

FRANK STIRLING

Valiantly Fights Dreaded Canker

by FRANK STIRLING

Introduction by JOE KNETSCH

Few figures in Broward County's colorful history are so well known for their individual contributions as Frank Stirling. To newcomers, Stirling is remembered as the first mayor of Davie, Florida, as the first elected state representative from western Broward County, and as a man of many community interests. As a political and social figure, he deserves his generally accepted standing as one of the county's leading pioneers.

Less well known, but often recognized by those who have studied the history of western Broward, was Stirling's leadership in agricultural affairs. Stuart McIver, in his *Fort Lauderdale and Broward County: An Illustrated History*, cites Stirling's role in the establishment of Davie's famous "Flamingo Groves" in 1927, and calls him "one of Florida's foremost agricultural experts." Victoriá Wagner adds, in *The History of Davie and Its Dilemma*, that

Stirling became attracted to Davie by the experiments being carried on by the Davie Experimental Farm. Mrs. Wagner also relates that Stirling's employments included stints with the United States Department of Agriculture and the Florida State Plant Board. Significantly, as will be detailed in the following article, Mrs. Wagner also notes Stirling's position as a leader in the fight against the citrus canker, which first appeared in Florida in 1912.

Stirling's leadership in agriculture was recognized throughout the state and did not end with the canker fight. In an interesting memoir, *A Yankee Pioneer in Florida* (1950), Allen N. Andrews throws valuable light on the stature of Frank Stirling. On October 3, 1946, Andrews visited Stirling and recorded the following:

I made a side trip on Saturday to see my good friend Frank Stirling at Davie. In addition to being

*an expert beekeeper, Frank is a maintenance man who, with a crew of some forty farm hands, cares for around 400 acres of local citrus groves. With a topsoil of some three to four feet of muck, underlaid with sand, and with water control in adjacent canals holding moisture to the desired level during the dry season, the Davie section has become noted for its summer oranges . . . But Frank is not only an expert grove man and apiarist, but an experimentalist in horticulture and forestry as well. He has found the Everglades much ideally adapted to growth of the Cajuput Tree (*Melaleuca Leucadencron*) — in fact the only place bordering the East Coast where it is known to have gone native like it has on the lower West Coast. The largest tree of its kind in the state is situated on his property, being some five feet in*

Frank Stirling has been appropriately described as "one of the founders of the community of Davie and among the most prominent horticulturalists in the state." Born in Gallipolis, Ohio, in 1878, he studied agronomy, biology, and entomology, and worked as a horticulturist in Washington and California before coming to Florida in 1907 to manage the John B. Stetson Packinghouse at Deland. In 1913, Stirling came to Dade County as chief inspector for the Florida Plant Board. It was in this position that he became a leading figure in the fight to eradicate citrus canker, a fight which he describes in the accompanying article.

In 1915, Stirling took a job as instructor at the University of Florida in Gainesville. He purchased property in Davie four years later, and moved there permanently

in 1924. From that date until his death on November 12, 1949, Stirling immersed himself in the horticultural and civic concerns of his adopted hometown. Among his many accomplishments were his establishment of successful groves, packinghouse, and nursery, and his efforts to establish systematic flood control for south Florida.

Joe Knetsch, who located and submitted Stirling's article on "Eradication of Citrus Canker" and wrote the accompanying introduction, was formerly a Davie resident, a history teacher, and a Broward County Historical Commissioner. He is currently employed by the state in Tallahassee, where he is pursuing a Ph.D. in history at Florida State University.

diameter and more than eighty feet in height, having been planted by Dr. John Gifford about 1912 . . . (he continues) I had become interested of late in finding a solution to a tropical horticultural problem, only to discover to my astonishment that Frank had been working on it for some years past and had already made much progress . . . I put the question to him as to the possibility of budding or grafting the avocado on the sweet bay, which plant is a denizen of wet land. Frank stated that he dimly recalled someone had once done so, but was not sure as to ultimate success. However, my query led to the discovery that he is years ahead of me in avocado research.

