eased trees, so pruning and cutting out of
diseased parts are not practicable.

Fifth: The rapidity with which the dis-
ease spreads during favorable weather
makes it difficult to handle even when the
infected trees are destroyed.

Sixth: The persistent nature of the
cankers in the bark of trunks and larger
branches forms an ever-present source
from which the disease is spread.

CONTROL

The most effective method of control-
ling this disease at present may be
summed up in the one word, eradication.
Citrus canker does not yield to treatment
with any of the known fungicides, and
the ordinary methods of combating fun-
gus diseases will not apply to this one.
Since the disease is so dangerous, it is
golly to temporize with it. Being confined
to comparatively small areas of the citrus
section, the most logical thing to do is to
completely eradicate it while it is possible
to do so. A few months or a year of de-
lay may mean that the fight is lost. Erad-
ication will call for the complete destruc-
tion of all infected trees within the State.
This will cause considerable loss to many
growers, and probably no little expense to
the State, but the amount spent now for
the eradication of this disease will be noth-
ing in comparison to the losses it will
cause a few years hence, if it becomes
generally distributed over the State.

ON THE FIRING LINE BEFORE CITRUS CANKER

Frank Stirling, Miami, Fla.

Mr. President, Ladies and Gentlemen:

After nearly twelve months of constant
endeavor, day by day, in touch with the
situation, we, who have been "on the fir-
ing line and in the trenches before citrus
canker," are compelled to acknowledge
that we are up against a foe well worthy
of our steel.

The story, how it has been and is being
handled, should certainly be interesting to
the Florida growers of citrus fruits. The
facts now known regarding this plant dis-
ease show it to be so virulent, so subtle
and insidious, that one is almost led to
believe it to be The Father of Evil himself
and eleven months' experience with it in
the field teaches us that it can be con-
quered only by using the most heroic
methods. (Note Bulletin 124, Fla. Expt.
Sta.).

We still have just as much, possibly
more, respect, or fear, of this disease as
we have ever had. With some, the im-
pression has prevailed that the disease was
due to weather and soil conditions and
would soon disappear of itself and hence
was not worthy of serious attention.
Some folks have said that this alarm,
which has been sent out by the Inspector
of Nursery Stock and the Florida Grow-
ers and Shippers League, was uncalled for,
that canker would turn out to be of a far
less serious nature, that it could be classed with other pests and diseases such as scab, red spider, melanose, etc., and could be as easily controlled as they are, but even those diseases are not easily controlled.

The possibility of controlling this disease by the introduction of chemicals or immunizing substances directly into the tree has long been a fascinating ideal, and while the basal idea may be sound, the method has been discredited by the number of "fake" remedies supposed to be applied in this way. But why look for a remedy of that kind, when we do not expect to need it, when eradication is possible. If canker is not eradicated, then there will be plenty of time to try control measures.

A large number of experiments have been carried on by the growers, state department officials and others. There has been for several months, and is now, a plant pathologist stationed in the canker-infected territory, carrying on experiments, and from this work some very valuable scientific results may be expected, whether his findings become of practical importance or not.

The one thing we do now know is that fire is the only sure cure, and those who have tried other remedies have in the end given up and have burned their diseased trees. With this knowledge at hand we have put forth every effort to keep up with and destroy every cankered tree as fast as it was found. We considered this the only way to retard its spread, but to do this many obstacles have had to be met and overcome. While almost all of the growers have co-operated with us, there have been some few who objected to this method of treatment, and we have been put to all manner of inconveniences from those who did object. We have been regularly refused admittance into certain groves, some have permitted inspection but have refused to have the diseased trees burned, and in one or two instances some of us have been arrested for trespassing; at which time "public opinion" and not law saved the day.

As so much has already been said about the technical, practical, historical, and financial side of citrus canker, you will probably be more interested in knowing what has been done and is being done in this canker fight in Dade county, where the prevalence of the disease is more to be noted than anywhere else, and where we are making the great effort toward eradication.

The actual work in the field is carried on by inspectors employed by the local growers' organization and the Florida Growers and Shippers League, a committee of three having full executive power. This committee outlines the plans for the work of inspection and eradication. In Dade county there are now one hundred and twelve men employed upon the work of inspection and eradication, half of which are employed in the southern or Redland section, and half in the northern or Miami section. An inspector-foreman is in charge of each of these bodies. The foremen lay out the territory to be inspected by each squad and see to the necessary details. The whole force of men employed upon the citrus canker work, dressed in their inspection suits and equipped with burning outfits, etc., going to work each morning, may be likened to
an artillery command, and the discipline under which it works may be very much the same.

The men are divided into squads, of four inspectors each, each squad having a certain number of groves or properties to inspect each week. The squad leaders are supplied with blank forms which are filled in each day, giving the number of trees inspected, the number of properties, names of owners, if any infections are found, and also if any other injurious insect pest or plant disease is found. These reports are turned in each day to the foreman and a record is kept of the status of each property. From these reports a condensed weekly report is made out and sent to the Inspector of Nursery Stock at Gainesville, The Florida Growers and Shippers League at Orlando, and to the United States Department of Agriculture at Washington. The men are all supplied with linen suits as a protection against their coming into contact with the diseased trees. The suits are dipped in a bucket containing a disinfectant solution of mercury bichloride. As the report from each squad shows where any canker has been found, the fire wagon is at once ordered to the infected groves and the trees showing canker are burned. Where only one or two small trees are to be burned the small hand outfit is used, the fire wagon going where there are large trees or larger numbers of nursery trees. For this purpose a mixture of kerosene and fuel oil is used, and up to the present time nine thousand seven hundred and sixty gallons have been bought and used at a cost of $1118.00. This oil is used in a burning spray under about one hundred pounds' pressure.

