Wisconsin State Cranberry Growers' Association. Forty-sixth annual meeting, Wisconsin Rapids, Wisconsin, January 14, 1933. Forty-sixth summer meeting, Wisconsin Rapids, Wisconsin, August 16, 1932. 19...

Wisconsin State Cranberry Growers Association
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C E Bennett

WISCONSIN STATE CRANBERRY GROWERS' ASSOCIATION

FORTY-SIXTH ANNUAL MEETING

Wisconsin Rapids, Wisconsin

January 14, 1933

FORTY-SIXTH SUMMER MEETING

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LETTER OF TRANSMITTAL

To the Honorable A. G. Schmedeman,
Governor of Wisconsin.

Dear Sir: I have the honor to submit to you herewith the Forty-sixth Annual Report of the Wisconsin State Cranberry Growers' Association containing papers read, discussions and a financial statement for the year 1932.

Respectfully yours,

Clare S. Smith,
Secretary.

Wisconsin Rapids, Wis., January 14, 1933.

Democrat Printing Company
Madison, Wisconsin

MINUTES OF THE 46TH SUMMER MEETING

Meeting called to order at 11:30 in the Rose Room of the Witter Hotel, Wisconsin Rapids, Wis., August 16, 1932.

Minutes were read and approved.

The following were appointed to draft a regret on the passing of Andrew Searles: F. R. Barber, Guy Nash and A. E. Bennett.

Dr. H. B. Johnson: O. O. Potter, E. E. Bennett and Richard Rezin.

Wm. Charles: Phil Bennett, Alex Grimshaw and Roy Potter.

Moved and seconded that the Association make exhibits at the county and state fairs along the same lines as last year.

President read a letter from the State Insurance Rating Bureau giving their decision on cranberry warehouse fire insurance rates.

Letters read were from the Federal Department of Agriculture acknowledging our letter of appreciation of their work on cranberry diseases and insect pests and from Mr. A. D. Makepeace in regard to the sale of the new crop between sales and non-sales company members.

Moved and seconded that chair appoint a committee of three to correspond with Mr. Makepeace and that the president be empowered to call a special meeting to act on results of committee's investigation if so desired. F. R. Barber as chairman, C. L. Lewis and C. A. Searles were appointed.

Adjourned for luncheon.

Meeting called to order at 1:30 P. M. Following the president's address talks were given by C. L. Hill, chairman Department of Agriculture and Markets, E. L. Chambers, A. U. Chaney and H. P. James.

M. O. Lipke displayed several paper boxes as possible substitutes for the wooden one we now use to ship cranberries in.

Moved and seconded that president get in touch with the Compensation Rating Bureau and see if rates cannot be altered to our advantage.

Moved and seconded that a vote of thanks be given to L. P. Daniels for the use of this room and the fine treat given us this afternoon recess.

Moved and seconded that the next winter meeting be held on the first Wednesday in December.

Motion passed to adjourn.

CLARE S. SMITH,
Secretary.

In Memoriam

WHEREAS, In the death of Andrew Searles, a valued member of the Wisconsin Cranberry Growers' Association, and for many years president of the organization, we have lost a faithful and active associate who has had part in the development of this industry from its start in the State of Wisconsin.

Resolved, That this Association spread upon the minutes of this meeting an expression of esteem and sorrow at the passing of our friend and associate, and transmit to the family our condolence and sympathy.

F. R. BARBER,
GUY NASH,
A. E. BENNETT.

In Memoriam

An all wise Providence has removed from our midst our esteemed friend and member of this Association, Dr. H. B. Johnson, who has been a friend and co-worker of the cranberry industry for the past thirty years.

The members of this Association in common with the whole community deeply deplore his loss and join with profound respect and regret in placing on record our estimate of his worth.

O. O. POTTER,
RICHARD REZIN,
E. E. BENNETT.

In Memoriam

An all wise Providence has seen fit to remove from our midst B. P. Clinton, a fine neighbor and member of this Association, therefore be it

Resolved, That we extend our sympathy to the surviving family and that a copy of this resolution be placed on record.

CARL GETSINGER,
JOE BISSIG,
S. N. WHITTLESEY.

In Memoriam

WHEREAS, Death has called William Charles, a kindly neighbor, friend and fellow cranberry grower, be it

Resolved, That an expression of regret at his passing be recorded in the minutes of this meeting and our sympathy be conveyed to his surviving family.

PHIL BENNETT,
ALEX GRIMSHAW,
ROY POTTER.

In Memoriam

This Association acknowledges with regret the passing of Mrs. Doyle, wife of Daniel Doyle, and Mrs. Konkel, wife of Joe Konkel, and extend our sympathy to the surviving families in their bereavement.

C. S. SMITH,
Secretary.

ADDRESS

A. B. SCOTT, *President*

I will briefly place before you matters of interest to our members that have been brought to my attention during the time since our last meeting.

Compensation insurance rates have increased steadily and continuously since the act was made a law. The last increase in 1932 over 1931 shows a 51 per cent gain. Receipts from all products of farm or factory have shown a marked decline, still the authorities allow the companies to raise the rates regardless of the fact that the employer finds it much more difficult to raise the money with which to pay the increased rates. I took this matter up with the Commissioner of Insurance, and letters will be read giving the reasons why the rates have been raised.

I have also taken up the matter of minimum wages for women in picking and sorting. Letters from the Industrial Commission in regard to this matter will be read later in the program.

Correspondence with Mr. Gaus, secretary of the Land Utilization Committee, will be presented. While in Madison recently, I called on Mr. Gaus to take up with him the matter of probable work on lands and water conservation in our area. The work of zoning and classification is now being carried on in Langlade County and is under the general direction of the Department of Markets. I called on Mr. Hill, chairman of the commission, and was fortunate in meeting Mr. Bordner, chief of the field staff, at the same time. The crew is now being moved to Juneau County where a camp will be established at Sprague. They hope to find time to make a water survey of the cranberry area this fall and be able to make recommendations to the Conservation Commission on procedure to follow in conserving water by placing suitable and proper stops in the various drainage ditches that are a detriment to the cranberry growers and also to the possible growth of timber. Plans are now under way to construct cross dams at two or three strategic places to hold back water in the marshes in the Mather area. With this work accomplished, we will have made the first step in the conservation of the natural resources of this area.

It is, I think, in order here to call your attention to the publication of the report of the state committee on Land and Forestry. This report gives excerpts from the proceedings of our last summer meeting which embody suggestions of procedure for conservation of water. This indicates the attention this method of fire protection and conservation of natural resources is attracting, and I am confident that it will grow to be of considerable importance in the reforestation and land use policy of the state.

1933 CROP ESTIMATE

A. U. CHANEY

There is no definite estimate of crops as yet. General survey shows a tremendous bloom on the Cape. It was followed by a long dry spell resulting in some blight which might have been serious if the drought had not been broken. They expect about 350,000 barrels.

Where the water was taken off early the crop seems to be best, just the opposite of last year. Well sanded bogs are not hurt as much. We expect 85,000 barrels in New Jersey; 63,000 for Wisconsin and 16,000 for Oregon and Washington if no further damage occurs.

Fruit seems to be larger than usual at this time of the year. Water is very scarce except where stream or lake fed.

They are experimenting on a new method of frost protection, using airplane propellers to create circulation of air on the bog.

The commercial apple crop is eleven per cent less than last year; prices are low. The peach crop is short except in Michigan and California. Peaches are as low as 35 cents a crate. The prune crop is enormous and selling for four dollars a ton. I am confident that we can do better than last year. Last year's crop cleaned up well. We do not expect them to buy in large quantities; it will be a hand to mouth consumption, regulated to suit the demand.

TAXATION

CHARLES L. HILL, *Department of Agriculture and Markets*

I am taking it for granted that those of you who know me or know of me, fully realize that I was anxious to come and speak to you, not because I know anything about taxation, but because I happen to be chairman of the State Department of Agriculture and Markets. As you know, we are given money by the Legislature and expected to expend a certain part of it each year to promote the cranberry industry. You people promoted that enterprise and obtained that appropriation from the Legislature. It was turned over to us to administer, and we are doing the best that we can to promote the industry.

This is the second time in my life that I agreed to get up and talk about something I know nothing about. I see Professor Hibbard was here and talked to you about the economics of agriculture. Doubtless he knows all about it from the theory end of it, and I am not attempting at all to belittle the theory end of it, because it is the investigational work with the principles of economics that makes it possible for us to change conditions that have to do with agriculture and other economic features of life. Mr. Scott asked me to come, of course, because I am a member of the department at Madison; then, when I wrote him and asked what he expected me to talk about, he said taxation. This amused me, especially during the heat of a political campaign when there are hosts of people discussing that subject. In fact, there are two political meetings going on in this town at this time, where doubtless they will be talking about taxation from a political standpoint. I saw a poster this morning, just put out by a candidate for Congress in my own district. I hadn't

seen the fellow for some time, but I recognized his picture. His slogan was, "Repeal the Eighteenth Amendment, and Lower Taxes." I am sixty-two years old, and as long as I can remember, the slogan of every political campaign has been to lower taxes. In spite of that, taxes have risen from one year to another, and probably will continue to do it.

We complain a lot about taxes, but they are a necessary part of the running of our government, as you know. We demand more and more government all the time, and by so demanding, we have to "foot the bill".

May I speak of the difference between taxes and tribute. We vote these taxes on ourselves. If you do not do it directly, then you elect representatives who do vote them on us. If you aren't suited, the next time they come and ask for your vote, you can vote for someone else who promises to lower taxes, as they promised to lower them the last time. In the old days, if you didn't pay tribute to the master of the clan, he would probably knock you over the head with a hickory club. That was true in many countries up to almost the present time. They say the last of the absolute monarchies, that of Siam, was abolished a month ago, so we are getting into the representative form of government more and more.

Most of us think of property taxes when we speak of taxes, and they are the ones that hit us the hardest. Taxes may be direct or indirect. Up to the days of the income taxes, people didn't realize that they paid a large amount in taxes to the federal government. Import taxes, excise taxes, and other indirect taxes are camouflaged so that people do not know they are paying them. There will never be an end to the tax question. The next time they revise the Scriptures, to the part that reads "The poor you have always with you", they will probably add, "The poor, and taxes, you have always with you." The property taxes are the ones that we are at this time protesting against. People who have had income enough so they have had to pay surtax in our state for unemployment this year, are protesting now. I have just accepted—in the same kind of moment I accepted the job of speaking to you—the chairmanship for the Capitol Building for the Community Drive in Madison. Everybody able to pay the surtax this year is wrought up. They say they won't contribute to community affairs this year. I know people who say they do not have to pay it, but, they would be glad if their income required such payment.

The property taxes are the ones we are thinking and talking most about now, because of the large amount of farming territory in the state of Wisconsin on which the farmers are not able to pay taxes. This has been true for three or four years, and this year worse than ever. I was in Northern Wisconsin last year, and saw some of the marvelous school buildings that were built where they have very few pupils to attend them. They were built because some of the logging companies owned the land, and they thought it would be a good time to get a good school building while the lumber companies were paying the taxes. I was at one where they did better than that. Through some sort of scheme, they got enough taxes ahead so that they have the school endowed, and can run the school, regardless of the fact that the lumber companies let the land go back to the county through not paying the taxes. These property taxes are a burden, almost greater than we can bear. They are greater than a lot of us can stand up under. I am going to speak of those a little later, more directly.

The several other forms of taxation I will merely mention. Probably the fairest tax ever invented is the gas tax of three or five cents per gallon. The only way we can get out of paying it is if we put the cars in the garage and don't buy licenses for them.

The income tax, with the gas tax is the fairest, and to my mind, the only kind of tax we will have to pay eventually. I am looking forward to days, probably a long time from now, when we won't have to pay property taxes, but when we will pay taxes like the gas tax and income tax, depending on the profits of the business or income of the people.

There are a lot of other taxes that bring money into our state government and local municipalities and country townships. There is, for instance, the license tax. In the old days, the only license was the saloon license. Now we license everything under the sun. Our department has to administer so many license taxes that the number is getting to what my little girl used to call "beyond the counting." When the number got beyond the fingers of her two hands, it was "beyond the counting." Some license taxes bring a large amount of taxes into the government. The soda water beverage license of $5.00 brings an enormous amount of money into the state treasury. The chain store tax was put into effect at the last session of the Legislature. This is $10.00 for anyone who has two dry goods stores, hat shops, lumber yards, etc. They must pay $10.00 each, and the license increases per store, according to the number. When the number of stores is past twenty, it is $50.00 a piece. This tax of $50.00 a piece paid by Standard Oil, Wadhams, the Woolworth and Penny Stores, brings a lot of money into the state treasury.

In the old days we used to have a poll tax of $1.50, or went out and put a day's work on the road. At our town meeting someone who was often "primed" beforehand, made a motion to vote so many mills for road purposes. Some day in June, the pathmaster of the town called you to come and work out the tax. I remember one man had a team of ponies weighing 900 pounds, took some rails off his fence, and a six-inch sideboard, and drove into the gravel pit, and started out again. The only time he ever got a load was when someone held the horses so that they would have to take a load of gravel. That is what we call "working the road tax."

There are people who think that the only tax that can be just is Henry George's single tax. Ex-Lieutenant Governor Comings, now in our State Humane Department, is a "single taxer", and believes in a single tax. Edward Nordman, who used to be head of the Department of Markets, was a "single-taxer", and those who are, can convince you, if you can be convinced at all, that all other taxes in the world aren't worthwhile.

The so-called "luxury tax" is another one of the kind they try to camouflage so that you don't known you are paying it. When I walk down the street and see the amount of coloration on the faces of some of the women I meet, I can understand why some of the luxury taxes bring in a lot of money.

There are various stamp taxes which aren't in force except during times of war and emergency. We are now paying a three cent postage rate instead of two. That is supposed to be another way that we don't feel it, but my guess is that for the first six months at least—we may forget it after that—we aren't going to write quite as many letters, so it won't bring in much more money to the government. You all decided you would write less checks when the check tax went into effect, and you will for a while, but you will soon forget about it. You can go to the bank and get a certain form of receipt, and draw out money, avoiding the check tax; but when you find you forgot to put the amount down on your check stub and have overdrawn your account, you say, "What's the use? I'll pay the 2c and have no more trouble." That is the way with many of these taxes that are camouflaged.

The question everybody asks is, "Is there going to be any change

in our tax situation? Are they going to be lower?" They are lower this year. All of the departments in government, from the local township government up to the state government, are actively interested in saving taxes; they are doing this because the state is made up of tax payers who are demanding that this be done. Anyone who expects to stay in office has to see that taxes are reduced somewhat in order to hold his job. Please do not think that I am speaking of any party or person, but this applies to anyone. You will remember my saying that there won't be much change in taxes, and there won't be unless you take a different attitude than you are taking right now. That means all of us. How many of us would want the school systems, which are the heaviest load we have in taxes, any less efficient than they are today? Nobody would be willing to have the schools less efficient even though the taxes were lower. We would be willing to cut the expenses in some ways—pay the teachers less in some instances, consolidate some departments, etc.,—but that would all be a "drop in the bucket" compared to the cost of the school system. We aren't building, and won't build a lot more high schools, especially in small towns; but isn't it true that people in small towns and countries need high schools and a high school education as much as people in more fortunate cities like Wisconsin Rapids? Since our form of government is a democracy, we are going to endeavor to so adjust things that everybody can have an equal opportunity. With that in view, we will have to provide more high school opportunities, rather than less.

Probably the biggest hole in the game of taxation is our road system. We are proud of the concrete roads in our locality. We like to say that we are located on a main concrete road from Chicago to St. Paul, or that we can go to Milwaukee two, three, or four ways on concrete—I don't know what the case is here. Do you know how much you have to pay for that privilege? When our county bonded itself for $5,000,000 to build concrete roads, they paid $40,000 a mile for those roads. It means that if the land is worth $100 an acre, it would take the value of a strip of land three-fourths mile wide beside the road, to build that road. A lot of people predicted that we would have concrete roads every mile square before long. The total value of the farming land wouldn't much more than half pay for it. I do not mean to cast any reflection, but I tried to figure out how wide a strip of the land from here to Plainfield it would take to build that road. We want the roads. My son-in-law drove from Scranton, Pennsylvania, to Rosendale in 2 days, and was on concrete all the way. We demand those things, and then we don't want to pay for them.