Notwithstanding the prevailing idea that plants are devoid of even a low degree of consciousness, or instinct as it is called in the animal kingdom, Mr. Stirling had demonstrated that avocado trees can be educated to thrive in wet soil that ordinarily would be inimical to their growth . . .

From a back room in his office Frank brought in a half bushel basket filled with avocado seeds which he exhibited to me — about 70 seeds in all. Twenty years ago he stated that he had planted two dozen avocado seeds in the muck soil that at times was subjected to saturation during wet summer

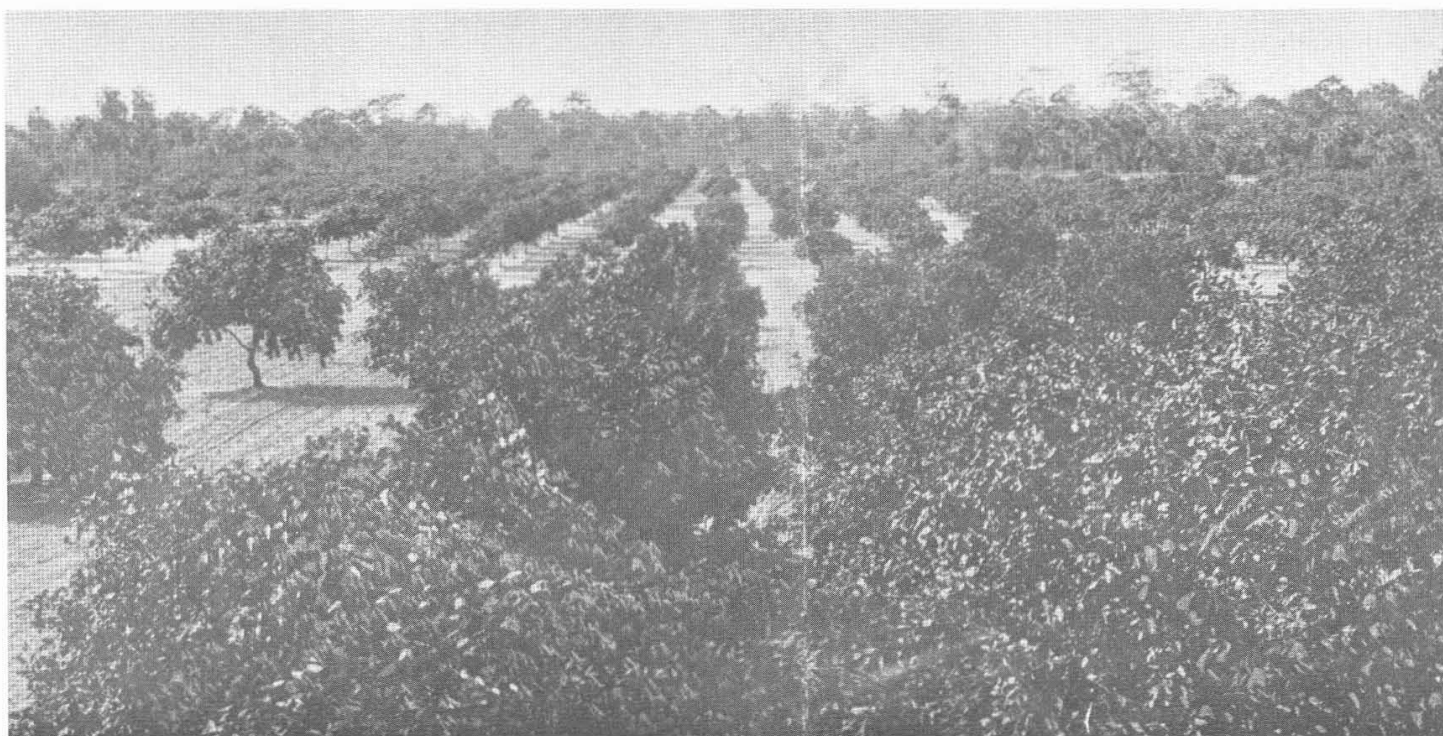
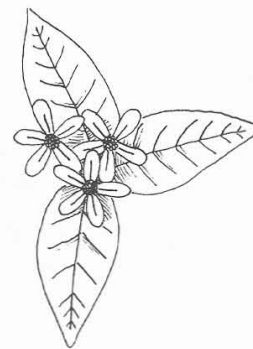
months. Strange to relate, several of the resulting young seedlings survived to the first fruit bearing stage. From the fruit of the most vigorous tree he saved the seeds and planted them.