There are in all in Dade county some twelve hundred groves or properties which must be inspected each month. This is the number of citrus plantings in the county. They range in size from five acres up to seventy acres, and contain in all approximately ten thousand acres. About forty per cent of these are bearing and sixty per cent non-bearing. The number of grove trees is between seven and eight hundred thousand. There are besides this approximately 3,500,000 nursery trees to inspect. In order to cover all of this ground once each month, you can readily see requires a lot of work and a large body of men. Besides this, we inspect once every week those properties where any canker has ever been found, and it is in these properties where we now find almost all of the canker. A total of 201 properties have at one time or another had canker. The men attending these diseased properties do not go into the groves that have never shown any canker; we do this to avoid every possible chance of the men carrying any spores or germs into clean groves.

Our work in Dade county has not by any means consisted of an unbroken chain of triumphs. As I have said before, we inspect each week those groves where canker has ever been found; many of these groves have shown canker week after week; some have gone past several inspections and have again showed infections. We have thought that after a grove had gone over twelve weeks without showing infection that it might be clean, but in a few instances some groves
have again shown canker even after that length of time. This shows how very tenacious the disease is. We may think that a grove has been clean but it may not be so. However, the groves that have passed twelve weeks, or twelve successive inspections, without showing disease very seldom show canker again, and of the 201 infected groves in the county some ninety have been clean over twelve weeks, and the number is slowly increasing, which encourages us to believe that eradication is possible.

In these diseased properties we have found and destroyed by fire, since we first began our campaign of eradication, 5750 grove trees and 388,063 nursery trees. The total cost of this fight in Dade county, up to the present time, has been $26,903.29. This includes what the United States Department of Agriculture has expended, up to April 1st, but does not include what The Florida Growers and Shippers League has expended. Neither does this include the volunteer work given by the growers themselves, which, reduced to dollars, would be some $2400.00. Assistance from other interests will amount to over $1,000.00.

An important feature of this canker fight in Dade county has been the noble effort put forth by the women of the Redlands. When funds were low and things looked discouraging, the Womens Citrus League, some sixty-one strong, came to the relief of the work by contributing. Money was raised by giving entertainments, suppers, etc., and in this way they raised over six hundred dollars, which has been turned over into the canker fund. They have also saved for the Association over one hundred dollars in making inspectors' suits, or uniforms, which otherwise would have had to have been bought outright.

It's a difficult matter to get exact information as to the actual loss to the growers whose property has been destroyed. A large number of the trees burned were small ones, which have been planted not over a year or two, the loss of these is not large; however, some of the trees which have been burned were capable of producing from ten to twenty boxes of fruit per year. For instance, we burned one tree which last year netted its owner about fifty dollars. A conservative estimate of the loss of the burned grove and nursery trees would be nearly fifty thousand dollars. It would be impossible to estimate the losses otherwise sustained, since, for instance, a grove where canker is known to exist will not sell for any price, whereas before it would have brought thousands of dollars.

One of our greatest troubles has been trying to prevent the spread of this dread disease. Regarding the virulent parasitism of citrus canker, there is no possible question. It is easy to demonstrate this by making artificial inoculations upon healthy trees, especially when there is abundant new growth. Past investigations have shown that the spores are ejected during and after a rain. Whether these extremely small bodies are blown about by the wind or not is not absolutely known. It is conceivable, however, that they may be blown about by the wind as far as rain or spray is blown. We do know that they are constantly being
washed out by the rain down the trunks of the trees, where they may become lodged in the cracks and crevices of the bark and develop mature cankers, even on exposed roots. That the disease is carried for great distances on diseased nursery stock, that the spores may become attached to the various forms of animal life, insects, birds, dogs, etc., is a demonstrated fact. Another danger of carrying infection is by grove hands and trespassers who do not realize the virulence of the canker. We have evidence of its being carried by wagons, farm tools and automobiles. When the spores have once been carried to a previously uninfected tree, they may develop in any sort of wound or injury in the bark, leaves or twigs that is reasonably moist and there produce a canker. The new growth seems to be especially susceptible. No evidence has adduced up to the present time to show that a tree with reduced vitality is more susceptible to infection or that the cankers develop more rapidly in such a tree than in a perfectly healthy and well nourished tree; nor has any evidence yet been adduced to show that soil conditions within the present range of the disease exert any appreciable effect upon it, beyond the fact that plenty of moisture favors the distribution of the spores.

How long the spores remain alive upon the ground under the diseased trees is not yet known. It appears safe to state, however, that they will remain alive after two months, and should they be carried up to the new growth produce cankers there. We have found in every instance, if the ground is not burned over at the time that the tree is destroyed, that the shoots which grow up from the old stump become reinfected.

With the disease known to be so very virulent, it is almost needless to add that with the present outlook, citrus groves within the diseased area are a poor investment, and because of this fact there is considerable discrimination against setting out citrus.

After passing through the past year of the canker fight, with so very many odds against us, knowing, as we do, the deadly nature of this disease, it is certainly idle to attempt to prophesy what will be the future course of the canker, but whatever the outcome, we may be sure that the results of our work in fighting it will in the end justify all present efforts. We may be sure that this is not the last devastating disease of Florida's fruits and vegetables to appear, and in the future we shall need all the knowledge and experience that has been gained from fighting this malady. With the rapid development of extensive groves, methods which have heretofore been deemed impracticable for controlling citrus diseases will come into regular use and the practicable methods of the future can only be developed by just such scientific research and field work as we are now passing through.