *Sclerotium rolfsii*, which causes the disease attacks the plants just at the surface of the ground and a circle of the cortex is rotted at that point. The cortex is killed and the diseased area frequently becomes covered with a white mass of mycelium in which develop some small sclerotia. The sclerotia are small, hard bodies about the size of mustard seeds and of about the same appearance when mature. At first they are white, but later change to brown and finally nearly to black. Plants affected with the disease usually die.

For some reason or other this disease is not of much importance in Louisiana. It attacks other plants, such as peppers, very badly, but usually does not do much damage to tomatoes. In Florida, this is one of the worst tomato diseases. This disease does not usually do enough damage to make treatment profitable.

**ROOT KNOT.**

The root knot disease is fairly well known in many parts of the State, especially in the sandy regions. The disease is characterized by the presence of galls or nodules on the roots of the plants. These galls or knots are produced by very small nema-
tode worms. The root galls when they become very abundant often damage the plants very badly. The roots are killed and rot off, and the plants are stunted or killed entirely.

The nematodes attack a large number of plants, including tomatoes, cowpeas, peaches, beets, potatoes and a large number of others. There are a few plants which do not seem to be affected, some of these being corn, oats, peanuts, velvet beans and the Iron cowpea.

Soil badly infected with these nematodes should not be planted with tomatoes. If possible this crop should be grown on land as free from them as possible to find.

Land can be freed of this pest in two or three years if only crops are grown which are not attacked by them. It is also necessary that weeds be kept out of these crops during the season, as many weeds are attacked by the nematodes. By rotation a farmer can gradually free his land of this pest and then he should be able to keep it free.

BLOSSOM END ROT.

The blossom end rot disease is characterized by a rotting of the fruit generally near the flower end. The rotten spots are usually large and are either dark colored or of a pinkish color, the latter being due to the development of the spores of a fungus. Frequently also this disease is characterized by the presence of large water-soaked areas on the tomatoes, and these are generally at the point end.

The cause of this disease is not absolutely proven. From later work at the Georgia Experiment Station it seems that dry weather has much to do with the disease. It has long been known that the disease is much worse in dry weather than in wet. The Georgia people have proven that the disease can be largely prevented by thoroughly irrigating the plants.

In Louisiana this disease does not usually do very much damage. Occasionally in dry seasons, there is considerable loss, but generally we have enough rain to prevent it.

There is nothing that can be done for the disease unless irrigation is possible, in which case the disease should be almost entirely prevented.
LEAF MOLD.

This disease, caused by the fungus, *Cladosporium fulvum*, is characterized by the presence of a white moldy growth, especially on the under side of the leaf. This moldy growth frequently begins in spots but usually spreads over the leaf. The leaves are badly damaged as the affected tissues are killed. This disease is common in the State, especially in wet years. During a severe infection of the disease many of the lower leaves of the plants are killed by the fungus. This disease, however, never does the damage that the early blight does and, furthermore, does not affect the fruit.

This disease should be prevented to a large extent by the same methods advised for the early blight; that is, destroying the plants, disinfecting the seed and spraying with Bordeaux Mixture.

ANTHRACNOSE.

This disease, caused by the fungus, *Gloeosporium fructigenum*, is of very little importance in the State. The disease is characterized by a rot of the fruit. Large sunken, decayed spots, usually covered with small pink or black pustules develop. This disease does so little damage that treatment would not be worth while.

SOUTHERN TOMATO BLIGHT.

Although the Southern tomato blight was first described from Mississippi, and is supposed to be severe in the South, it does but very little damage in Louisiana. The disease is characterized by a rapid wilting of the leaves, followed by the death of the plants. The disease is caused by bacteria which enter the tissues of the leaf and kill it. The leaf stalks become filled with the bacteria and generally there is a discoloration on the inside. Also if a fresh diseased leaf is cut, there will be a slimy exudate on the cut surface.

This disease is very severe in places where it gets a start, and care should be taken to prevent its doing damage in the State. The sanitary measures advised with the wilt and early blight should be practiced to keep out this disease. All stalks should be removed and destroyed, and the seed should be sterilized. Spraying does not seem to help in controlling this disease.
LEAF CURL.

The disease known commonly as the leaf curl is very common in the State. It is characterized by a curling up of the lower leaves. The disease is not due to any organism but is caused by the change in the moisture content of the soil. We have never seen the disease severe enough in the State to do much damage. The worst damage it does is to weaken some of the lower leaves so that they are more readily attacked by such diseases as the early blight.

DAMPING OFF.

Damping off is a disease of the seed bed and cold frame, and is doubtless well known to all who have tried to grow young plants in such places. This disease, caused by the fungus Rhizoctonia sp., is characterized by a rotting off of the young stems at the surface of the ground, followed by the falling and death of the plants.

After the trouble is started in a seed bed or cold frame it is sometimes hard to stop. It can be checked by giving the plants more sunlight, by keeping the surface of the soil dry and well worked up, and by sprinkling a thin layer of sand over the soil. If the plants are given sufficient light and are not kept too moist and the ground is kept well worked so that there is a dry dirt mulch on the surface, there is usually not much damage done.

GENERAL CONSIDERATIONS.

In the preceding pages the two principal and most serious diseases of tomatoes in the State have been discussed quite fully, and mention has been made of the minor troubles. If success is to be had in tomato raising in the future, more attention must be paid to the diseases than has been in the past. The growing of plants on a large scale is usually attended by an increase in the development of any diseases that may be present. These tomato diseases if left alone will cut down the output of the crop so that it will destroy the profits of the industry. If attention is paid to these troubles and an attempt is made to control them there seems to be no reason why the tomato industry will not be successful.
The points which should be especially borne in mind in the control of these diseases are the rotation of crops, the destruction of diseased tomato and potato plants, care in keeping the diseases out of the seed bed and cold frames, the thorough spraying of the plants and the use of resistant varieties. These points have been discussed in the previous pages, and they should be read over carefully by all who expect to grow tomatoes.

It might be well at this time also to mention the damage frequently done to tomato fruit by the cotton boll worm or tomato worm. This damage can be lessened considerably if the plants are dusted with arsenate of lead just about the time the plants are coming into flower.

Before closing this bulletin we would like to ask all growers to send us specimens of diseases which they see developing in their fields, not only of tomatoes but of all crops. We will gladly write them in regard to the troubles, and if possible will tell them the methods of control.

REQUEST FOR WILT RESISTANT TOMATO SEED.

If any one having had trouble with the tomato wilt disease in the State desires to test out a wilt resistant tomato the coming season, and will answer the following questions, a small package of the seed will be sent unless the supply becomes exhausted:

After reading the article in this bulletin on the tomato wilt, do you believe that you are troubled with this disease?

If you receive the seed will you grow them on wilt-affected land alongside of some other tomato variety?

Will you watch the plants carefully and report to the station at the end of the season what results you have had with this variety?

Name ........................................

Postoffice address ..........................