This process has been repeated now for four generations during the past twenty years . . . Seeds are about to be planted for the fifth generation and Frank says that if he could live forty or fifty more years he believes he would have developed a real wet land avocado.

Such perseverance shows the disciplined scientific mind of Frank Stirling and the true pioneering spirit that he represented.

The article that follows was written by Frank Stirling and explains his role, with characteristic modesty, in the citrus canker eradication program. Modesty, in spite of the fact that Stirling's reputation led Lloyd S. Tenny, president of the Florida Growers' and Shippers' League, to hire him away from the Department of Agriculture and ask him to lead the fight against the newest threat to Florida's citrus industry. The esteem his contemporaries gave him is evident throughout the article. Though Stirling does not give us a cure for the blight, he presents the case as it stood when Broward County was still part of Dade County and outlines his plan for holding back its deadly spread.

What is also remarkable about this pamphlet is its contemporaneous information. Frank Stirling put his thoughts down in 1914, yet much of what he said has meaning for the current citrus industry. For Stirling, canker was a new disease of undetermined origin; for citrus growers today it is an old and undefeated enemy. The biggest advance over Stirling's tentative thesis is the current certainty that the disease is caused by bacteria, and not by a fungus, as he suspected. This advance came from the experiments of Clara H. Hasse of the U.S. Department of Agriculture which were published in 1915. Even these experiments were based in part on Stirling's studies. Frank Stirling's reputation as a scientist/agriculturalist is as deserving today as it was in his own era. Unfortunately, Stirling's old enemy still plagues citrus growers.



J. M. Browning's grapefruit and orange grove, Broward County, c. 1917.

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CONDITIONS IN DADE COUNTY

There is hardly a grower of citrus fruits in the State of Florida, but has learned of the newest and by far the most dreaded disease of citrus — Citrus Canker. Bulletin 122 of the Experiment Station, issued in March of this year, by Prof. H. Stevens, treats of this disease in a preliminary manner, and tells of its serious nature. Dr. E. W. Berger, in an address to the Florida State Horticultural Society last April, told of the Citrus Canker in the Gulf coast country, in Alabama, Mississippi, Louisiana, Texas, and Northeastern Mexico. Bulletin 122, Circular 8, and Dr. Berger's report of investigations along the Gulf coast, give all the known information concerning the disease. The present paper treats entirely of my observations and experiences in combating the disease in South Dade County, where the Canker was more prevalent than anywhere else in the State.

It is well known that Mr. Lloyd S. Tenny, of the Florida Growers' and Shippers' League, took up the matter of financing a campaign against the Citrus Canker (there being no other funds available at the present time for the work), and of making an effort to completely eradicate the disease in the State. Along the middle of May of this year, I was employed by Mr. Tenny to undertake the work under Dr. Berger's instructions; and with that end in view came to the southern part of Dade County, where the canker was at that time beginning to cause trouble. It was thought at first that there would not be more than ten or a dozen properties having any Canker in them, and that it would be but a matter of a few weeks, or possibly two months, to make a clean-up in that part. I found, however, that there were in all, in Dade County, 95 properties having Citrus Canker infection, extending from Fort Lauderdale on the north to Detroit (now Florida City) on the south, a district 55 miles long and in width from ocean to everglade. Fully 80 per cent of the disease was, however, in the southern part of

this district, in a section about three and a half miles across, having the little hamlet of Silver Palm for its center.