We demand all sorts of service. The Cranberry Growers' Association is demanding service from the state of Wisconsin. It is one of a lot of semi-private organizations the state is aiding—the Wisconsin Livestock Breeders' Association, Potato Growers, Dairymen's, Cheese Makers, Buttermakers and other local associations. I won't attempt to mention them all. You are asking for aid for your county fair at Marshfield. As you know, the state appropriates $300,000 a year to pay premiums at county fairs. If your county fair association runs a fair and pays out $5,000 in premiums, the state pays 80% of that, and your county board or the receipts of the fair pay the other part. This year a few fairs discontinued, and all fairs have cut the premiums. The state appropriates from $75,000 to $125,000 a year to pay the deficit on the State Fair, and the question is whether it is worth it. If you think it is, you have to pay the bill. I was dumbfounded, during the last session of the Legislature, when the governor called me into his office and said, "I am giving you advance information. It is necessary that $700,000 be saved. I am very sorry, but we will have to cancel the State Fair appropriation

before the estimated budget and receipts will come together. I know you will feel very badly about it, and I don't want you to tell the other commissioners for a while." We had already made a lot of the contracts. Of course, while we had signed the state's name to them, the state wouldn't have to live up to them, because you cannot enforce a contract with the state by legal procedure. I got busy with the heads of the other departments, without telling them the reason, in an attempt to show how $50,000 could be saved out of other funds, so as to save the fair. If anybody thinks the state is parsimonious this year in reducing premiums, cutting out a lot of help, etc., I want them to know we are doing it in an attempt to save enough money at the fair so the next Legislature won't say the cost is $100,000 to $125,000. We want to get the deficit reduced to an amount that they will consider worthwhile. Those are state activities. Until these strenuous times, hardly a village in the state thought they were complete without a town or village hall. They even built community halls in country communities. There were very fine enterprises going on, but they had to be paid for.

Those are legitimate taxes, but I want to talk to you about some I think are not legitimate. I think the Garner Pork Barrel Bill introduced by Congress was just a successor to the kind of "Pork Barrel bills" we have been standing for for years. It didn't pass, not because it was a pork barrel bill, but because of hard times. I talked with the Congressman from my district, and he said there was plenty of opposition to this bill, but he would have to vote for it. He said, "There are six or eight $50,000 to $100,000 projects in communities in my district. Do you suppose I could live if I didn't get that money for my district?" The same is true in building post offices, etc., in every town in the country, and we have to pay for it. They are dredging out a harbor at a cost of $25,000 to $30,000 at Calumet Harbor, on the east shore of Lake Winnebago, using a big government dredge, tender and another big boat, three of them, besides the scows carrying the material. The Indians used to use that harbor to run canoes in or out of, but the only time it was used for commercial purposes was when they used to make brick and bring it across in scows to Oshkosh. This could be trucked to Oshkosh just as easily. It is nothing but a chance to spend some money in that district.

We have a similar project near home—that of improving the Fox River route to Portage. There was a large appropriation made to re-dredge that channel of the Fox River. This compelled the towns of Berlin, Omro, and Princeton to maintain draw bridges over the Fox River. They compel the Chicago and Northwestern railroad at Buffalo to keep someone there day and night to open that draw bridge. There are locks up the river, and you drive in and see the beautiful park maintained at that place. My son asked the lock keeper last summer what the purpose of it was, since there were no boats going up and down the river. He answered, "Well, the tender makes two round trips a year." That is all the traffic there is up that way.

We have, from year to year, stood for "pork barrel legislation" that has cost us money. This year we began to feel some of it. However, that is just a "drop in the bucket". You know, I am sure, what the biggest bugaboo is—the amount of money we pay to support war. It seems impossible that anybody would continue to advocate preparedness at the cost of $700,000,000 a year, when you think what that money could do. We spend $40,000,000,000 on a war that lasts a year and a half, like the World War did. If we continue to live in a civilized world, we will some day cut out that expense and put the money in some useful endeavor.

As I said before, the slogan of everyone running for office will be the lowering of taxes. The other day I saw a facetious article or

address by a Washington representative of the St. Louis Post Dispatch, delivered before the Press Association meeting in Texas. Perhaps a lot of you saw the article, because it was quoted in a lot of papers. It spoke about Ex-President Coolidge, and it said he got to be known as a super-man because he didn't say anything. "Did you ever stop to think that he was in the same class with a lot of other people who didn't say anything either? About once in three months he said in sepulchral tones, "Economy". Taxes mounted in every year of his administration except one." That is true of what everyone else says about reducing taxes. I happened to be asked to serve this year on a committee of the United States Chamber of Commerce on the reduction of Congressional appropriations. We met around a table in Washington, and the official secretary had prepared a statement that we were rather expected to adopt, and did adopt—and it was pretty sane, too—in which we asked Congress to cut out a lot of things. This included the request that they consolidate the Navy and War Departments, because it had been figured out by government officials themselves that at least one to two hundred million dollars a year of war appropriations could be saved by consolidation, because the two departments were doing duplicate service. A number of other things were mentioned in that report. Mr. Chambers, our entomologist, is here, and that brings to mind the barberry eradication problem. One of the first things I was requested to do when I got in office was to write to Washington protesting against abolishing the appropriation for barberry eradication. I wrote to two United States Senators and all the Congressmen. Most of them wrote back, as they usually do: "Your letter received and put on file, and when the subject is brought up we will give it careful consideration." You have had that kind of letter. A couple of them didn't write that kind of letter. One said, "I am mighty glad to get the letter, because I think I know you well enough to come back and tell you about the situation we are in. You, like a lot of others, demand that we cut taxes, and the minute we start doing it, you begin to protest. You are protesting against one particular project you are interested in. Someone is interested in every project we expect to have to cut. We aren't going to be able to do any legislative business in Congress if we try to reply to all of these requests, or if the government tries to get clerks enough to reply to them." I wrote back and thanked him, and said, "If you and the Lord will forgive me for writing that letter, I promise to take care of the public business from now on." Every time you want a certain piece of road graded, or are in favor of any other project in your state or nation,—and I don't blame you for being in favor of worthwhile projects—please remember who is going to pay for it.

I am going to list the biggest items in the state taxation program. I will not take the time to quote any statistics whatever. Someone said that if all the fellows running around the country making after-dinner speeches and quoting statistics were laid end to end, six feet under ground, it would be a good thing. I will merely mention some of these items. Our state university costs a lot of money. It is up to you to make up your mind if it is worthwhile. I can tell you things that are very much worthwhile in connection with the university, and some things that are not. That is for you to find out. The board of control is another one of the very costly parts of our state government. We are maintaining charitable and penal institutions, apparently all necessary. We are doing another thing since the last session of the Legislature, and I believe it is the best thing done along penal lines for a long time, and that is putting out prisoners in reforestation project camps. Colonel Hannan, of the State Board of Control, says the figures given ordinarily regarding the possibility of making trusties of the prisoners—really trusting them—

show that ten per cent can really be trusted. Thirty-two per cent of the prisoners from Waupun are now in camps, and not a single prisoner tried to escape. Col. Hannan said at Tomahawk he overheard two of them talking. They said, "Isn't it great to be up here, even though we do have to work? And the strangest thing is, they trust us." When you trust a man, he begins to trust you, and some reformation will go on in that way. We know of some ways we could very greatly reduce the cost of this charitable and criminal institutional program in the next generation. I am thinking of people that have to be taken care of, such as idiots, etc. Isn't it fine that we can take care of them instead of doing with them like they used to years ago—take them out in the woods and knock them over the head, almost literally. We are going to find it necessary to put a lot of money into the reforestation program. You people are probably as much interested as any other community in the state. The passing of the Forest Crop Law which made it possible for counties to put their land that came back for taxes under that law and get 10 cents an acre from the state toward common taxes, is going to be the first step in reforestation. We are talking reforestation and aren't doing much. They say everybody talks about the weather and no one does anything about it. That is altogether too true about the reforestation program. When it gets worked out, however, these reforestation camps of prisoners will hasten our reforestation work.

It is a funny thing that when we talk of the cost of the state government and farmers begin to talk about it, they begin to want to cut out the things that are of most interest and help to them. The reason is that they happen to know about those things. How many of you knew about the project of keeping the Fox River open, and what it costs? Some farmers will no doubt want to cut out the appropriation for the Wisconsin Cranberry Growers Association, but you can easily call their attention to something bigger than that.

Property taxes have become such a burden that we in Wisconsin cannot pay them at this stage of the game. Hundreds and thousands of farmers are going to lose the titles to their farms on account of the taxes. There isn't any short time program that will stop it. It will require a long time program of economy, and of adjusting the tax system to the basis of an income tax so that those able to pay—either farmers or someone else—can pay them without bankrupting themselves. I spoke of people who could pay the surtax and hate to do it. Sooner or later we must realize that the cost of government must be paid by those who have an income, and not by those who have none. It cannot go in in any other way and keep the people contented and happy. I have looked back at the taxes on my own farm. I have one hundred forty acres, all inside the village limits. Immediately you would smile and say, "Of course your taxes would be high." As a matter of fact, the taxes on my farm—which is assessed all I think it ought to be, of course—are considerably less than they would be in one of the townships just outside of the limits. That is true because of the income taxes coming into the village from the pea canning factory and a few other institutions. Our taxes were $75.00 a year in 1915, then $240.00, as high as $550.00, and this year, $436.00. I talked with two farmers lately. One of them said it took eight months' milk check to pay his taxes this year. We cannot stand up under that, but if we must reduce it, we must reduce some of the activities.

I haven't any solution for the problem, but I could mention two or three things that I think must be stopped. One is continually issuing bonds for everything instead of paying. The situation that we are in in this country is quite largely due, according to my viewpoint, to paying on the installment plan. People in the city now out of a job had mortgaged, in many instances, their income for a year ahead,

and many farmers did the same thing. They bought machinery expecting to pay with next year's crop or the crop after that. We said, when we built the concrete roads, that we want the next generation to help pay for them. I don't know whether we have the right to place this debt on the shoulders of the next generation. Five or six years ago, when we voted for those roads, we figured prosperity was going to continue "forever and ever, Amen". Now we are up against another proposition—we have them, and have to pay for them.

In criticism of the state government, I hear a lot of talk about salaries being so high. As you know, the salary of the state Governor is $7,500. The salary of the president of a dairy company in Milwaukee was $38,000 last year. He had a large part of the stock in the company, with enormous profits on that, and he got a slight commission on every dollar's worth of business they did. If the president of a large company of this kind is worth around $50,000, what would you consider the man who runs a project as big as the state of Wisconsin worth? Phil La Follette was the first man to cut his own salary. The demand came to all of the departments in the government to cut salaries. I will confess I was one of those, and the other commissioners in our department. We said, "We will gladly do that when we see that the University will do the same thing." The University cut even more severely than we did. The president of the University gets a good salary. He doesn't get $25,000 in salary—I think he gets $18,000, or did before he was cut, and he had an automobile and a house furnished for his use.

Those who know me know that I have always been a Third Party Prohibitionist. I am not standing up for anybody. When the elder Du Pont died, he was said to be worth $40,000,000. There were 13 people by the name of Du Pont who had taken part of the estate, who are now worth that much or more. One of the things we have to do is to make it impossible to obtain wealth as we have been doing. I would go so far as to say—although it is foolish and I know it cannot be done—I would advocate making it impossible for any man to die and leave any one of his children more than $5,000. Didn't every one of those men start with less than $5,000 and build up a fortune? The only hope of the situation, as I see it, is that they say it is only three generations from overalls to overalls. The Vanderbilt family had a custom fixed by the old man, who tried to pass it on to his sons and daughters; there was a pre-nuptial arrangement with the person they married showing exactly what they were to get, and they signed a waiver to never accept anything more than that pre-nuptial arrangement. We will have to have a system to prevent people from amassing wealth, or we will have a Socialist government. I was in Denmark a year ago last summer. They have a Socialist government. All of the cabinet, including the Prime Minister, are farmers. You cannot imagine a happier people. I visited a great estate owner. He had 280 cows in one pasture, and a barn 400 feet long in which to house them. He had pig pens where he raised hogs by the thousands. He was proud to say he belonged to the farmers' cooperative. He was a member of the feed plant, packing plant, and everything else. He was just one of the common people, with the rest of them. You can study, between now and the primary election, political questions enough so that you can form an opinion on what you would like to have done and who will carry out those policies, and support those people or policies. Study the legislation talked about and advocated at the next session of Congress. If you have studied it and formed an opinion, you can either encourage or discourage the legislation when the question arises.

I realize I haven't talked about the tax situation at all in the way an economist would talk about it. My son is on the farm and has the tax problem to contend with. I am interested in it from the same

standpoint that you are. I believe you will go away from this meeting with the thought that when you want to advocate something that will cost a lot of money you will figure out how you are going to pay for it, and then you may or may not advocate it.

NEW DEVELOPMENTS IN INSECT WORK

E. L. CHAMBERS, *State Entomologist*

You have heard a lot this afternoon about taxes, and a lot about insurance, and if I get started talking about some of our insect pests, you will be convinced there are a lot of insects; and before we get through, the reporter will think we have too many speakers, so I think I will make my remarks very brief.

Speaking of cooperatives and the problem of making them a success, reminds me of a story of a youngster eating an apple. An elderly gentlemen reminded him to be careful not to bite into the worm. The boy replied, "When I'm eating an apple, the worm has to look out for itself." That is the way some cooperatives work out—it's everybody for himself. Mr. Bennett told me a while ago in his jesting manner, that every time he sees me I am either talking or eating, which reminds me of another story. Two boys were talking about ants. One said, "Isn't it funny that ants work all the time, and never play?" The other said, "Oh, I don't know. Every time I go to a picnic they're there." So to get back at Mr. Bennett, I might add that every time I see him, he too has been either eating, sitting down or talking. Like Mr. Bennett, I too work occasionally, and we have four or five people in the audience who are on the program this afternoon who have been doing work we would like to hear about, and as our time is short, I will not monopolize it but will make way for those who have been solving your problems. I do want to stress one or two points first, however. I want to advise you first that I did not intend to make an address. This is the twelfth or thirteenth time I have talked to you folks. The first time I talked up here I didn't know that I was to be called upon to talk, and when your chairman announced that the first thing on the program was to be an address by Mr. Chambers, I felt that my remarks were somewhat over-advertised when given such a label. There is a little poem that about illustrates this point, the author of which I have forgotten, that goes something like this:

A lion met a tiger as they drew beside a pool.
Said the tiger, "Tell me why you're roaring like a fool."
"That's not foolish", said the lion with a twinkle in his eyes.
"They call me the king of beasts because I advertise."
A rabbit heard them talking and ran home like a streak.
He thought he'd try the lion's plan but his roar was a squeak.
A fox came to investigate,—had luncheon in the woods.
Moral: If you advertise, be sure you've got the goods.

One thing that we are frequently asked when discussing our work is, "Where do all these insects come from, and why do we have all these beetles, flies, leafhoppers, etc. I have tried to point out in the past that these insects have priority rights. We are told by geologists who study the fossils in the rocks to get their information that the insects were here 50,000,000 years, and man has only been here

on earth for the last twenty minutes, comparatively speaking. If we were to take antiquity as the basis for aristocracy, the cockroach would be a true aristocrat. The cockroach could look at these lights that illuminate this room and say that when the coal that was used in producing that light energy, was laid down, their family was already well established. That was a mere 50,000,000 years ago, and long before man appeared on earth, and so we may expect that these insects will put up a strong fight to hold their place. There are as you know, an enormous number of species. If when you stretch out your arms and fingers horizontally at your sides, you take the distance between the tips of the fingers of your outstretched arms as representing the different kinds of animals living today, the last joint of the middle finger of your right hand will represent the number of kinds of mammals. The middle joint of your right hand will represent the different kinds of reptiles and their kin. The first joint of the same finger will represent the number of different kinds of birds, and the distance from the knuckles to the wrist will represent the fishes. In other words you can hold our so-called zoological gardens and their aquannexes in one hand. The length of one forearm from the wrist to the elbow would on the same scale represent the number of the different kinds of spiders, worms, known as protozoa, and all other invert that are not insects.

A New Yorker referred to the famous New York Zoological Gardens with pride to an entomologist friend and was shocked to be told he did not know they had one. "Have you never been to our Zoo Gardens in the Bronx?" The entomologist answered, "Oh yes, but they are merely gardens of vertebrate zoology. You have no insects and they represent three-fourths of the kinds of animals." I brought this out to show you why there are so many insects being discovered all the time. They are not being created, and we are not manufacturing them—they are here.