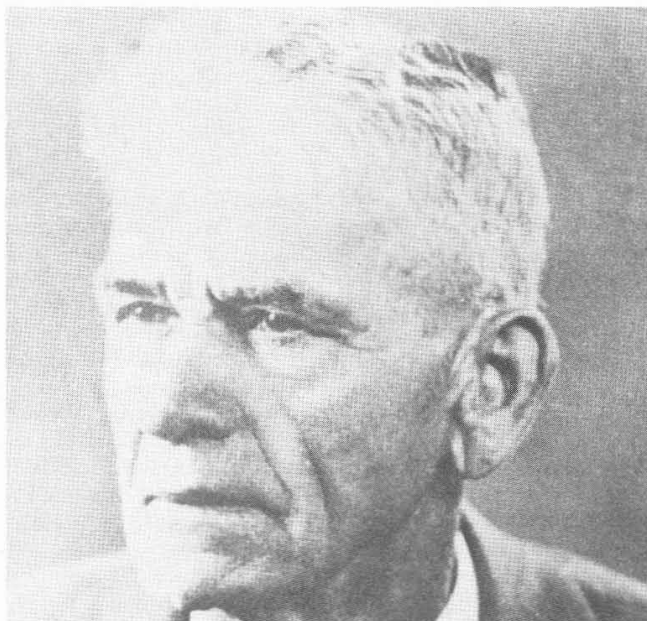
In this section, of which little is known except by those living there, the citrus industry has developed with remarkable rapidity. In the Redlands territory, which is different from anything else in the United States, the geologic formation is chiefly oolitic limestone which has weathered into angular shapes producing extremely rough surfaces, with only small quantities of soil in the crevices of the limestone. The soil is frequently red. In this section, while the sawmills go ahead and clear away the timber, dynamite follows, not only blowing out the stumps, but blasting holes in the porous rocks for the young trees. It may be somewhat taxing to the credulity of those who have not witnessed it, to be told of digging holes with dynamite and cultivating the trees with a pick; but it is none the less true. The amount of clearing and planting is almost un-

believable. In Dade County south of Miami there are now some eight hundred thousand trees in groves; almost three hundred thousand of these trees are in the Redlands territory, and it is safe to say that fully 80 per cent of the whole are grapefruit.

THE CAMPAIGN

When the Growers' and Shippers' League first took up the matter of Canker eradication in this section, fully 99 per cent of the growers were ignorant of its presence in the locality. They all, however, soon learned of it; and wishing to assist in the work of eradication, organized a branch of the Growers' and Shippers' League, which at the present time has a paid-up membership of nearly 250.

We knew that this disease attacked the leaves and young shoots and fruit; and that when the tree became infected its growth was stunted, and all of the fruit were reduced to "culls." It was learned that Canker is not like other diseases, amenable to treatment; and that spraying did no good whatever. At the outset we deemed it necessary that all infected groves and nursery stock should be cut back, defoliated, and the trunks painted with Bordeaux of carbolineum. This was a radical treatment; but there seemed nothing else to do, and we went at it bravely. We cut back and treated in this manner over two hundred thousand nursery trees and over five hundred acres of grove trees. This was in May, June, and the first part of July. At this juncture everyone began to breathe a little easier. People went on clearing land and planting out new groves. Several weeks passed; the



Frank Stirling

inspection went on, and the treatment went on. More and more infection was found, and more and more was treated. What was at first thought to be quite local infection, proved widespread. Instead of a dozen diseased properties, a score were found, and fifty, and then almost a hundred. Still we kept fighting on, and cutting back, and treating with Bordeaux and carbolineum.

FAILURE OF CUTTING BACK

But the worst was yet to follow. The groves cut back and painted and left for clean, began to put out new growth. Imagine our consternation when it was found that this new growth still showed the infection, and that all of our treatment had been useless. We found that we had been actually spreading the disease. In one grove for instance, there were twelve trees originally infected when it was treated; when the new growth appeared there were forty infected. What was to be done? Positive advice was not to be had. There was no precedent to follow. In the absence of knowledge as to what else to do, we redoubled our efforts; but the disease, every time it was felled, arose tenfold stronger. In short we were "up against it" in two different ways; lack of funds and lack of knowledge. The growers went into their own pockets as they had never done before. The growers, the business men, the banks, the Board of Trade of Miami, professional men, even the women, did their share. So the money was raised, but we still lacked the knowledge of what to do. We had followed the only known remedies, and been defeated. Washington was appealed to, and a man, we were advised, was detailed to our assistance; but even he had to first make a tour of Alabama, Mississippi, Louisiana and Texas, where the disease is of longer standing, before he could come to us.

THE FIRE TREATMENT

In the meantime a number of the growers and others in the district began trying out methods that might prove successful, and experimenting in other ways. At this juncture Dr. Hiram Byrd proposed a method of treatment, namely, applying a forced flame to the diseased trees. If cutting the trees back and painting them was a radical measure, what was to be said of turning a spray of burning oil upon the infected trees, and about reducing them to ashes.

The rationale of the method is this. The disease is of a fungus nature; it spreads by dissemination of spores; these spores are washed off the infected trees and get on the ground, the grass, and rocks beneath the trees. When the

tree has been treated, the tree itself may be clean, but it has the infection all around it, from which it becomes re-infected as soon as the new growth puts out. In cutting back the trees, the tools, clothing, hands, etc., of the workmen become infected; and when other trees are handled, they likewise become infected. No method of treatment can succeed that does not take into account all these factors.

The method of burning the trees is to spray a flaming mixture of kerosene and crude oil upon the tree, the grass, and soil beneath, till the tree is charred. In this way nothing comes into contact with the disease except the forced flame, and there is absolutely no danger of carrying the disease to other and healthy trees.

RAPID SPREAD OF CANKER

Canker is without doubt the most infectious of any known disease; and during a time when the atmosphere is humid, in the rainy season, it spreads rapidly. I have found that during the early part of the season it requires two or three months for the Canker to infect and mature so as to reproduce itself, owing, no doubt, to the dryness and coolness of the weather. Under favorable conditions, however, the Canker will infect and mature in much less time; and it is certainly a good thing that we began work when we did, or we never would have caught up with it.

As I have said before, this disease is by far the worst which has ever yet affected the citrus industry. The leaves, twigs, and fruit become covered with a cankerous growth. The fruit itself seems to be especially susceptible to the disease, and drops soon after becoming diseased. Canker is so deadly that when the tree first becomes infected, in this territory, it is worthless inside of two or three months.

WHAT HAS BEEN DONE

For the past two months we have been passing through the worst of the fight. We have destroyed every tree showing the slightest infection. We have done this by applying the torch, which resembles a plumber's blow torch, only a hundred times larger. The diseased trees were burned to a crisp. The torch was also applied to the surrounding ground. The cost has exceeded one hundred dollars per day (this does not include the \$2,000 which the Growers' and Shippers' League is spending). We have burned, in the Redlands district alone, 1,933 grove trees, and 101,300 nursery trees. Over 200 grove trees, and a good many nursery trees were burned in the Miami district. We have in the two districts some fifty

odd men employed in the work of canker eradication. Most of these men are being paid by local subscription, and some few are volunteering their services.

ALL FLORIDA THREATENED

If such a thing were possible that we fail to entirely eradicate the disease here, then the entire State is in jeopardy. It would be merely a matter of months before the Canker would be entirely over the orange belt. If every grower in Florida knew of the deadliness of this disease as we do here, and of the rapidity with which it spreads, not one of them would rest a moment as long as there was left a trace of it in Florida. Another thing — if this disease had been permitted to have gone on six months longer before taking steps for its eradication, I doubt if one hundred thousand dollars would have effected a cleanup.