Probably less than one-half of one per cent of all insects we have are virtually injurious. It is true that ten per cent of those we have are potentially injurious—that is, they could be if it weren't for the fact that they are held down by their natural enemies. I want to stress the fact that if anything happened to interfere with the natural balance, this country would "go to the dogs." We have been told that the next great war would be with the insects. Most people think this is newspaper talk, by over-enthusiastic entomologists. but when you figure out how fast insects multiply it does seem possible. There are ten to fifteen generations per year in the case of some plant lice. It takes a long time for man to develop, and a lot can happen to him before he gets to be twenty-one. We are today more disease conscious. Those of you who are experimenting with raising children know that every time the child coughs somebody will tell you of some terrible disease it may have, and that if not given proper care he or she may lose his or her hearing or eyesight. We have gotten to a point where there seems to be a new disease every time we turn around. If you were to believe everything you heard, it would seem next to impossible to raise a child today. However, in places like "Little Italy" in Madison and other over-populated centers. the children seem to merely grow up like Topsy by themselves. They seem to get along all right in most cases. Maybe we are too insect and disease-minded. We are more observing today. With the development of the microscope we have been able to run down many of these things. and being able to recognize them, we naturally notice them more. If we discover that they are doing damage, we want it stopped. sometimes at any cost, but at least if the cost is not less than the good accomplished. to justify the expenditure of the effort and money.

We have talked about taxes. I pay 2.35 per cent on a forty foot lot, and I think that is a good deal. It runs to $235.00, or approxi-

mately that. It is very conservatively estimated that we pay over 10 per cent of our crops to insects. If I had to pay 10 per cent taxes, I would think it was terrible, but that is what we are paying the insects. We are doing much to control them, but we can never get the problem solved until we are able to work out a plan whereby we can artificially balance nature. A lot of insects got into the country like the Greeks got into Troy. They tried to get through the walls and weren't successful. They built some big wooden horses and crawled inside them. The Trojans came out and thought they had deserted these wooden horses, and took them inside the walls. Then the Greeks crawled out and let the others in. (That accounts for all the Greek restaurants we have.) Some of our good Scandinavians brought plants from their home country, and folks from various other countries brought along shrubs and plants from their native country, and in so doing brought in insects along with the plants and unfortunately seldom brought the insect's natural parasites. The Japanese beetle, gypsy moth, corn borer, and all the other insects we worry about are held in check, naturally, by their own specific parasites.

I want to mention one more thing. The Japanese beetle is spreading very rapidly this year. While confined, until this year to Pennsylvania and Eastward, it has been discovered in Ohio at Columbus. We thought we had the gypsy moth pretty well cornered, but the entomologists were surprised this summer to find forty square miles of infestation in Pennsylvania. It is believed that it probably had been there fifteen years but had not been discovered. We think we know the distribution and infested areas of these serious insects, but we frequently find that they have jumped and become established in greater districts than we have realized. The corn borer, for instance, was found last year in Sheboygan and Manitowoc counties, and was wiped up through a thorough clean-up. This year we didn't find it in these counties but we have found it in Mount Pleasant township, in Racine county. The Mexican bean beetle has been found near Marinette, not in Wisconsin, but on the Menomonee side in upper Michigan.

I could go on and talk at length on some of the new developments in insect work, but as I said when I first got up to speak, we have four or five people on the program who have subjects that are of more immediate interest to you and concern your own pest problems a little more, and I will surrender my time to them.

COMPENSATION INSURANCE RATES

H. P. JAMES, *Representative*, Employers Mutual Liability Ins. Co.

Mr. Hill has explained quite thoroughly, and certainly very entertainingly, the fact that we make our own taxes. Of course, it is true to some extent that there is a lot of wasted effort here and there in organizations like the state and national governments, but after all the largest part of the money paid as taxes goes back to something the communities have requested through their representatives. Even more directly do employers make their own rates for compensation insurance. A good many of you are insured with us and know that we return to our policyholders all that is left from the premiums collected after paying the losses and overhead expenses. The "old line" stock companies conduct their business on a plan which does not permit them to do this. Out of every dollar

which they collect in compensation insurance premiums they pay out from 38 to 40% for agents' commissions, cost of administration, taxes, payroll audits, inspections for safety, and other overhead expenses, and their rates are calculated to cover only these overhead expenses and the actual losses, with no margin for profits. We think that their expense ratio is too high because under our plan of doing business it is usually in the neighborhood of 17% instead of 38 to 40%, and it is because of this great difference in overhead expenses that we are able to charge lower rates and still pay substantial dividends to our policyholders.

Losses have gradually gone up to such an extent that the stock companies are experiencing an average deficit of about 20% on their compensation business, and they have recently proposed a nation-wide increase in rates. Two weeks ago there was a meeting of the Rates Committee of the National Council on Compensation Insurance, an organization of all companies writing compensation insurance. The stock companies wanted an increase of 25% in every state but the mutual companies did not think that this was necessary, and as the mutual companies and the stock companies have equal representation on this Rates Committee the vote was tied. The presiding officer at meetings of this committee is a representative of the National Association of Insurance Commissioners and he has the deciding vote whenever there is a tie. He decided that an increase of 20% was necessary, but that does not mean that there is going to be a 20% increase in Wisconsin, and I am telling you this only to let you know that the Insurance Commissioners, who are appointed by the Governor in each state to watch the interests of the employers in connection with every line of insurance have admitted that there is an emergency that justifies a considerable increase. We contend that while it may be true that the stock companies are experiencing an average deficit of about 20% throughout the United States this deficit is not the same in all states, especially as rates have been adjusted in some states recently to a higher level than in other states. I am glad to say that there will be no increase in the rate level in Wisconsin this year, but this does not mean that there will be no increase in any individual industry.

Until eight or ten years ago there was no systematic plan for periodically revising compensation insurance rates. When there appeared to be an especial reason for a change the companies would get together and review the statistics and adopt a new schedule of rates, but that proved to be very unsatisfactory and inequitable, so some eight or ten years ago the National Council on Compensation Insurance, above referred to, was formed, and this organization acts as a general clearing house for all statistical information on compensation insurance. At the same time a system of annual rate revisions was adopted and the new rates which are adopted each year under this plan are based on the actual losses during the latest five-year period for which completed statistics are available. Of course there is a substantial fluctuation in the losses in any industry from year to year but over a five-year period this fluctuation is smoothed out so that the annual changes in the rate for any particular classification are not usually very great, provided that there have been no changes in the compensation law.

As a matter of fact, the benefits under the Wisconsin Compensation Act have been gradually increasing year after year. The Act was passed in 1911 and there were no changes in benefits until 1917. In 1917 the legislature added certain amendments to the compensation act which increased the cost to the employers of the state nearly 11%. In 1919 they made a still further increase of nearly 28%. In 1921 there was an increase of 4.6%; in 1923, 9.8%; in 1925, 1.8%; in 1927, 2.1% with another increase of 1.1% later in the year. The next year

the increase was approximately 3%. Last year the changes which were made in the law and which became effective May 8th increased the average cost to employers about 10%. One of these amendments increased the benefits to the injured workmen from 65% of his wages to 70%. Another decreased the "waiting period" from 1 week to 3 days. When those amendments were passed it was estimated that they would increase the compensation benefits 8½% and the Compensation Insurance Board thereupon ordered all insurance companies to increase their rates 8½% on all outstanding policies. Later computations showed, however, that the actual increase in benefits was nearer 10% than 8½%.

In the annual rate revision effective November 1st, 1931, it was found that besides this increase of 10% in the cost of accidents because of increased benefits under the compensation law there had been a further increase of about 14%, and the rates adopted at that time were therefore approximately 24% higher on the average than those in effect a year earlier. The reasons for this extra increase of 14% are not very easy to explain but the Secretary of the Compensation Insurance Board has given some of them in his reply to a protest by one of your members against the present rate which applies to your industry. In normal times an injured man wants to get back on his job, because he is only getting 70% of his wages while he is out and if he is out for only a day or two he gets nothing at all. In these days, however, he is never sure that there will be a job when he gets back, and there is a temptation for him to stay out as long as he can. Furthermore, in many industries men are working only two or three days out of the week and yet if they are disabled they receive compensation to the extent of 70% of a full week's wages, so they make more money by staying out than they would by going back to work. Probably this is not true in your industry but rate levels have to be based on average conditions in all industries throughout the state.

I said a few minutes ago that while there would be no general increase in the rate level in Wisconsin this year rates would be changed in accordance with the plan which I have described for annual rate adjustment and that there would undoubtedly be an increase in some rates, but you will be glad to know that there will be no increase in the rate for cranberry growing and, in fact, there will be a slight reduction.

I have just stated that one of the reasons for the increased cost of accidents, which became apparent in the rate revision last year, was the temptation for men to stay out as long as possible when they were injured. Another important cause, as was pointed out in the letter from the Compensation Insurance Board, is that compensation insurance premiums are based on payroll and that when wages are reduced the payroll decreases faster than the losses do, and consequently the ratio of losses to payroll, on which rates are based, goes up. One reason why the losses are not reduced in proportion to the payroll is that the medical expense, which constitutes about 1/3 of all compensation losses, is not reduced at all, and another one is that compensation benefits are based on a maximum wage of $30.00 per week, so that when a man who has been earning $40.00 per week has his wages reduced to $30.00 per week the payroll is decreased 25% but he gets the same compensation for injuries that he got when he was earning $40.00 per week. Of course, wages of this amount are not common in your industry but, as I have already explained, rate levels have to be based on average conditions in all industries and there were a great many workmen earning more than $30.00 per week a few years ago.

There are a number of other factors which, to a smaller degree, have helped to increase the losses per $100.00 of payroll and made necessary an increase in the rates per $100.00 of payroll, but it would

take too long to explain all of these. Besides, facts are of more importance than explanations and the facts are that the stock insurance companies all over the country, have been losing from 10 to 30% on their compensation insurance business in recent years, the total deficit running into millions of dollars. Of course, the mutual companies have experienced the same increase in the ratio of losses to premium and have had to reduce their dividend rates. The stock companies have no dividend margin to take this loss from and so they must continue to take it out of their pockets unless they secure an increase in rates. Wisconsin is fortunate, in a way, in that they took their dose last year and do not have to take it this year when rates in other states are being increased considerably.

The only question that may reasonably be raised is whether your industry is properly classified. The whole plan of insurance is to divide losses among a large group of employers who have somewhat similar conditions, so that each member of the group will pay a fair share of the total losses of the group instead of taking the chance of having individual losses which will be severe enough to cripple him. You may operate for years without costing your insurance company a dollar and yet it may be that next year the company will have to pay out thousands of dollars for accidents to one or more of your employees, so you must expect to pay your share of the losses of your group. The rates for each group of industry are based on exact statistical data and are adopted only after it has been proved to the satisfaction of Insurance Commissioners throughout the United States that these rates are reasonable, but it is natural for you to ask whether you are included in the proper group.

The rate on the cranberry industry is not based purely on the experience of cranberry growers. It has been found that the experience on any classification of industry is unreliable as a guide to the rate unless the payroll for five years in that industry is in the neighborhood of $20,000,000,000, or $4,000,000 per year. There are not enough persons employed in the cranberry industry in this state, nor in the whole country, for that matter, to produce losses which will have a fairly uniform average from year to year and so the cranberry growers have been grouped in this state with the growers of other berries and of fruits, such as cherries, and with truck gardeners, such are are common in the neighborhood of large cities and who raise only table vegetables and use no farm machinery other than a plow or cultivator, as distinguished from regular farming, where such machinery as reapers, corn shredders, threshing machines, etc., are used. This classification is applied to all operations in connection with cranberry growing except the preparation of new marshes, which is classified the same as regular farming and takes a higher rate, but that part of the total payroll in the cranberry industry is small.

Under this classification of fruit and berry growing and truck gardening, the total payroll in Wisconsin on policies issued in 1926 was only about $900,000 and it was therefore necessary to consider the national experience on this classification in order to have a sufficient volume to produce reliable results. The losses in Wisconsin that year were $1.46 per $100.00 of payroll. The next year, on about the same payroll exposure, they were $1.16. In 1928 the payroll was nearly $1,200,000 and the average losses were $1.28. Then in 1929 we had a catastrophe. You may say that it was not in the cranberry industry but it could have happened just as well in one of your cranberry marshes. That was the typhoid epidemic in Door County, in the cherry growing district. For many years they have had large camps of pickers and they furnish board and water for them, as you do during your harvesting season. In some way or other some of the wells became contaminated and a large number of illnesses and deaths from typhoid fever resulted. I believe that the total losses

from this cause were $20,000 or $30,000, and because of this the average losses for that group for that year went up from $1.28 to $4.18! On policies issued in 1930 the losses dropped to $.74, and the average for those five years was $1.84.

The losses which happened throughout the United States in this group in this same period of five years would have cost $1.00 per $100.00 of payroll if they had occurred in Wisconsin. Your rate for the past year is based on estimated losses of $1.16 per $100.00 of payroll and this figure is the result of combining the Wisconsin and the national experience. If your rate was based on Wisconsin experience only it would be nearly 60% higher than it is. You will see, therefore, that the rate which you are now paying is not even enough to cover the actual losses which the insurance companies have sustained in Wisconsin the group in which you have been placed, and I think you will admit that this grouping is fair.

If anyone has any questions which he would like to ask I shall be glad to answer them to the best of my ability.

Question: You said one-third of the cost was for medical services. What percentage of the cost is actual compensation?

MR. JAMES: One-third of all the *loss* cost is medical. The other two-thirds is compensation. The sum of these two factors constitutes 62% of the stock company rates, the other 38% being required for overhead expenses. As our rates are 10% under the stock company rates, the compensation benefits and medical costs use up about 69% of our premium income and the other 31% is for overhead expenses and dividends.

Comment: When we first took out compensation insurance the rate on harvesting and packing was 47¢ and the rate on construction was $1.50. It has now all been put under class 0008 and the cost is now $1.77 for harvesting and packing and $4.30 for construction work. Of course, you have explained why that is.

MR. JAMES: The rate of 47¢ which you had at that time was altogether too low. That rate was based on experience which was accumulated on truck gardening before the cranberry growing industry was put into that classification. About 9 years ago the fruit and cranberry growers, who had formerly been classified the same as regular farming, were given the truck gardening classification and immediately the losses under that code number began to increase, with the result that in 1924 the rate more than doubled. Therefore, you cannot properly compare the rate of nine years ago with the rate of today but should rather compare the present rate with that of 1924, which was $1.20. Since that time the increase in the rate on cranberry growing has been about the same as in other industries in the state.

Question: Have the number of claims increased per certain volume of business?

MR. JAMES: Yes. You mean in proportion to the number of employes, I suppose. One reason for this is because compensation now has to be paid for every accident which involves a disability of more than three days, whereas formerly no compensation was payable unless the employee was disabled for more than seven days. Of course, the medical expense is paid in all cases, whether there is any disability or not, but the number of cases in which compensation has to be paid has been greatly increased by this recent change in the law. Also, during this depression some employees who are not provided with full time employment will take advantage of the slightest cut or scratch or bruise to claim disability, whereas in normal times they would be satisfied with first aid treatment and keep right on working.

Question: The higher your rate is, the more claims; and the more claims, the higher your rate. That is a vicious circle. Where will it end?

MR. JAMES: I sincerely believe that we have reached the point now where it is fair to expect that rates will go backwards a little bit. I do not think that it will be next year, because our recovery from this depression will not be as rapid as that, but I do think that in the next two years there will be some decline in rate level and I have already told you that in your industry there will be a slight reduction even this year. When this emergency is over it is probable that rate levels will fall somewhat, but there has been a gradual upward trend ever since the compensation law went into effect. This is partly because of changes in the compensation law and partly because workmen have become better acquainted with their rights under the compensation law and partly because of the increase in medical cost. The Industrial Commission has published some figures which show that the average cost of medical treatment in all cases involving any disability practically doubled from 1920 to 1930, being $35.09 per case in 1920 and $69.67 per case in 1930.

Comment: You spoke of efforts to cut down overhead. At the end of last year, when we found ourselves "in the red", we made a resolution to cut our expenses 15 to 20% in 1932. Then, in January, the Employers Mutual demanded a 25% increase in rate.