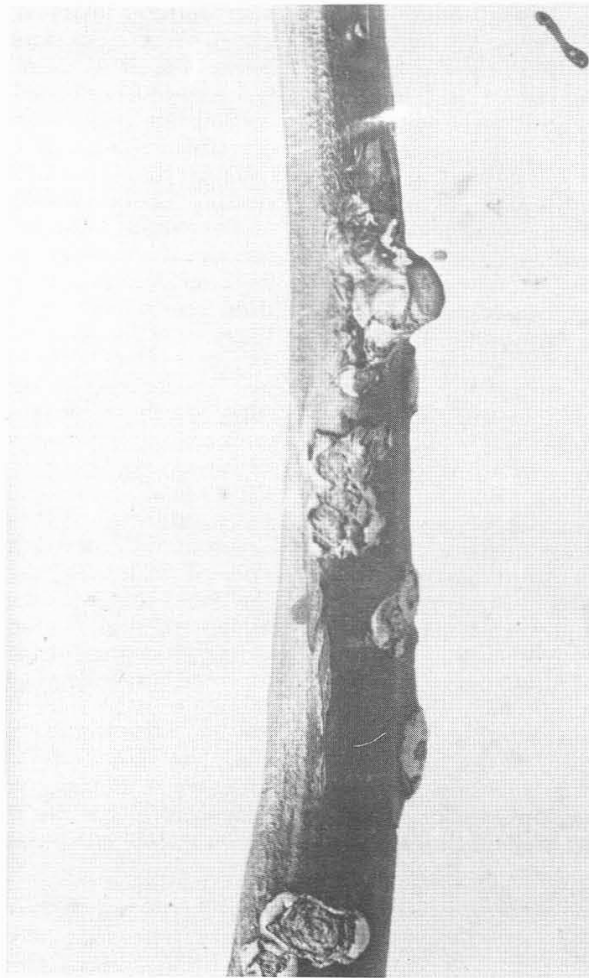
VARIETIES AFFECTED

We have found the disease upon all of the varieties of citrus, with the exception of the kumquat; although the grapefruit seems to be by far the most susceptible of them all. The order, according to the degree of infection observed is as follows: Grapefruit, *Citrus trifoliata*, Persian lime, Key lime, navel orange, sweet orange, Satsuma, tangerine, mandarin, King orange and lemon. The seedling grapefruit and the Triumph seem to be the most susceptible of the pomelos, and I have never yet seen the disease upon Castalo tangerine. The Canker has never yet been observed upon any non-citrus plant.

EFFECT ON TREES AND FRUIT

The great danger to South Dade County, lies in the fact that it is principally a *grapefruit* district. As was stated in articles by Dr. Berger and others, this disease attacks the twigs and leaves of the pomelo virulently, resulting in a putting out of more twigs, and thus overloading the tree with small branches. Canker is also virulent in the manner in which it affects the leaves, spotting them and causing them to turn yellow and drop prematurely. The worst of it is its effect on the fruit. With oranges, the disease is not often seen upon the leaves and twigs, but upon the fruit itself, causing spotting to a considerable extent.

In one grove in the vicinity of Silver Palm, known as the Walker and White grove, there are about four acres of grapefruit trees about seven years old, bearing from two to twenty boxes of fruit per tree. During the first week in June these trees were inspected, and



Young citrus twig infected with canker. This photo is from a booklet on citrus disease compiled by Frank Stirling.

were found to all appearance free from Citrus Canker. Three weeks later, one tree began to show a slight infection upon one of the limbs. Four days later I made a careful inspection of the grove and found that the disease had spread to five trees. The owner was away at the time, and when he returned, a week later, the disease had spread to twenty-seven trees. I would have had no trouble whatever in picking fifty boxes of diseased fruit — fruit that was all covered with the Canker, and some of which was beginning to rot and fall off. By the time we could get the consent of the owner to burn them, three days later, the disease had spread further, and we burned over fifty trees.

Fortunately, there were not many large bearing groves in the section (it being a new country), and consequently, the loss per tree has not been so great as it would have been had the disease broken out in an older country. Most of the trees are under three years old. However, I want to say that this disease attacks a large bearing tree just as readily as it does a young tree.

HOW WE DO THE WORK

When we learned that this disease was so terribly infectious, we began to take every precaution in regard to disinfecting ourselves, tools, etc., to prevent carrying infection from tree to tree and from grove to grove. The men on the job are supplied with suits similar to the harvesters' suits used in the West. We secured 72 of these suits. The men use them in the groves. When they leave one grove they take off the suit they have on, dip it into a solution of mercury bichloride (strength one to a thousand), and put on another suit to use in the next grove while this one is drying. No one is ever permitted to touch a tree, whether diseased or not. So particular and careful have the growers become, that anyone trespassing, innocently or otherwise, is apt to get into serious trouble.