MR. JAMES: I know it is hard to take, but what can we do? As a matter of fact, the reduction of wages in our own company has been as great as that in the average industry in the state. Cuts have been made in our company in proportion to the salary, so that the highest paid employees lost not only the most money but the highest percentage. We cut wages not only this year, but last year. Furthermore, the allowance to our salesmen for the use of cars was reduced about 30% or more. In every way, we have been "up on our toes", not only to cut expenses directly in every way possible but to make everybody do more work than they did before. We have not taken on any new employees in the last two years, although our work has grown considerably. We are doing our best, but in spite of that the tremendous decrease in payrolls and in volume of premium has caused our overhead expenses ratio to go up rather than down. We have more policies than we did two years ago, but less income on each one, so the overhead has to be distributed over a smaller volume of premium income. The mere fact that you have to pay more for something than you paid before is not in itself a proof that it is not worth what you are paying. If the increase in price is unavoidable, it is justifiable. The insurance companies are not responsible for the increase in losses. We do all that we can to help employers reduce the number of accidents. We visit places where accidents are frequent and educate the employers and the employees in keeping down accident costs, which is about all that we can do. We are just a pool in which the money is put together, losses and administrative expenses are paid, and you get back what is left over.

Question: In regard to the grouping, do the individual groups have anything to say about that?

MR. JAMES: The perspective of any particular employer is very limited. He may feel that he is being charged too much for insurance but he has no way of measuring the effect which a change in conditions would have on his rates. The rate in the stone cutting industry has recently gone up from $2.50 to $11.00 and a friend of mine who is in that business asked me only yesterday, "Why aren't we called on to sit with the rating committee when they are figuring?" I explained that this increase was due to the hazard of sili-

cosis, which has only recently been realized, and that the employers could not contribute anything to the rating committee which would help them to determine the proper rate. It is purely a matter of statistics or actuarial data, and the rating committee has to take these statistics and decide without prejudice what rate should be charged in each industry in order to take care of the losses. After that is done, any employer has the right to protest to the Compensation Insurance Board against the rates fixed by this committee, but a mere protest unsupported by figures to show that the rates are too high would naturally receive little consideration. Employers are sometimes able to make useful suggestions to the rating committee as to the proper grouping of industries, but the rate on each group is based on actual statistics rather than on judgment and the employers are unable to furnish any information which will affect the rates, since they have no records of the actual losses in each industry and it is these losses that determine what rates must be paid.

MINUTES OF THE FORTY-SIXTH ANNUAL MEETING

Meeting was called to order at 2:00 P. M. Saturday, January 14, 1933, at the Realty Hall, Wisconsin Rapids, Wis.

Minutes of the last meeting were read and approved. Financial report was read. Auditors appointed were: Joe Bissig, Vere Johnson and Roy Potter. They reported the accounts correct, and it was moved and seconded to accept their report.

Appointments to draft resolutions of regret of the passing of former members are as follows: Joe Bissig, S. N. Whittlesey and C. Getsinger for B. P. Clinton; W. A. Fowler, Geo. Bennett and Clark Treat for Eugene Huffman; E. Grimshaw, Duane Bennett and Clayton Fowler for Mrs. Daniel Doyle.

Speakers on the program were: E. L. Chambers, Vernon Goldsworthy, F. L. Musback, and J. S. Bordner. Mr. Hefly of the Exchange was called upon. Papers by H. F. Bain and L. M. Rogers were read by the secretary.

Moved and seconded that the President appoint three besides himself as chairman, to act as a legislative committee to appear before the investigating committee at a hearing to be held in the near future at Madison relative to the cranberry disease and insect pest control appropriation. Joe Bissig, Geo. Bennett and Roy Potter were appointed.

Moved and seconded that subscriptions to Horticulture be renewed for all paid up members.

After some discussion a motion was made and seconded to exhibit at the coming State Fair.

C. L. Lewis, Guy Nash and Henry Gebhardt were appointed on the nominating committee. Names submitted finally as follows: Herman Gebhardt, Black River Falls for president to succeed A. B. Scott, resigned; Geo. Bennett, Warrens as vice-president; Clare S. Smith,

Wis. Rapids as secretary-treasurer. Moved and carried that the nominations be accepted.

Motion carried to adjourn.

Ninety-three growers and friends of the industry attended the 6:30 banquet following the meeting, at Witter Hotel. Mr. Scott acting as toastmaster. Responses were made by our new President, Mr. Gebhardt, also Mr. A. B. Benson and Mr. R. Makepeace of the Am. Cranberry Exchange. Mrs. Stevens of Tomah rendered two pleasing solos. The remainder of the evening was spent in dancing.

CLARE S. SMITH,
Secretary.

An expression of thanks and appreciation is due Mr. Chambers, Mr. Goldsworthy, Mr. Rogers, Mr. Chaney, Stokely Bros. and the many growers who so kindly assisted in various ways to make our exhibit at the 1932 State Fair a success, also to those contributing toward the County Fair held at Marshfield.

C. S. SMITH.

In Memoriam

Eugene Huffman died at his home at Grand Marsh in Mather, Wisconsin, on Sept. 17, 1932, in his seventy-second year.

We remember Mr. Huffman as a modest and retiring gentleman and record his death in the minutes of the Cranberry Association with personal sorrow. We mourn with his family in the loss of a beloved friend and patient co-worker.

Committee: W. A. FOWLER,
GEORGE BENNETT,
CLARK TREAT.

FINANCIAL STATEMENT, WISCONSIN STATE CRANBERRY GROWERS ASSOCIATION, CALENDAR YEAR 1932

			Receipts	Disbursements
Jan. 1		Balance on Hand	$308.44	
Jan. 11	Check No. 113	H. R. Ebsen, Clinton Memo.		$ 6.00
Jan. 11	Check No. 114	A. B. Scott, Exp. to Madison, Ins. Conf.		6.00
Jan. 18	Check No. 115	W. F. Huffman Printing Co., Stationery		3.75
Jan. 28	Check No. 116	C. S. Smith, Salary to 1-1, 1932		40.00
Feb. 23	Check No. 117	A. L. Fontaine, Envelopes, stamps, postage		1.47
Mar. 10	Check No. 118	A. L. Fontaine, 200-1c stamps for reports		2.00
Mar. 17	Check No. 119	H. J. Rahmlow, 44 subs. to Horticulture		17.60
Mar. 15	Check No. 120	H. R. Ebsen, A. Searles Memo.		8.50
Mar. 15		Dues	6.00	
July 1		Dues	6.00	
July 7	Check No. 121	C. S. Smith, Salary to 7-1, 1932, envelopes		41.67
Aug. 2	Check No. 122	Louis Storkel, Wm. Charles Memo.		5.00
Aug. 4	Check No. 123	A. C. Rockwood, 100-3c stamps, 25 st. env.		3.82
Aug. 11		Dues	28.00	
Aug. 16		Dues	14.00	
Aug. 17		Dues	18.00	
Aug. 24	Counter check	C. S. Smith, trav. cheques to State Fair		75.00
Sept. 30	Check No. 124	Mrs. I. G. Schroeder, Steno. services at August meeting		10.00
Sept. 30	Check No. 125	C. S. Smith, County Fair Expenses		50.00
Dec. 7	Check No. 126	A. C. Rockwood, reg. & large envelopes, stamps		2.15
Sept. 10		State Fair Premium	67.50	
			$447.94	$273.06
January 1, 1933		Balance on Hand		174.88
			$447.94	$447.94

ADDRESS

A. B. Scott

One more cranberry season has become history. In that history will be recorded the momentous record of the handling and disposition of Wisconsin's largest cranberry crop since 1926. It was a large and critically important problem that confronted our co-operative selling organization when definite information was obtained regarding the quantity of cranberries to be disposed of in face of the severe adverse financial condition that existed. However, all of the crop was disposed of, which is nothing short of wonderful, considering the untold quantities of other fruits and vegetable products that were not even harvested. But this is not all. It was disposed of for real money and at an average price that is nothing short of phenomenal. Cranberry growers can well be proud of history they made for themselves this past season.

Even so, we still have our problems to consider. The necessity of economy in various lines is going to have its effect on the income of our association. The biennial appropriation made by the legislature is in jeopardy. It will, undoubtedly, be trimmed and is in danger of being entirely disallowed. The appropriation maintains our cranberry laboratory here at Wisconsin Rapids, and two field men who are at the call of our growers who need technical assistance to solve their various problems. Great progress has been made toward solving the false blossom problem. With another two years of work by our field men, no doubt, definite information will be obtained on how to control this dangerous pest. This, in itself, will be of more value to the cranberry growers of Wisconsin than all of the money spent by the state on this work to date.

With the establishment of the state cranberry laboratory the Federal Government placed a plant pathologist and an assistant here to carry on research and investigative work on the cranberry plant under Wisconsin conditions. This work is of extreme importance to Wisconsin cranberry growers. If the laboratory is not maintained there will be no place for the Federal representatives to work and they will, of necessity, be transferred to some other headquarters. Hence, it behooves every cranberry grower to do all within his power, by writing the commissioners of agriculture insisting on the maintenance of the appropriation such as will insure the continuance of the laboratory and field men. Personal and political differences should be laid aside and the one view point, of keeping the establishment as we now have it, be kept uppermost in our minds. It was with this idea in mind, that your president asked Mr. Hill, chairman of Department of Agriculture, to speak before our meeting last August.

I am informed that the appropriation made by the Wood County board last year was not made this year. It will be missed but we cannot expect to hold all of our appropriations intact.

Compensation insurance premiums are of importance to cranberry growers. Matters pertaining to rates, reclassification of the industry and the possibility of organizing our own insurance company were matters taken up with the various departments of insurance. The matter will be presented in full before this meeting.

Favorable progress has been made toward the solution of the water shortage problem in the Mather section. Representatives of the Wisconsin Land Economic Inventory made a survey of the water and land conditions in this section during the early fall. A report with maps was compiled by Mr. Bordner, director of the department, and a meeting of growers interested was held at Mather, December 6,

to consider the report and decide what action should be taken. A committee, consisting of B. R. Mitchell, A. W. Fowler and Geo. Bennett was appointed with instructions to act on suggestions advanced or to advise of other procedure to obtain results desired in the nature of water conservation. Plans are now being made for construction of certain dams and ditches.

ADDRESS

E. L. CHAMBERS, *State Entomologist*

A few days ago we sent most of you a letter summarizing in a brief way some information we wanted you to have before coming to this meeting. We have additional copies for those of you who have not seen it, and we wish that each of you would provide yourself with a copy while we are talking so that you can glance over the contents and get your minds focused on just what problems we have under consideration this afternoon.

When Dr. Musback was talking about the results of fertilizers, we remembered that when gypsum first came out as a fertilizer it looked very promising the first time it was applied. The corn fields in which it was used appeared much greener and healthier, but when the harvest came the yield was the same as the plots that were not so treated. The salesmen who sold the gypsum before harvest time were fortunate, since after harvest the purchasers were much more skeptical. We hope that the experimental work will not only find the fertilizer that will be effective in giving better color to the vines but will also put more and better cranberries on the vines.

Dr. Musback was very much surprised, he told me a few moments ago, when discussing some cranberry growing problems with me, that I did not know anything about the culture of cranberries. I explained to him that if I did I would be sitting down with you cranberry growers instead of standing up here and talking to you.

I wish to again impress upon the growers, as I tried to on Dr. Musback, that we are depending upon our specialists to learn the necessary cultural practices in cranberry growing and to use them in connection with our insect and disease control recommendations in such a way as to avoid losses to the crop which might have been avoided had the cultural conditions been taken into consideration. You will find most scientific articles are safe-guarded by phrases such as these: It is apparent, it would seem, etc., because many factors enter in and it takes time to prove that any one factor is responsible for injury or for avoiding the injury. Sometimes a scientist finds it necessary to revise his views at times, and if he were to commit himself definitely on a statement because he was pressed to do so by those who were eager to have the information, he might find himself in an embarrassing position. We believe in keeping accurate records of all of the observations we make and to correlate these with those of the grower in such a way as to determine the possible factors involved. Unless the cranberry growers keep an accurate record of their cultural practices correlated with temperatures, etc., little can be done in the way of tracing clews in case of an emergency.

Before we take up the subject for discussion this afternoon concerning our future plans in cranberry insect and disease control work

we want to relate a story to you to illustrate the opposite of my position in this matter. The story is told of a man in Madison who is considered a keen business man. He and another man formed a corporation when it was possible for two to do so a few years back, and each time they held a business meeting they would get into difficulties because one, the Jewish member of the corporation, would say "I have half to say, and we won't do that." One time he thought it might be a good plan to strengthen his domination, and suggested to his partner that they should reward their secretary, a young man in the organization, by giving him a bonus. The partner agreed, and suggested that each give half of their share of stock, which was agreed upon. At the next meeting when a discussion came up on a very important matter which the partner did not approve of he reminded the Jewish member of his frequent statement that he had half to say and that he would not do it. The Jewish man laughed and said, "No, we have three members now, so it isn't 50–50 any more. This young man and I have agreed upon the matter, so we have two votes against your one."

I am trying to make clear that I have no cut and dried program that I desired the growers to follow concerning this appropriation. This letter which we mailed to you and which I am passing out here today summarizes briefly the facts as they stand. There is no question in my mind but that you need this type of service. The question that is for us to decide is how you want to handle it. Inspectors are the most unpopular people on the face of the earth, and if they do anything that interferes with the progress or sale of the crop even though their services have been requested, they are no good and should be abolished. We now have fire laws and fire drills in our schools. Our grandfathers would question the wisdom of fire drills and probably feel that fire inspectors were unnecessary. Back in the days when he went to school in the little red school house and the stove got over heated he could holler fire and jump through the nearest window, and there were still enough windows left in the one story building so that the rest of the kids could jump out to safety. Now they have two or three story buildings and have to have fire drills and ways of getting larger numbers of pupils out of a building in case of fire. To illustrate the value of an inspector,—we have a fire inspector in Madison who goes around and investigates all possible hazardous places where fire could start and tries to eliminate them. As a result the number of fires has been greatly reduced. Also more than $200,000 has been saved in insurance premiums in the past year because of the fact that Madison has been placed in a different fire classification. This gives an idea of what has been accomplished in a service with the expenditure of a comparatively small amount of money. I wish to make clear that I am not talking for my own salary because I get no money out of this appropriation. I am only talking for your own interests. You asked for an appropriation, and wisely so. You did not get much but you got some. When it was first set up the statutes said there would be so much money expended annually for cranberry growers just as it specified so much for beekeepers and certain amounts for each of the other groups, and the Commissioner of Agriculture or the State Entomologist had no alternative but to expend that money the way it was directed. The last legislature decided that there was too much bookkeeping involved in this system, and instead of setting up separate items they gave the Department of Agriculture and Markets a flat amount and gave the Commissioners who are responsible for the work the deciding of how it should be expended. So the statute does not now provide that you will have $5,000 annually but it is a matter of selling the commissioners on the fact that your work is of sufficient value to be continued and on a satisfactory

basis. Now the situation as it stands this year is that the appropriations were cut 20% once, and then they had to be cut again. When they cut again they went through the various projects and did what was considered good business, but unfortunately was not very good for us. We try to economize and keep our expenses to a minimum, eliminating some necessary work in the interests of economy, and we did not expend all of the money appropriated last fall, so this year they gave us just what we spent last year, which was $3,600. The Commission has not been fully sold on the work, it seems, since they feel that you are being partially subsidized and I have tried to carry the expenses of some of your work out of other fields. This cannot always be done. We wish to have the matter placed squarely before you, and we have no choice in personnel or policies to be followed. We have always left the plan of the projects and problems to be studied entirely to your committee, and if your committee has a definite plan other than the one now in practice, we want to know about it. We have to go before the Commissioner and sell the proposition to him, and we wish the cooperation of the committee in this matter. It is not a one man's job, and it affects all of you. We think the Commission has a right to know why you feel you should have this service, and I personally have a right to know how you want it spent so that I can present the matter to the Commission in the way it should be presented. The Commission has to go before the Budget Director, and the Budget Director before the Governor, and the Governor before the legislature. We have legislators who are new and not familiar with your industry, and the importance of it, and it behooves each of you to let them know what should be done because this matter will surely come up before that body this session. The legislature is the means you have to go through to get what you feel you are entitled to from service from the state. If you do not say anything and someone else says a lot about some other industry, the cranberry industry is going to lose out. If you feel any changes should be made in the policies or activities, that should be brought out on the floor today. Now is the time to air your views. If you think everything is going all right we want to know that you feel that way. That is what we are here for. If you sit back and keep it under your hat we never will be able to be fair to each other or to the legislature, the Commissioners or the Governor, and we can blame nobody but ourselves if we do not place our cards on the table and everyone express their own views.

One other matter we want to have decided here today is relative to the State Fair exhibit. As superintendent of the Horticulture Department of the State Fair I need to know whether you are still interested in setting up an exhibit at the State Fair. They set up a certain amount of money for premiums, and if you are not going to show the funds will be needed in the budget from which the premium money was taken three years ago when you set it up. If you do not desire to show it will not embarrass me in the least, and we do not want you to feel you should do it unless you think it is a good plan. Your premiums were cut 20% last year, as were all other premiums at the Fair.

In conclusion we wish to state that our recommendations are that you have a committee appointed to represent your organization and to be your spokesman and if necessary be prepared to go to Madison to look after your interest and present your views before the legislature and Commission. You should be solid in your decision one way or another, so that you can instruct your members of the legislature what the cranberry growers want and not have a divided house. If you are not organized and do not have a solid front you will find it difficult to sell the legislature on your problems. They are very anxious to find places where they can make reductions.

They must make reductions to balance the budget. There will, of course, be a reduction in the $4,000 tentatively set up for cranberry insect and disease control work. Just how this cut will be made is up to you. If you can sell the proposition to our Commission, as I think you can, they will see that your cut is no greater in proportion than they give other projects. But if you do not show any interest they will naturally use their own judgment on the matter.

MR. C. L. LEWIS: I would like to ask Mr. Chambers if this cut would indicate that we could not continue with the two men as we did last summer.

MR. CHAMBERS: I can answer that question by saying it is evident from the figures that two men could not be carried on the basis that we are carrying them now, and if they will be able to accept a reduction in salary as great as the reduction in appropriation, they can be continued. In other words, the money this year was the exact cost. In order to keep within our budget, we have carried Mr. Goldsworthy on nursery inspection part time. We have spent $2,256.62 since the first of July, and have left to spend from the time the work begins in May until the end of the fiscal year July 1, $1,348.00.

PRES. A. B. SCOTT: What percentage of cut would be necessary?

MR. CHAMBERS: We don't know, but we anticipate 20 to 25 per cent. That doesn't exactly answer Mr. Lewis' question, but our feeling is that it does mean that sooner or later we are going to have to drop one man. It may mean dropping two men. The United States Department of Agriculture is in the same position, and it may mean the dropping of Mr. Bain, and I have thought that there might be a possibility of combining federal and state funds in some way to retain one of these men in case all our funds are cut to the extent where we cannot retain any man on one appropriation. It won't be possible to maintain the office unless we keep the cost of salary and traveling expense down. Some of you folks may think the traveling expense runs high. The highest traveling expense was $73.00, and if you want me to get the figures I would be glad to have anyone who is interested look them over. We have an itemized account of salaries and expenses. Practically all the money is spent for salary and travel. We are paying $15.00 a month office rent. That item might be reduced or eliminated if someone would donate an office, but no one has donated one as yet. We have incubators and equipment that should be kept under cover the year around.

MR. C. L. LEWIS: Do you wish the members here to express themselves on the question of which man they have in mind to be retained?

MR. CHAMBERS: I think it shouldn't be left to me. I would say that you people should express yourselves as to which of the men you want. I felt the committee should decide that, and you folks instruct the committee.

TWO YEARS' RESULTS OF FERTILIZER WORK ON CRANBERRIES

PROFESSOR F. L. MUSBACK

In 1931 fertilizer trials on three different peat bogs were started in cooperation with growers in Central and Northern Wisconsin and assisted by H. Lathrope, County Agent, L. Rogers of the Department of Agriculture and Markets, and H. F. Bain of the U. S. Department of Agriculture.

The Biron field (Wood County) and the Potter field (Monroe County) represent general conditions in Central Wisconsin. The peat varies in depth from less than a foot to five or six feet and is fairly well decomposed. Fine sand underlies the peat deposit. Analysis of the peat at Biron shows a total nitrogen content of 8,960 lbs. per acre-eight inches, phosphorus 456 lbs., and potassium 1,520 lbs. The Lewis marsh (Washburn County) is located in the northern part of the state and represents also deep peat differing from Central Wisconsin, however, in that the soil mass beneath the peat is clayey material instead of sand.

Since little was known regarding the cranberry response to fertilizer under Wisconsin conditions the work was necessarily of an experimental nature. Other states, notably Massachusetts, and New Jersey, have carried on extensive work in the use of fertilizer but the conditions in Wisconsin are quite dissimilar both as to climate as well as type of peat on which the crop is grown.

Peat soil is an unbalanced soil being relatively deficient in mineral plant food and excessively high in nitrogen. For the usual farm crops grown on peat the fertilizer requirements are fairly well worked out. In the case of cranberries, however, we are dealing with a plant which has an absorbtive system quite unlike that of root or cereal crops. The form in which plant food is to be supplied as well as the specific element or elements that may be limiting factors are also problems requiring further study. Neither does the analysis of cranberries shed light on the question. In Table No. 1 is given the food analyses of the crop.

Table No. 1

Water	88.9%
Protein	.4
Fat	.6
Total carbohydrates	9.9
Fibre	1.5
Ash	.2

The fertilizing elements of the edible portion are also known as indicated in Table No. 2, but neither does this afford information upon which to base fertilizer recommendations.

Table No. 2

Fertilizing Constituents of Cranberries

Calcium	.018%
Magnesium	.007
Potassium	.077
Sodium	.010
Phosphorus	.013
Chlorine	.009
Sulphur	.007
Iron	.0006
Copper	.00009
Manganese	.0003

In the trial plots set up fertilizer mixtures were formulated so as to study the response of:

(a) Rock phosphate versus superphosphate.
(b) Muriate of potash vs. sulphate of potash.
(c) Varying the amount of potash or phosphate in the mixture.
(d) Nitrogen in the mixture.

Each inauguration consisted of fourteen plots, nine of which received various fertilizer treatments and five were left unfertilized or as blank plots. The fertilizers were applied broadcast about June 15 in 1931 at the rate of 400 lbs. per acre except in those plots which carried Rock phosphate. The "R" plots received 400 lbs. of finely ground rock phosphate, and nitrogen and potash on the basis of 400 lbs. treatment; i.e. the 4–R–12 means a treatment including 400 lbs. rock phosphate, 16 lbs. nitrogen, and 48 lbs. of potash. In all cases nitrogen was derived ½ from Sodium Nitrate and ½ from organic sources. Milorganite, a sewerage product, was used as a source of organic nitrogen.

1931 Results

The 1931 crop yields are indicated in Table No. 3:

Table No. 3

Fertilizer Treatment and Yields—1931 Harvest. Yields Per Acre Based on Weight—100 lbs. per Barrel

Plot	Treatment 400 lbs. per A.*	Biron Searle's Jumbo	Potter McFarlins	Lewis Howes	Average
1	4-R-12	143.1 Bbls.	79.2 Bbls.	69.4 Bbls.	97.23 Bbls.
2	Blank	127.3 Bbls.	70.8 Bbls.	97.2 Bbls.	98.43 Bbls.
3	2-R-6	125.0 Bbls.	68.4 Bbls.	67.8 Bbls.	87.06 Bbls.
4	2-R-12	137.9 Bbls.	70.0 Bbls.	88.4 Bbls.	98.76 Bbls.
5	Blank	135.3 Bbls.	58.4 Bbls.	68.6 Bbls.	87.43 Bbls.
6	2-R-12 (Kcl)	108.8 Bbls.	62.8 Bbls.	76.8 Bbls.	82.80 Bbls.
7	2-R-24	128.2 Bbls.	58.4 Bbls.	75.8 Bbls.	87.46 Bbls.
8	Blank	143.4 Bbls.	64.8 Bbls.	66.2 Bbls.	91.46 Bbls.
9	0-R-12	97.1 Bbls.	61.2 Bbls.	75.8 Bbls.	78.03 Bbls.
10	0-20-12	103.2 Bbls.	55.6 Bbls.	71.6 Bbls.	76.80 Bbls.
11	Blank	84.8 Bbls.	57.2 Bbls.	67.4 Bbls.	69.80 Bbls.
12	2-10-12	70.4 Bbls.	49.2 Bbls.	89.6 Bbls.	69.73 Bbls.
13	2-20-12	99.3 Bbls.	45.6 Bbls.	96.4 Bbls.	80.43 Bbls.
14	Blank	91.2 Bbls.	53.6 Bbls.	74.8 Bbls.	73.20 Bbls.
	Av. of all treatments(9)	112.53 Bbls.	61.15 Bbls.	79.06 Bbls.	84.25 Bbls.
	Av. of all blanks(5)	116.40 Bbls.	60.96 Bbls.	74.84 Bbls.	84.06 Bbls.

*400 lbs. per acre except on plots receiving Rock Phosphate (R). On these, Rock Phosphate applied at rate of 400 lbs. per acre, and in addition Nitrogen and Potash on the basis of 400 lbs treatment. Plot No. 6 received Muriate of Potash (Kcl). Sulphate of Potash used on all other plots.

Since the fertilizers were applied after the buds had already been set little response could be expected the first year. On the Biron marsh the treated plots on the average yielded less than the blanks. No significant difference can be noted in the Potter plots while some increases due to fertilizers were obtained on the Lewis plot.

The effects of fertilizer on keeping quality, and on size of berries are important factors to be considered by the grower. Dr. H. Bain assumed responsibility for this piece of work shown in Table No. 4.

Table No. 4

Fertilizer Treatment, Cup Counts, and Percentage of Berries Showing Decay—1931 Harvest

	Biron (Jumbos)		Potter (McFarlins)		Lewis (Howes)	
Date harvested	September 21		October 15		September 26	
Date examined	December 8-10		December 8-10		December 8-10	
Treatment	Cup count	% showing decay	Cup count	% showing decay	Cup count	% showing decay
4-R-12	77	32.2	98	14.0	150	11.7
Blank	77	28.8	103	15.2	150	6.4
2-R-6	83	22.1	93	19.9	160	5.8
2-R-12	73	22.9	98	21.9	141	5.5
Blank	76	30.0	93	11.1	143	5.2
2-R-12 (Kcl)	81	38.8	101	14.4	146	5.6
2-R-24	76	35.0	97	22.2	143	5.9
0-R-12	71	36.1	86	8.1	157	4.4
0-20-12	69	32.5	95	14.8	146	7.3
Blank	79	29.7	92	17.8	162	6.2
2-10-12	78	40.4	102	24.0	156	3.8
2-20-12	78	41.4	89	15.0	150	6.6
Av. Blanks	77.3	29.5	96	14.7	151.7	5.9
Av. Fertilized	76.2	33.5	95.4	17.1	149.9	6.3

The size of berry as determined by the cup counts appears to show little effects due to fertilizer treatments. On the average a slight but not significant increase is to be noted in favor of the fertilized plots. While there appear some inconsistencies in the results yet it will be noted that in each case a higher percentage of decay is reported on the average for the fertilized plots as compared with the blanks. In the case of Jumbos, 4% increase in decay is noted on the fertilized berries, 2.4% for McFarlins, and .4% for Howes.

1932 Results

Harvests were again secured in 1932 on each of the three inaugurations, and the results are shown in Table No. 5. On the Biron marsh an exceedingly heavy crop was obtained averaging nearly 50% increase over that secured in 1931. The highest yield (200 bbls.) was secured on the 2–R–12 plot where muriate of potash was the source of potassium. This plot in 1931 was one of the low yielders. On the whole the results are too inconsistent to warrant any conclusions as to fertilizer effects. The lack of uniformity of the soil is undoubtedly a factor, perhaps due to the levelling of the field when it was prepared for planting. On a bog of this type the use of fertilizers does not seem warranted, at least not when yields such as those secured the past two years can be obtained.

Bud counts were made by Mr. Rogers in May, 1932. (Table No. 6) The unfertilized plots on the average produced heavier budding than the fertilized. The relationship between the bud count is fairly consistent.

Table No. 5

Fertilizer Treatment and Yields—1932 Harvest. Yield Based on Volume—40 qt. Equivalent to 4/10 Barrel

Treatment*	Biron (Jumbos) Bbls.	Potter (McFarlins) Bbls.	Lewis (Howes) Bbls.
1) 4-R-12	149.8	63.4	92.19
2) Blank	178.5	66.8	68.60
3) 2-R-6	165.5	77.5	64.46
4) 2-R-12	180.9	62.7	67.19
5) Blank	189.5	53.8	55.60
6) 2-R-12 Kcl	200.6	42.4	67.18
7) 2-R-24	164.9	51.7	68.45
8) Blank	163.7	68.9	50.00
9) 0-R-12	179.7	65.2	63.45
10) 0-20-12	131.7	56.6	61.18
11) Blank	175.4	70.1	50.80
12) 2-10-12	129.2	46.1	69.12
13) 2-20-12	130.4	51.7	81.72
14) Blank	147.7	62.1	43.60
Av. Blank Plots	170.9	64.34	53.72
Av. Fertilized Plots	159.1	57.48	67.84**

**Plot 1 not included in average.

*400 lbs. per acre except on plots receiving Rock Phosphate (R). On these Rock Phosphate applied at rate of 400 lbs. per acre, and in addition nitrogen and potash on the basis of 400 lbs. treatment. Plot No. 6 received muriate of potash (Kcl). Sulphate of potash used on all other plots.

Table No. 6

Bud Counts

Treatment	Biron	Lewis		Potter	
	May 15, 1932	May 7, 1932	Oct. 27, 1932	May 26, 1932	Oct. 1932
4-R-12	58.5	61.0	45.0	65.0	57
Blank	73.0	39.0	44.1	73.0	58
2-R-6	70.0	47.0	60.0	81.0	60
2-R-12	65.5	39.5	45.0	61.0	47
Blank	62.0	34.5	43.5	73.0	61
2-R-12 (Kcl)	72.0	35.0	46.6	70.0	66
2-R-24	64.5	40.0	45.8	85.0	52
Blank	77.5	34.5	41.8	76.5	57
0-R-12	60.0	34.5	50.0	73.0	60
0-20-12	67.0	43.0	58.3	78.0	45
Blank	70.5	32.5	57.6	75.0	65
2-10-12	64.5	33.5	45.8	75.0	61
2-20-12	54.5	37.0	52.5	74.0	55
Blank	67.0	29.5	40.8	77.0	46
Average fertilized	64.0	41.1	49.8	73.5	55.9
Av. Blanks	70.0	34.0	45.5	74.9	57.4

In the case of the Potter field some increases were secured due to fertilizer treatments but the results on the whole are too inconsistent to be of significance. The blanks on the average outyielded the fertilized plots better than six barrels per acre. Bud counts, made on

May 26, show a slightly higher number on the average on the blanks than on the fertilized plots.

The results on the Lewis field show a rather consistent response to fertilizer treatment. This was already evident to a certain extent in 1931 (Table No. 3). This marsh, located in the northern section of the state is subjected to cooler weather conditions during the growing season and no doubt this affects the biological activity of soil organisms in liberating plant food. A study of Table No. 5 brings out some interesting points.

Potash—Increasing the potash from 6 to 12% (compare plots 3 and 4) increased the yield 2.73 bbls. Increasing the potash from 12 to 24% (No. 4 and No. 7) results in a further increase of only 1.26 bbls. In other words stepping up potash does not appear to increase yields significantly. Muriate may be compared with sulphate of potash in study of No. 4 and No. 6. It is interesting to note that the yields are 67.18 bbls., in the one case, and 67.19 bbls. in the other. As concerns yield, there appears to be no choice between muriate and sulphate of potash.

Nitrogen—The high yield on plot No. 1 receiving 4% of nitrogen is probably due to other factors. This plot happens to be near the edge of the field and may be affected by better drainage and also by sedimentation. Nitrogen may be evaluated by comparing No. 4 and No. 9. An increase of 3.74 bbls. was secured by the addition of 2% nitrogen. Another comparison may be made where superphosphate is used—plots No. 10 and No. 13. Here the increase of 20 bbls. seems rather high.

Phosphate—Stepping up phosphate from 10 to 20 per cent (Plot No. 12 and No. 13) is responsible for an increase of 12.6 bbls. Rock phosphate may be compared with superphosphate in plots No. 9 and No. 10. Rock phosphate in the 0–R–12 shows an increase of 2.27 bbls., over superphosphate in the 0–20–12. However, in comparing the 2–10–12 with 2–R–12 (Nos. 4 and 12) superphosphate outyields Rock phosphate to the extent of 1.93 bbls. Increasing the content of superphosphate in the mixture to 20% (No. 13 and No. 4) gives an increase of 14.53 bbls., in favor of super.