The growers get together once a week to receive reports on the progress of the Canker eradication work, and to discuss ways and means for keeping on with the work; as we deem it necessary

to keep on inspecting for several months after the last Canker has been seen.

Lately, practically no new infections have been found, although there are recurrences of the disease in those groves where heretofore Canker was found; but even these are growing less week by week, and this being the rainy season and the time when the disease is most apt to spread, conditions are certainly favorable. The growers are not by any means out of the woods yet, but we have come to the turning of the road, with a straight way ahead, and we but need the vehicle—the finances to go on.

As I said before, the expense of the Canker fight is carried on mostly by the growers themselves, and in the County the expenses exceed \$100 per day. We have some forty inspectors in the field, men who do nothing but look out for Canker, and several men who follow up with the eradication outfits and do the burning. The trees that are found diseased today are burned tomorrow. If there is but one leaf showing any Canker found on a tree, we burn the tree just the same.

In the Redlands section there are some 75 properties which have shown Canker. In the section in and around Miami and north of there, there are some 20 properties infected. Consequently, we are having most of the fight in the Redlands section. In almost every case where we find Canker, we can trace it to some source, showing that the disease is carried by actual contact, and is not windborne. In many properties outside of the Silver Palm section, the disease has been carried on nursery trees which came from diseased nurseries. In some places the disease has been brought by men working in a diseased nursery or grove, and then going to a healthy property. Of course, in some cases, the spread of the disease can be charged to birds, and many kinds of insects; but this way of carrying has never prevailed to any extent, and only in the nurseries and nearby groves.

We have already made a tree-to-tree inspection of everything in the section, and are now on the second inspection. The thorough inspection of nearly a million trees, taking a look at about every leaf on those trees, is, as you see, quite an undertaking. Then we make a re-inspection every week of the groves in which the disease has been found. This means that we have to inspect some 45,000 trees every week. We use for this work 12 special inspectors who do nothing but re-inspect. It is in this re-inspection that we now find nearly all of the Canker, and, as said before, this is becoming less and less. When we first began this burning campaign, the

number of trees infected of those inspected was 15 in every thousand, or one and a half per cent. Now that percentage has fallen to a quarter of one per cent. Up to the present time one tree in every 167 trees in the entire section has been burned. We believe that by holding down the disease and gradually decreasing the percentage through the wet season, by the time that the dry, cool weather sets in there will be no trouble in making a complete eradication.

Any and every precaution for the prevention of the spread of the Canker has been urged. The State Inspector of Nursery Stock has revoked all certificates in the diseased district. This alone has proved to be of great value to us, as certain recent developments have shown. Nurseries that three months ago were apparently healthy and clean, have recently developed Canker. If the buying and planting of trees had gone on as before, it is hard to tell how much farther the disease would have been spread. At any rate our work would have been made much harder in locating and eradicating these new infections.

The success of our work in Canker eradication, has depended entirely upon the splendid organization and cooperation of the growers themselves. In the first place, we had, for the President of the Local Branch of the Florida Growers' and Shippers' League, one of the best men obtainable for that office, who is vitally interested in grove culture in that part of the State. Another thing was that we had only men who are grove-owners and property holders engaged upon the work of fighting the Canker. All of these men are vitally interested in the welfare of the country, and most of them have given up their own private interests in the meantime to help combat the common enemy.