Table No. 7

Fertilizer Treatment, Cup Counts, and Percentage of Berries Showing Decay—1932 Harvest

	Biron (Jumbos)		Lewis (Howes)	
Date harvested	September 29		September 28	
Date examined	November 15		December 1	
Treatment	Cup count	% showing decay	Cup count	% showing decay
4-R-12	94	10.6	118	6.8
Blank	91	9.9	117	4.5
2-R-6	90	4.4	125	4.5
2-R-12	92	7.6	122	4.9
Blank	81	1.2	Lost	
2-R-12 Kcl	87	9.2	120	3.6
2-R-24	99	16.7	120	6.6
Blank	83	4.8	123	3.8
0-R-12	84	11.9	122	6.2
0-20-12	80	11.2	120	4.4
Blank	87	9.2	127	4.0
2-10-12	80	13.7	Lost	
2-20-12	87	18.4	116	4.6
Blank	93	15.6	124	4.3
Ave. Blank	87	8.1	122	4.15
Ave. Treatments	88	11.5	120	5.2

Bud counts were made by Mr. Rogers in May and again in October. In both readings higher counts were recorded on the average for plants growing on plots receiving fertilizer treatment. The relationship between bud count and yield is quite consistent.

The fertilizer effects on size and keeping quality for the Biron and the Lewis crop are indicated in Table No. 7.

Table No. 8

Cup Count and Percentage Decay—Average 1931 and 1932

	Cup Count				Percentage Showing Decay			
	1931		1932		1931		1932	
	Fert.	Blank	Fert.	Blank	Fert.	Blank	Fert.	Blank
Biron (S. Jumbo)	76.2	77.3	88	87	33.5%	29.5%	11.5%	8.1%
Lewis (Howes)	149.9	151.7	120	122	6.3	5.9	5.2	4.15
Potter (McFarlins)	95.4	96.0	--------	--------	17.1	14.7	--------	--------
Average	107.1	108.3	104	104.5	18.9	16.7	8.35	6.12

Fertilizers, on the average, appear to be of little effect as concerns influence on size of berry. A slight decrease is to be noted in the case of Searl's Jumbos but a small increase in the Howes due to fertilizer.

The keeping quality seems to have been impaired by the use of fertilizer mixtures, as revealed by the percentage of spoilage noted on both plots. The fertilized berries at Biron show, on the average, 11.5% decay as against 8.1% for the unfertilized, and for the Lewis field the figures are 5.2% and 4.15% for fertilized and unfertilized respectively. A somewhat similar condition was observed in 1931.

Summary—As a result of two years' work some information has been secured concerning the use of fertilizers. The data from the Central Wisconsin district are too erratic to warrant any definite statements. Irregularities in the soil and frost injury to the vines are some of the factors involved. In the northern area where conditions are similar to those found at Beaver Brook (Lewis) the use of complete fertilizers will undoubtedly be found profitable. The fertilizer adapted under these conditions is one containing 2 to 3% of nitrogen, 16 to 20% phosphoric acid, and 6 to 8% potash. A 2–16–8 should make a satisfactory combination.

The effect of fertilizers on size of berries seems negligible as a result of two years' study. There appears, however, a fairly consistent impairment of berry due to fertilizer. The increase in percentage of decayed berries, attributable to fertilizer use, is more marked in the case of Jumbos than in such varieties as the Howes and McFarlins, though in no case is the difference very striking. The average for the three plots in 1931 (Table No. 8) shows 18.9% of the berries affected by decay on the fertilized and 16.7% on the blank plots.

For 1932 on two plots the respective averages are 8.35% and 6.12%.

FURTHER NOTES ON CRANBERRY SPRAYING AND WATER RAKING EXPERIMENTS

HENRY F. BAIN

At the last summer meeting of this Association, some holding tests made with sprayed and water-raked cranberries were discussed. Those tests indicated that water raking, as compared with dry raking, practically doubled the amount of storage spoilage which develops in Searl's cranberries. For two seasons, field spraying of berries with Bordeaux mixture according to schedules recommended in other cranberry regions failed to overcome the detrimental effects of water raking. The results of similar spraying tests made on two marshes in 1931 are given here.

Table I gives the results on one of the marshes. The crop on the section sprayed was very heavy, running about 150 barrels per acre. Injury from tramping and dragging the hose was naturally a factor of considerable importance, as was evident from the number of bruised berries observed in the samples.

Table I

Percentage of Rot in Samples of Searls Cranberries on Dec. 10

(Plots sprayed as follows: (1)—July 1 (hook stage), (2)—July 23 (after blossom), (3)—Aug. 19. Harvested Sept. 7).

Number spray applications	Water raked	Dry raked before flooding	Dry raked after flooding
	%	%	%
Check, not sprayed	32	14	13
1st spray only	39	24	19
1st and 2d sprays	47	18	13
1st, 2d and 3d sprays	28	17	10
2d spray only	31	16	16
2d and 3d sprays	26	16	15

These berries were harvested on September 7. They were somewhat immature at the time, and were gathered during a prolonged hot spell. Commercial water raking of the crop on this marsh was continued throughout the hot period. Unfortunately for all concerned, these early-harvested berries were held until after Thanksgiving, by which time the development of spoilage caused considerable trouble in the market. Berries from the same marsh harvested later in the season and shipped before December 1 carried satisfactorily.

A large part of the other marsh on which tests were made was sprayed by the management. Unsprayed check plots were left on three different sections. Keeping tests with berries from sprayed and check plots gave the results shown in Table II.

In each case there was practically no benefit from the spraying, while dry raking cut the amount of rot in half. We understand that the bulk of the sprayed berries from this marsh showed unsatisfactory keeping quality.

Table II

Percentage of Rot in Searls Cranberries on December 10

(Berries sprayed June 10 (hook stage) and July 16 (after blossom). Harvested in mid-September.)

Section	Treatment	Water Raked	Dry raked before flooding	Dry raked after flooding
		%	%	%
1.	Check	24	--	10
	Sprayed	16	--	12
2.	Check	27	10	10
	Sprayed	26	11	8
3.	Check	24	9	8
	Sprayed	22	12	14

It will be noted that samples were raked dry both before and after flooding in most of the cases cited above. On the average, berries gathered dry following submergence kept as well as those raked before the flood was put on. Similar results have been obtained in previous years. This seemingly indicates that these short submergenses are not of themselves injurious; the berries must be pulled from the vines in the water to suffer injury.

Certain facts begin to stand out clearly after following such experiments for several years. Most important is that water raking is practically certain to at least double the amount of spoilage which will develop in berries of the Searls variety. Berries harvested immature, especially when water raked, are apt to spoil more rapidly than mature berries. Field spraying with Bordeaux mixture does not prevent the increase in spoilage.

Having demonstrated repeatedly that water raking has an injurious effect on Searls berries, it is in order to find some means of overcoming the effect. There is no direct way of doing this known as yet. Indirectly, the following suggestions are thought to be of some value: Exercise extreme care in harvesting, handling, and storing the fruit, to prevent bruising; do not harvest berries before they are mature; most important of all, try to sell the berries early, before rots have time to develop extensively. Water raked Searls berries apparently do not often go bad before Thanksgiving.

BOG CONSTRUCTION AND MANAGEMENT IN WISCONSIN

MR. L. M. ROGERS

Considerable has been written about construction and management of cranberry marshes in Wisconsin. I do not wish to go over the whole field again, but to touch on a few points that seem of importance.

I think the soil is all right for growing cranberries in any locality in central or northern Wisconsin. Cranberry vines seem to do well in any soil running in acidity from pH 3.8 which is the sourest I have tested, to 7, which is neutral. Vines are growing in a soil sweetened to 8.2 at the nursery, but nothing is known as to production as there probably is no marsh growing fruit that tests above neutral.

In selecting a location the permeability of the soil should be considered in relation to drainage. On a close packed peat a great deal of fall is needed for a quick getaway of the water and it should be possible to maintain at least two feet of drainage at the lowest point. On coarse peat where the circulation of the water is quick a drainage of 18 inches might be enough.

In constructing the fields the size should be determined by the amount of slope in relation to the cost of grading, no field being larger than can be made approximately level. Each field should be independent in its flooding and draining. A small marsh where only a few harvesters will be employed should have small fields if water raking is to be the method of harvesting, and large marshes should have no field larger than can be harvested in a day. If in leveling, any low areas are filled with the top soil from higher portions, a considerable amount of upland dirt should also be mixed in if possible, otherwise a too rank growth of vine is likely to follow, with the consequent poor keeping quality of fruit and the tendency to vine growth at the expense of fruit. If a bottom where the peat is of hard water-tight composition is to be scalped, it should afterwards be plowed or disked, and if exposed to the air for several months vines will grow better than if planted at once. On a hard peat the vine growth is likely to be slow, while on a spongy peat it will probably be too rank.

The stamping method, the manner of planting most practiced in Wisconsin, is very successful if about one and one-half tons of vines are used to the acre and great care used in distributing and stamping in the vines. Better work can perhaps be done with the single blade stamper, but the cost is greater. Vines planted with a dibble through sand do very well. The cost of this method is considerably greater, especially when the hills are planted near together, but advantages accrue from it, chief among which is the fact that the water table may be lowered as soon as the plants start and need not be raised again throughout the season except in time of drought. This may mean a clean instead of a weedy marsh. Vines do best if planted from the 1st to the 25th of May.

The variety of vine to plant is problematical. Searles Jumbo, McFarlin, and Native do well in any soil in the southern, central, or northern cranberry growing districts. Bennett Jumbo appear to do better on a slow growing bottom. Howes grow rather small berries in some seasons in the northern part of the state.

The height at which water should be held in a marsh is always a problem to the cranberry grower. There is considerable evidence that many floodings with the consequent continual wet condition of the marsh at the time terminal buds start growing, or the holding of the

water just over the surface for several days at that time, throws the vine into a quick growth which continues at the expense of the fruit. Forcing may not be as dangerous on marshes that make a slow growth of vines.

In putting on the winter flood, many growers must be guided by the amount of water on hand and the severity of the weather as winter approaches. On marshes suffering from winter submergence, seen in the form of leaf-drop in the spring, the flooding should be delayed as late in the fall as can be risked and let off as early in spring as possible consistent with safety from spring killing. This may be a good method for any marsh. A shallow winter flood seems preferable to a deep one. If by the middle of January the water is not frozen to bottom, it might be well to let it out, resting the ice on the vines. If this is done, care should be taken to raise the water again if warm weather exposes the vine tops extensively while the roots are hard frozen. This method of resting the ice on the vines apparently has done no damage in the limited number of trials made in the past three seasons. Many growers put on a few inches of water and wait until it is hard frozen into the bottom, then add a few more inches and let that freeze, and so on, until they have a winter flood.

The warm days and nights this season just previous to the time for the June floodings for the black-head fireworm, made dangerous water temperatures, and several growers in flooding sustained some hook injury. There is considerable evidence that the best method to follow when a twelve hour flood is to be made in June, when worms and hooks are large, is to turn on the flood the latter part of the night when the water has become cooler, having the submergence complete from seven to nine in the morning. If cool with sunshine all day, the flood may continue for several hours longer than planned. If hot and cloudy, the time of submergence should be shortened or even discontinued if the worms are not dangerously thick. It is probable that the water used in one flooding and next day turned on another field is more likely to injure hooks than is fresh water from the reservoir.

With the knowledge we now have of the false blossom disease and the manner of its spread, growers should be able to bring new marshes to bearing age without serious infection, and should be able to restrict its spread on old ones.

I wish to emphasize the importance of careful handling of the berries in harvesting, and especially in packing. We all know that bruised berries do not keep well, yet in some warehouses I find unnecessarily long drops into the hoppers and sharp corners over which the berries must pass. I hope that all growers will carefully go over mills and tables and as far as possible eliminate everything that can scratch the fruit.

A PRELIMINARY REPORT ON CRANBERRY FALSE BLOSSOM IN WISCONSIN WITH SPECIAL REFERENCES TO EARLY LITERATURE AS FOUND IN THE WISCONSIN GROWERS REPORTS

By Vernon Charles Goldsworthy

A THESIS SUBMITTED FOR THE DEGREE OF MASTER OF SCIENCE

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Acknowledgment is made for valuable advice and suggestions to E. L. Chambers, Wisconsin State Entomologist, in whose department the work was carried out.

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L. M. Rogers, State Cranberry Specialist, aided in some of the experimental work, and his assistance was very valuable in the selection of varieties.

The Biron Cranberry Company and A. E. Bennett furnished the land on which the work was carried out.

E. P. Breakey identified many of the leaf hoppers.

Wisconsin ranks third among the cranberry producing states in the United States, having 2,500 acres of a total of 29,000 acres, devoted to this crop in this country. The average annual production for the period between 1924 to 1931 inclusive, was 43,500 barrels. The average yield per acre is between twenty-one and twenty-five barrels. The exact value is subject to the same uncertainty that applies to the total acreage, which is extremely difficult to estimate due to the fact that in Wisconsin there is a transition stage between the wild marsh and the cultivated ones. In 1928 the value of the Wisconsin cranberry crop was slightly less than $1,000,000.

The large areas of marsh land in the state make Wisconsin especially adapted to the growing of cranberries, and there is ample opportunity for expansion of the industry when the occasion arises. The growing of cranberries on marsh land is very necessary from a land utilization standpoint, for much of this land so cultivated could be put to little other use. Cranberry culture requires besides the large acreage in vines, extensive territory to maintain a water supply, which is used in flooding the cranberry vines. It can be said as a general rule, at least in the Cranmoor district, that it requires about seven acres of reservoir to supply one acre of vines.

The cranberry industry, similar to all other agricultural industries, has to fight many insects and plant diseases. The chief diseases of the cranberry in Wisconsin are: Cranberry false blossom (virus disease), cotton ball (Sclerotina oxycocci War.), rose bloom (Exobasidium oxycocci Rost.), red leaf-spot (Exobasidium vaccinii) and various storage rots, probably chiefly Fucicoccum putrefacions Shear. Insects that exact a heavy toll are the blunt-nosed leaf-hoppers (Euscilis striatulus Fall. and E. vaccinii Van D.), the black-headed fire worm (Rhopahata vacciniana Pack.), yellow-headed fire worm (Peronea minuta Rob.), tip worm (Dasynorra vaccinii Smith), cran-

berry weevil (Anthonomus musculus Say.), cranberry fruit worm (Minevla vaccinii Riley), leaf-miner (Carpodisca negligence Braun), and a flea beetle (Systena frontalis Fab.)

Cranberry false blossom is without doubt at the present time the most serious cranberry disease, and threatens to completely destroy many of our cultivated varieties of cranberries, unless a control can be devised for its chief carrier, the blunt nosed leaf-hopper. So far as it is known, the virus can be carried only by two species of leaf hoppers, Euscelis striatulus Fall. and E. vaccinii Van D.

The false blossom of cranberries apparently originated in Wisconsin and was first recorded in that state about 1905. At first it was considered of little consequence, and was little understood. O. G. Malde[1] contributes some of our first reports, which we know to be inaccurate. The following quotations give his explanation of the disease at that time:

"The 'false blossom' situation during the season 1910 in the cranberry districts of Wisconsin, was very much like that in the season of 1909. As was reported in connection with the 1909 conditions, the prevalence of 'false blossom' did not seem to be so great as in the Mather districts, where in previous seasons it had been very evident, and as before, this tends to indicate that the dryer conditions in which the Mather bogs have of necessity been kept the past two seasons, owing to the drought, seems to have materially lessened the amount of 'false blossom'.

"At the cranberry station, however, where during the last two very dry seasons the bog has been abnormally dry, some of the native vines, and one or two of the nursery plot vines, had been found to show 'false blossom' had been recorded before, indicating quite strongly that the dry condition of this particular bog has had a tendency to promote the same effect on the vines as the common practice of keeping the bog wet in the Mather districts had done in the past seasons.

"These observations quite strongly confirm what has already been put forth as quite a reasonable cause for the presence of the 'false blossom', on the cranberry vines, namely, that an abnormal condition in either direction, that is that the wet or dry season, stimulated the vines in this particular growth."

In the above report, O. G. Malde[2] makes reference to his record of the previous year, to show that his idea of false blossom had not changed. He states as follows:

"The dryness of the season seems to have reduced the amount of 'false blossom' this year, and from the data gathered in the Mather region, it has become more evident than ever that this so-called 'false blossom' is due to conditions of culture, rather than any disease affecting the plant."