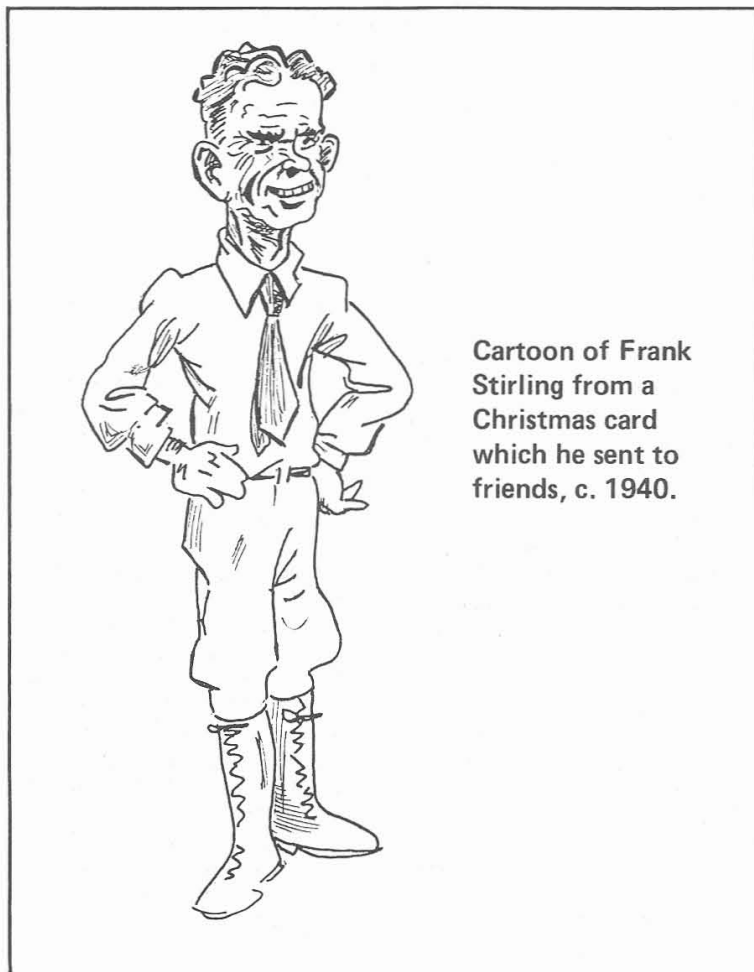
Experiments and investigations in regard to the nature of the disease have been, and are being carried on by Prof. Stevens of the Experiment Station at Gainesville, and by Dr. Wolfe of Alabama. However, a committee has been appointed in the Redlands section to carry on some experiments in the diseased territory there. There we have learned some things which have proved quite valuable to us in our work. We know that where we have burned the tree and surrounding ground, and where the new shoots have sprung up from the roots, in no case has the infection returned. This shows conclusively that the roots were not infected. However, only a few of the trees have sent forth sprouts where they were burned. In many cases the trees are entirely dead.

We know that, during the warm, wet

periods, the disease infests quickly and matures in a few days. I took a leaf having two pustules of the Canker on it, soaked it in water one minute, drew it through my thumb and forefinger once, then drew a leaf which was on a healthy potted grapefruit seedling through my thumb and forefinger once; with the result that, in eight days, on that leaf I counted over fifty tiny pustules of the disease. In four days more, these pustules had developed to maturity; that is, they had burst open, and were infecting the other leaves upon the seedling. To learn if the disinfectant (bichloride of mercury) which we were using, was effective, I repeated the experiment, using a solution of one to a thousand in which to soak the diseased leaf; with the result that no infection occurred upon the healthy leaf. We have also noticed that where groves have been repeatedly sprayed with Bordeaux, even though they are close to an infected grove, the chance of their becoming infected is considerably lessened, although the Bordeaux does no good after the tree is once infected.

Now the question arises, is it worthwhile to resort to this most drastic method of eradication — that of burning the diseased tree. It certainly is

heart-rending to burn beautiful trees, which in some cases have ten to twenty boxes of fruit on them. As I have said before, we have burned in the Redlands section one tree in every 167 trees, or something like a half of one percent. We consider that if we could make an entire eradication by sacrificing ten percent of the whole number of trees in the section, it would be worthwhile; and I feel confident that we will not lose more than one percent of the total. While there may be found some remedy to effect a control of the disease, I doubt it very much; and if there is, our knowledge of other diseases shows us that eradication at almost any price is preferable to any remedy for control. Take Citrus Scab, for instance, I am told by good authority that that disease will cause something like a hundred thousand dollars loss to the citrus growers of the State this year. One-tenth of that amount, if applied properly at the start, would have stamped it out completely; as could have also been the case with the whitefly in 1896. So with this new disease, which is by far the most terrible yet known to affect the citrus industry in Florida, we deem that the only way to handle it is by complete and absolute annihilation.



Cartoon of Frank Stirling from a Christmas card which he sent to friends, c. 1940.