Cranberry false blossom apparently did not attract much serious attention after this for two or three years, but in 1914, Dr. L. R. Jones and Dr. C. L. Shear[3] made a survey of cranberry diseases in Wisconsin and principally of false blossom. Their report given at the winter meeting of the Wisconsin Cranberry Growers' Association shows that they, too, at this time, had no true knowledge of the cause of false blossom. Extractions from their summary are:

1. "False blossom has never been observed in any cranberry growing section outside of Wisconsin.
2. "The evidence indicates that under certain conditions, this disease is perpetuated when diseased plants are used for propagation, but under other conditions it disappears.
3. "There is no evidence that the malady is in any way whatever directly or indirectly due to the attacks of any parasitic fungus or disease.

4. "On the other hand, all of the evidence indicates that it is a physiological disturbance due to unfavorable cultural conditions.

5. "This is further shown by the fact that the trouble does not occur in Wisconsin where the best cultural methods are practiced, and that where diseased plants have been transferred to another locality and propagated under good cultural conditions, the disease has disappeared.

6. "The most important factor for the elimination of false blossom, and for increasing good general productiveness, is proper drainage. Every cranberry bog visited where false blossom occurred showed lack of sufficient drainage.

7. "The practical conclusion reached is that in all these cases, a radical change of cultural methods is demanded."

Dr. Shear, too, brings out much the same idea in an ensuing report:[4]

"The so-called 'false blossom' of Wisconsin is also a trouble which, as we have said before, is intimately associated with, and apparently produced by, unfavorable cultural and nutritive conditions, and can we believe be largely remedied by drainage, pruning and sanding."

After the survey of Shear and Jones in 1914, false blossom again slipped into the background until 1919, when the Growers' Report of that year gave us an account of false blossom by Shear and Fracker.[5] Shear noticed its spread to Massachusetts and New Jersey, and suggested that it may be of an infectious nature, as brought out in the following extract:

"On the other hand, some recent observations in Massachusetts and New Jersey indicate the possibility of its being of an infectious nature, as it appears to have spread in some cases from Wisconsin to Cape Cod vines."

Fracker at this time still clings to many of the old theories of O. G. Malde[6] as can be readily seen by the following quotations, taken from his address to the cranberry growers:

"There is little evidence to show that it is an infectious disease, and efforts to find an organism responsible for the damage have been unsuccessful.

"Whether a false blossom 'habit' could be developed and inherited under such circumstances is perhaps questionable, but the fact that cultural conditions modify the severity of the attack, is clear. Wet conditions seem to be favorable to the disease, while the policy of a dryer bog makes the plants more resistant. Sanding and commercial fertilizer have also resulted in a marked improvement.

"From the nursery inspection standpoint, false blossom must be considered the same as an infectious disease. While plants transferred from an infected bed to a new one operated under better conditions show a marked improvement in crop returns, they still continue to develop false blossom."

As to the susceptibility and resistance of different varieties at this time in this same report S. B. Fracker[6] wrote as follows:

"At the other extreme are the more vigorous growers, McFarlin, Searls Jumbo and Prolific, with practically clear records. Bennett Jumbo seems to be comparatively resistant, while the acreage of Potter's Favorite, Early Ohio and other varieties examined have been too small to show positive results."

B. A. Rudolph[7] also states the resistance of the Searls Jumbo in his report, given before the cranberry growers in 1921. He states the following:

"Even the highly resistant Searls Jumbo is attacked, although the disease may not manifest itself in so pronounced a manner in this variety as it does in more susceptible ones. On certain bogs of Searls Jumbo the writer has found this disease with great difficulty, but on others, it has been found with comparative ease. This is par-

ticularly true in Oregon. Searls Jumbo is probably the most resistant of all commercial varieties to the disease."

In the light of our present knowledge, we know the above list of resistant varieties to be erroneous. The writer has seen sections of Searls Jumbo entirely killed out with false blossom in the Mather district, and has seen it spread very rapidly in Searls Jumbo at Cranberry Lake. Bennett Jumbo and Prolific are also vines which are very highly susceptible to false blossom, and in the Cranmoor district, some sections of these vines are almost one hundred per cent invaded by false blossom. Native vines are also readily susceptible to the disease as most bogs will bear witness in the state.

Dr. H. B. Scammell[8] in a report to the cranberry growers in 1923, gives the Wisconsin Cranberry Growers a much better perception of false blossom. He wrote the following:

"False blossom is not a serious trouble with us, but I have found it occurring on numbers of bogs in New Jersey, attacking such varieties as Howes, Early Blacks, Centennials and Jerseys. It appears on our mud bottoms and our savannas, where drainage is good, and where drainage is poor."

This is the first clue we have from the Wisconsin Cranberry Growers' Association reports, that false blossom is not necessarily due to cultural conditions, and may be due to entirely different causes.

Dr. Franklin[9] gave us our first idea in 1927, that false blossom may be insect borne.

"The manner of spread is receiving particular attention. We find the disease present in greatest quantities on the Cape on bogs which are not flooded often. This leads us to believe there is some carrier there which flooding destroys. We are strongly suspecting leaf-hoppers, and are carrying on investigations with leaf-hoppers. We are also suspecting bees, because we find that even on bogs which are flooded and where no leaf-hoppers are present, the disease still spreads somewhat. The spread seems to be 'jumpy'. That is, a new infection may appear on the other side of the bog, a great distance from the first place of infection. This suggests that there is some carrier which may fly. You may say it is the wind, but wind can't be entirely responsible or we couldn't control it all with water. The wind may be the cause of this jumpy distribution, however."

In 1928 the first correct clue to the insect vector of false blossom was published as far as Wisconsin literature goes in a report given by Dr. Stevens.[10] His report in part states:

"During the past three years Miss Irene Dobrosky of Boyce Thompson Institute, has worked in New Jersey and at the home laboratory on the problem of the spread of false blossom by insects. While her evidence is not conclusive, she is inclined to believe that false blossom is carried from plant to plant by a leaf-hopper, Euscilis striatulus Fall."

Mr. Beckwith and Mr. Hutton of the New Jersey Cranberry Station have also made some very interesting infection experiments, which point to Euscilis as the most important carrier of false blossom.

In this connection it should be remembered that a survey of sucking insects on the cranberry bogs of Washington and Oregon failed to show any leaf-hoppers of the species mentioned above, while we find them often abundant in the three eastern states, especially on bogs which are severely infected with false blossom.

A series of tests in what may be called "mass infection" was carried out by Dr. Franklin and his associates in Massachusetts' Cranberry station last year, which seem to establish beyond a reasonable doubt, the fact that cranberry false blossom is transmitted by insects. Between June 26th and July 2nd, 1927, they set up on a section of Howes, which was comparatively free of false blossom, five

insect-proof cages. In each of these cages they liberated a number of insects, freshly swept from a bog, badly infested with false blossom. The insects were not all identified, but there were no large leaf-hoppers among them, and the leaf-hopper Euscilis striatulus was abundant.

At blossoming time that spring (1928) all five of the areas on which insects were confined were heavily infected with false blossoms. One one part 157 diseased and eight healthy uprights were counted. Adjacent areas on which these infective insects had not fed showed no false blossom, or at most one or two diseased uprights. This was to be expected since the disease is gradually increasing on the bog, and these areas were not protected from chance insects. This clear cut case, together with the work in New Jersey and elsewhere ought to convince the most skeptical that we are dealing with an insect-borne disease.

In 1929 C. S. Beckwith[11] in a report to the cranberry growers of Wisconsin states several experiments in which it was proven quite definitely that the blunt nosed leaf-hopper E. striatulus, carried false blossom. He also went into the matter of resistant varieties in cranberries to false blossom as well as to give some idea as to the life cycle of the insect vector and its control. The method of control by flooding is especially adapted to Wisconsin conditions, for with one or two exceptions, we have no adequate spraying equipment.

In 1930 H. B. Scammell[12] in his talk to the cranberry growers in Wisconsin gives much the same ideas as had Beckwith. Neither he nor Beckwith cover Wisconsin conditions to any extent, but primarily take up the situation as it is found in New Jersey. Scammell believes that control can be had by the development of resistant strains and the control of the insect vector, by spraying or by flooding. Control for the insect vector quite likely will have to be worked out independently from that of New Jersey and Massachusetts, for Wisconsin has not, as yet, adequate equipment or experience, and will probably have to resort to flooding, which should, if carried out correctly, give excellent results.

The first work done on false blossom in Wisconsin in relation to insect vectors, was done by the author during the summer of 1928 at Wisconsin Rapids. Eight cages, two feet square and eighteen inches high, were covered with cheese cloth and placed over Howes' vines on the property known as the Biron Cranberry Company. These Howes' originally came from the East, and were infected with false blossom to some extent, but where the cages were located and for some distance around them there was apparently no false blossom. During the period of time from July 12th to July 19th, leaf-hoppers were placed in these cages as follows: Number 1—325 hoppers of Euscilis species; Number 2—300 hoppers of Draceulaephala species; Number 3—600 hoppers of Emposca species; No. 4—450 hoppers of Cicadula species; No. 5—450 hoppers of Deltocephalus species; No. 6—150 hoppers of Platymetopius species, Aggallia species, Thammotettix species; No. 7—check; No. 8—check.

The species of Euscelis and Dracculaecephala were swept from bogs heavily infested with false blossom; the Emposca species were taken from potato fields badly infected with hopper burn, while the species of Cicadula, Deltocephalus, Platymetopius, Agallia and Thammotettix were taken from both cranberry marshes and the upland surrounding cranberry bog.

DIAGRAM I

EAST

I	II	III	IV
Euscelis (Braile)	Dracculacephala (Ball)	Emposea (Walsh)	Cicadula (Zeherstedt)

NORTH SOUTH

V	VI	VII	VIII
Deltocephalus (Burmeister)	Thammotettix (Zottenstegdt) Agallia (Curlis) Platymetopius (Burmeister)	Check	Check

WEST

The following year, the amount of false blossom was estimated by the number of uprights found to have malformed flowers, and those which appeared normal. False blossom in the early stages can only be positively identified by the malformation of flowers, as the witches' broom effect and other symptoms do not appear until the disease is much farther along. Undoubtedly, many of the uprights which failed to bloom for various reasons were infected, but the infection could not be determined at this time by any positive method. In working with false blossom it was never possible to determine in the same year, or in the same growing season, experimental results, as in the case of aster yellows, for the leaf-hopper infection of the current season can only be noted when the uprights bloom the following spring.

The amount of infection from the cages placed on the vines in 1928 and read the following year when the plants bloomed were as follows: Number 1—52 per cent; Number 2—0 per cent; Number 3—0 per cent; Number 4—0 per cent; Number 5—0 per cent; Number 6—1 upright; Number 7—0 per cent; Number 8—2 uprights. This experiment showed very definitely that Euscelis species were the chief carriers of canberry false blossom, and quite likely the only carriers, although this is not necessarily the case. It, too, proved very conclusively that we are dealing with a virus disease and not a nutritional or physiological disturbance as some of the early workers as Malde, Shear and Jones believed. As cranberry false blossom is found practically on every marsh in Wisconsin, including some wild marshes and where cultural conditions are extremely varied, this would also tend to show that false blossom is not merely a matter of culture. The author's inspection of the cranberry bogs in Wisconsin for three consecutive summers has afforded ample opportunity to note the presence of false blossom in Wisconsin under different cultural conditions and upon different varieties; and the only way cultural conditions probably would affect the spread of the disease, would be by the addition of fertilizers, or in some way producing a heavy, succulent growth, upon which the leaf-hopper would be apt to increase in numbers because of the abundance of desirable food. It is a known fact that, from observations, false blossom spreads more rapidly upon new bogs or young plantings, making a heavy vegetative growth when such plantings are exposed to infection, than older, more matured bogs, making a much slower growth.

During the summer of 1930 experimental work was carried out on the A. E. Bennett marsh in Cranmoor as to the resistance or susceptibility of the McFarlin variety. Previous to this time the

McFarlin was thought by many growers to be immune to false blossom, for very little false blossom was noted in the McFarlin. Sometimes chance sprays were found, but as the McFarlin is never one hundred per cent pure anywhere in Wisconsin, these chance sprays were attributed to some other variety.

The McFarlin is a very late berry and for this reason is grown primarily in the central part of the state, for in the northern section the berry is quite late, and the Searls Jumbo is a much better variety for this region. The McFarlin vine is a vigorous grower, with strong uprights, and the leaves have a heavy cuticle. It is a much coarser vine than the Searls Jumbo, which is rather delicate. It grows well in almost any type of cranberry soil, and generally stands adverse conditions better than the more delicate varieties.

Six cages, eighteen inches square and twelve inches high, were covered with cheese cloth and placed over some McFarlins that seemed to be pure. Into these cages, leaf-hoppers of the Euscelis species (vaccinii Van D. and striatulus Fall) were placed. All hoppers were fed on diseased vines for a period of two weeks, before they were placed in the experimental cage, to be sure they were infected with the virus of false blossom. The hoppers were placed in the cages in the following numbers: Number 1—25; Number 2—50; Number 3—100; Number 4—25; Number 5—50; Number 6—100. Hoppers were handled carefully to prevent any casualties, and all were identified as to whether they were Euscelis vaccinii Van D. or Euscelis striatulus Fall. (See page 45)

During the early part of July, 1931, when the plants were in full bloom, counts were made of the normal flowers, and abnormal flowers, and the percentage of infection determined. The percentage of infection was as follows: Number 1—31%; Number 2—39%; Number 3—47%; Number 4—40%; Number 5—38%; Number 6—52%. The percentage of infection was not consistently related in any degree to the number of hoppers in each cage, but spiders and other predators were thought to have destroyed some of the leaf-hoppers in some of the cages.

The plants in this experiment did not bloom as well as they ought to have done, due to poor cultural conditions. Water was held high during most of the spring, and many of the fruit buds failed to develop, their food reserve being used for vegetative growth. Undoubtedly, had there been more blossoms, a greater percentage of infection would have been observed.

From the above results, we can plainly see that the McFarlin is not immune to false blossom, as many growers had previously thought. In the field, false blossom probably does not spread rapidly in the McFarlin, as the leaf-hopper prefers other varieties on which to feed. This is only an assumption, however, and no experimental work has been done to prove this point. From observation on sweepings it has usually been found that the leaf-hopper is much more abundant on other varieties than on the McFarlin. The observation would suggest that the hopper prefers a vine with a thinner cuticle for feeding if such vines are available.

I II III IV V VI

EAST WEST

NORTH

The rest of the area surrounding the cages was used as a check, and less than one per cent infection was noted in these vines.

During 1930, experiments were also carried out to determine if both Euscelis vaccinii Van D. and Euscelis striatulus Fall. were carriers of false blossom. All previous work done by various experimenters

had named only Euscelis striatulus as the carrier. In Wisconsin, at least on some marshes, Euscelis vaccinii Van D. is more prevalent than Euscelis striatulus Fall.

Thirty-nine individual uprights were selected and placed in individual cages. Hoppers then were placed in these cages July 26, 1930, after having fed previously on false blossom vines for a period of ten days or longer. Different numbers of hoppers were placed in the cages, to note if more than one hopper was necessary to cause an infection.

The wire cages used in this experiment were of a size to permit the easy insertion of a single upright. This let in more light, and kept the vines in a much more normal condition than those in the larger cages under cheese cloth. (See page 46)

The results of this experiment show that both Euscelis vaccinii Van D. and Euscelis striatulus Fall. are carriers of false blossom. In Wisconsin this is a very important fact, as Euscelis vaccinii Van D. is as prevalent as Euscelis striatulus Fall., if not more so, as averages of sweepings tend to show. The exact life cycle of Euscelis vaccinii Van D. has not been determined. From observation in the field for the last three summers, it apparently runs parallel to that of Euscelis striatulus Fall. The nymphs appear at the same time. Their manner of feeding is apparently similar, or the same as Euscelis striatulus Fall. for both feed by inserting the beak into the tender stems or leaves and sucking out the plant juices. Both species are usually found together and are taken together by the same method of sweeping.

Cage Number	Number of Hoppers	Species	Infection
1	1	Vaccinii	Normal blossom
2	1	Striatulus	Normal blossom
3	5	Vaccinii	Normal blossom
4	5	Vaccinii	False blossom
5	10	Vaccinii	False blossom
6	10	Vaccinii	No bloom
7	1	Vaccinii	Tip injured
8	1	Striatulus	Normal blossom
9	5	Striatulus	No bloom
10	5	Striatulus	Lost
11	10	Striatulus	Lost
12	10	Striatulus	Normal blossom
13	1	Vaccinii	No bloom
14	1	Striatulus	No bloom
15	5	Vaccinii	Lost
16	5	Striatulus	False blossom
17	10	Vaccinii	False blossom
18	10	Striatulus	False blossom
19	1	Vaccinii	Normal blossom
20	1	Striatulus	No bloom
21	5	Vaccinii	No bloom
22	5	Striatulus	No bloom
23	10	Vaccinii	Normal blossom
24	10	Striatulus	Normal blossom
25	1	Vaccinii	Normal blossom
26	1	Striatulus	Normal blossom
27	1	Vaccinii	False blossom
28	1	Striatulus	Normal blossom
29	1	Vaccinii	Lost
30	1	Striatulus	False blossom
31	5	Vaccinii	Tip injured
32	5	Vaccinii	No bloom
33	5	Vaccinii	No bloom
34	5	Striatulus	Normal blossom
35	5	Striatulus	Normal blossom
36	5	Striatulus	False blossom
37	10	Striatulus	No bloom
38	10	Striatulus	Normal blossom
39	10	Vaccinii	Lost

In 1931 a study of the population of leaf-hoppers on Wisconsin bogs was made. The method of determining the population was as follows: One hundred sweeps were taken at three different locations on a section of the same variety, and the counts averaged together and recorded. Over seventy-five species were taken by sweeping, but only the chief species are recorded in this paper. No doubt, there are many of these species which do not feed on the cranberry as a general rule, but were present upon other host plants, for Wisconsin marshes are usually quite weedy. Most of them that do not feed on the cranberry can be dismissed from an economical consideration as far as cranberry culture is concerned.

Such data as is set forth here must necessarily have a wide range of experimental error, due to the wide variance found on individual bogs. A fair perspective of the situation as a whole may be obtained on Wisconsin by averaging all the marshes together. (See page 47)

The data on the following page is not accurate criteria of what could be expected at all times throughout the summer. These observations prove very definitely that the leaf-hopper population is constantly fluctuating throughout the summer, and varies very materially with the advancement of the season.

Name and Date		Euscelis Species	Cicadula Species	Deltocephalus Sp.	Deaeculacephala Sp.	Empoaca Species	Platymetopius Sp.	Phlepsius Species	All Others
George Bennett	8– 8–31	12	16	10	4	4	1	0	21
Williams Cranberry Co.	8– 8–31	14	19	7	5	3	0	1	11
William Badgely	8– 8–31	6	7	6	2	0	2	0	8
Dan Doyle	8– 9–31	2	6	3	1	0	0	0	10
Tony Regalia	8– 9–31	8	10	10	8	2	0	0	11
Wetherby Company	8–10–31	10	45	77	6	4	5	5	20
Central Cranberry Co.	8–10–31	41	118	73	6	6	3	4	18
A. B. Scott	8–15–31	15	121	231	3	8	2	2	17
Alfred Regalia	8–12–31	6	10	12	11	5	1	0	13
William Hall	8–13–31	1	2	2	1	0	0	0	7
Habelman Bros.	8–13–31	4	29	24	7	7	2	0	15
Crossett Cranberry Co.	8–14–31	3	8	17	10	2	0	0	9
Albert Grinshaw	8–16–31	11	16	18	23	5	10	1	19
Palmeter Marsh	8–16–31	12	17	12	5	6	2	1	29
Case Marsh	8–17–31	12	10	9	11	7	0	2	21
Phil Bennett	8–18–31	11	9	20	9	3	0	0	9
Grand Marsh	8–20–31	10	8	22	11	2	1	3	17
Mrs. T. Hoffman	8–20–31	8	11	19	7	0	2	0	7
Sucker Marsh	8–20–31	4	19	29	8	10	5	7	19
Chas. Bros.	8–21–31	5	18	9	2	4	4	0	12
Oscar Potter	8–21–31	7	13	15	3	5	3	0	12
Richard Rezin	8–21–31	9	17	7	5	6	2	2	13
Beaver Brook Cranberry Co.	7–10–31	4	15	9	7	2	4	1	11
McKenzie Lake	7–11–31	3	8	10	4	2	4	5	12
K. B. Coltons	7–12–31	24	7	4	5	0	3	2	7
Cranberry Lake	7–20–31	114	8	7	4	0	3	1	6
A. E. Bennett	7–22–31	23	15	10	14	7	2	1	15
Arpin Marsh	7–22–31	6	20	11	18	3	18	7	24
Lloyd Rezin	7–23–31	7	10	12	7	2	2	2	16
Mrs. Otto	7–23–31	9	15	14	11	4	15	3	17
Whittelsey	7–24–31	17	14	11	8	2	7	1	9
Mrs. P. M. Smith	7–25–31	6	8	9	5	1	1	0	8
Mrs. Jacob Searls	7–25–31	7	119	82	7	7	8	2	14
Biron Cranberry Co.	7–30–31	10	7	5	2	2	0	0	7
Elm Lake Cranberry Co.	7–30–31	5	6	10	7	1	0	1	11
M. O. Potter	8– 1–30	15	14	19	12	9	7	2	14
Wolfinger	7– 5–31	0	10	36	15	0	0	1	15
Hawkins	7– 6–31	0	250	89	12	3	4	2	35
Herman Gebhart	7– 1–31	5	190	120	15	3	7	5	51

The main thought to be derived from the above data is that the insect vector of false blossom is present on most marshes of the state, if not all. That the number of hoppers on different bogs is widely different, is another essential point to be kept in mind when considering the method of control. Leaf-hoppers, unless there are more than four or five hundred to a sweep, need no control as a rule.

Light-Trap

For two summers a light-trap was run to determine if Euscelis striatulus Fall. and Euscelis vaccinii Van D. come to light, or made nocturnal flights. In 1930 the trap was set up on the A. E. Bennett marsh in Cranmoor district, and in 1931 at the Biron marsh. In 1930 one specimen was found in the light-trap, and in 1931 not a single specimen was evident. On both of these marshes, the species of Euscelis concerned with false blossom were fairly abundant, as found by sweepings, and present within a few feet of the trap. Other species of hoppers were taken in large numbers, and on warm, humid nights, several thousand Cicadula sex-notata were frequently taken, and other species of Xestocephalus, Emposca, Deltocephalus, Phlepsius and Eutettix were present in large numbers.

From the above experiment, we can assume that the species of Euscelis with which we are concerned do not come to light as many other species do, as shown above by such species as Cicadula sex-notata Fall.; Euscelis obscurinervis Stal., a common species of Euscelis was frequently found to come to light in large numbers.

Summary

False blossom can be found on practically any cultivated marsh in this state, and on a number of wild marshes. It is the chief disease of the cranberry, and threatens to wipe out many of our cultivated cranberries, such as the Prolific, Bennett Jumbo, Metallic Bell, Searls Jumbo and Natives. The McFarlin is the only variety adapted to the Wisconsin climatic conditions at the present time that is resistant enough to be of any economic importance. The Early Black, an eastern variety, is also quite resistant, but does not do well in Wisconsin.

The insect vectors of cranberry false blossom are Euscelis striatulus Fall. and Euscelis vaccinii Van D. No other insects as yet are known to carry the virus. Control of this leaf hopper may be obtained by spraying or flooding. Under Wisconsin conditions, flooding, to drown the nymphs, is the cheapest and most efficient method of control. Kerosene should be applied at the time of flooding to the surface of the water, at the rate of two or three gallons per acre.

Euscelis striatulus Fall. and Euscelis vaccinii Van D. are single brooded species and winter over in the egg stage. Nymphs usually appear towards the end of May or the early part of June. The first adult was noted July 3rd in 1930 and July 1st in 1931. They are found on other heath plants besides the cranberry, but apparently prefer the cranberry plant, if it is available. Most of the adults disappear shortly after the first of September.

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Spraying and Flooding in 1932

Spraying and flooding for the control of the insect carrier of cranberry false blossom was carried out for the first time in Wisconsin this year. Ten acres were sprayed at Cranberry Lake and a 95% kill was obtained. Pyrethrum spray was used at the rate of one part to 600 parts of water, plus three pounds of soap for each 100 gallons of spray, and was very effective. At the Biron Cranberry Company, three acres were sprayed with this spray, and it was found to be equally effective. Nicotine sulphate was tried but was not as effective as the pyrethrum spray, although for the leaf-miner and the fire worm it is very good.

On the Union Cranberry Company marsh flooding was tried for the young nymphs of the leaf-hopper and proved to be almost 100% effective. The flood was put on July 8, 1932, for eighteen hours as the fruit on this two year old planting was of little consequence. Incidentally, it might be added that the injury to the fruit was small, even though the date of the flooding was quite late in the season. The day, however, was ideal, as the sun shone brightly all day and the oxygen content of the water was not depleted to any extent. On young plantings this date may be satisfactory, but on older plantings

flooding should be done much earlier in the season so that one does not risk losing the crop.

This year (1932) 70 acres of new plantings have been planted in the state and next year, if possible, this acreage should be flowed about the first part of July for 24 hours. If this is done, the insect carrier of false blossom can almost be completely controlled for a while on these sections, although the disease will again work in unless the original source of infection is controlled.

Trichagamma Parasites

For the first time in the history of cranberry culture, parasites have been tried on the cranberry fruit worm. On the Oscar Potter marsh at Warrens 150,000 Trichagamma parasites were released by the Cranberry Laboratory of Wisconsin Rapids. These parasites are tiny wasp-like insects and destroy the eggs of the fruit worm. Naturally, this parasite is present on most of Wisconsin's marshes, but on some of them is not present in large enough numbers for an efficient control.

The results this year were very promising. On sections where the experiments were carried out the damage by fruit worm amounted to about fifteen per cent, whereas in other years these same sections have frequently shown almost a hundred per cent loss. The experiment it is hoped can be carried on another year, and if practical will be a real aid in controlling the cranberry fruit worm, the growers' most difficult insect.

Cranberry Leaf-Miner

The cranberry leaf-miner (Carpodisca negligence Braun) is very abundant on most of the northern marshes and on some bogs around Wisconsin Rapids. Undoubtedly it has come in from the wild bogs surrounding the cultivated bogs, as I have found it on the wild cranberry, moss berry and leather-leaf (Chamaedaphere calyculata L.).

This insect has one brood a year. The moths appear about the fourth of July and live from ten days to two weeks. Soon after emergence the eggs are laid inside the leaf and remain here until the following spring. Early in the spring the egg hatches and the larva spends its whole life acting as a leaf-miner until it is ready to pupate. At this time it cuts out a portion of the leaf and makes a case in which it pupates. The cases can be found quite readily on the ground or may be anchored to bits of wood, moss, pebbles or other material. Neither the egg stage or the larvae stage of this tiny moth are exposed and the only time the insect can be attacked is when it is in the adult stage. Incidentally, the moth does not come to light as many moths do and so can not be destroyed by lights.

At Cranberry Lake this year, I sprayed two and one half acres of vines for the leaf-miner. Nicotine sulphate was used at the rate of one to four hundred plus three pounds of soap per hundred gallons of water, and applied at the rate of 300 gallons an acre, and seemed to be effective to a certain degree. The spray had to be applied three times as the moths emerged over a rather wide period.

Cranberry Girdler

This year for the first time in Wisconsin cranberry history the cranberry girdler has made its appearance on Wisconsin marshes. This new pest has been found both in the Cranmoor district and the

Mather district, and has done considerable damage. If its work is not checked undoubtedly it will wipe out many sections of valuable vines in the state.

Girdling work shows up in the fall when the girdler larvae feed ravenously for a short time before going into the cocoon stage where they winter. Girdler work also shows up in the hot summer months or dry spells when plants which have been girdled wilt and die. In cases where the plants do not die, the fruit is usually small, stunted, and white, due to the fact that the plant is not able to obtain a sufficient amount of moisture to mature the fruit.

The girdler can be controlled by flooding towards the end of August and putting on two inches of sand during the winter. Girdled plants are thus able to develop a new root system. The sand, too, is of added value as it covers up many of the cocoons and prevents many of the moths from emerging the following year. Sections which have been girdled should be kept well supplied with moisture as the girdler has partially or wholly cut off the water supply of the plant, depending upon the severity of the infestation.

Discussion After Talk by Mr. Goldsworthy

Question: You say you sprayed and got 95 per cent kill. Did you have occasion to examine that plot again within two or three weeks?

MR. GOLDSWORTHY: We checked it about a week after. It showed about 95 per cent kill. If the vines are thick it is harder.

Question: Have you had any experience with Pyrethrum dust?

MR. GOLDSWORTHY: We used a mechanical duster. A 40 per cent dust we found would kill fire worm.

Question: How many gallons per acre did you use?

MR. GOLDSWORTHY: One hundred gallons per acre, approximately, depending on the thickness of the vines. We didn't have a pressure gauge on the tank. They were both new outfits, and had good pressure. I think the pressure was about 250.

Question: Have you ever known a badly infested area to come back to normal?

MR. GOLDSWORTHY: Mr. Whittlesey's has had water cure, and partially came back. However, any vine that has once been diseased remains infected all the time. New vines must come in and replace them.

ADDRESS

MR. J. S. BORDNER

I did not come here today to talk to you peaple, but to listen in. I don't know anything about growing cranberries, but the job I have, and which is my part of the work done by the Department of Agriculture and Markets, is to try to get land put to its right use. It is a study of land adaptation. I had to go and seek information wherever it is to be found—either at the University or in the field, or from other sources—and then try to boil that information down and put it to use and give it to organizations such as your association. This summer the commissioners of our department directed me to go to Juneau County and make a survey of the land in that county because in the northern part of that county in the area in which they were growing cranberries, in and around Mather, they were

very short of water. I went there and after going through the whole area I made a report to the cranberry growers of that region which is of some considerable size, and while it hasn't gone to everybody, those that are in that area who have not received a copy and would like a copy can get one.

After returning from the meeting which was held in Mather December 6, it occurred to me that there was a certain amount of information you people should have that some of you don't have; that is, information which has to do with the total amount of rainfall and snowfall (that is, precipitation), the amount of water which gets back into the atmosphere through evaporation, water that passes back through drainage to the streams, and finally to the Gulf of Mexico and the Great Lakes; and finally the way in which the water behaves in the soil. I have therefore made an additional investigation regarding experimental work done by various people in water behavior in the soil and atmosphere and combined it in a supplementary report, of which I have adequate copies here this afternoon so each of you may have a copy.

It is obvious that you are engaged in a business economically sound, if you can in such a time of depression sell your crop. There must be an adequate desire on the part of the public for your product. This is obviously partly created by your fine sales organization, and partly due to the fact that your production is not overdone. On the other hand, all of you who are engaged in the business know that it is a long way to the first crop. Consequently, when you once get established, it is quite important that your business is continued, and that something doesn't come along and upset it for you. While you have your entomologists and experts on fungous diseases, etc., to help you, this summer it was quite obvious in this particular district around Mather that there was another handicap, viz., a shortage of water.

The cranberry is made up of largely water. Of course, we knew that before because of the fact that in its natural habitat it grows where there is little plant food, and where the condition of the soil is so acid that what plant food that is available soon disappears. Even if you can sell water and get a good price for it, it is a legitimate business. In other words, it is far better for you to sell cranberries, though most water, which give a cheer at Thanksgiving and Christmas time, than for some people whom we know selling watered stock.

As far as the water supply is concerned, there is only a certain amount of water that falls to the earth. As I tried to incorporate in this supplementary report, for the state of Wisconsin it is about thirty-two inches annually. Two-thirds of this passes off in evaporation, and one-third passes on through drainage channels. That is a general statement, but it is quite obvious to all of us that factors enter in, which modify that very materially. We know that if we set a teakettle of water on a hot stove it soon evaporates, and if we set it on a cold stove it stays there a long time. After the fires of 1930 and in the spring of 1931, a great deal of the moss which served as insulation for the swamps, burned away. We see on the wall of this room the head of a moose, one of the moss eaters of the North country, where it is always cool and damp. In fact, wherever peat moss grows, it must be wet and cool. Wherever it doesn't continue to be wet, the moss ceases growing, and the bull moss or dry soil moss, comes in. Figures show that there was a ten inch shortage of actual precipitation in this region last year. Then there was excessive evaporation due to drying winds and high temperatures. Further, this area has many open ditches put in for a drainage purpose, but apparently the use for which they were supposed to function has not obtained, viz., to convert the area into farm land. So in our work this summer we decided to find out what was necessary to hold the water and thereby increase the total water supply for the cranberry grow-

ers. Certain additional recommendations have been made which are included in this supplementary report.

I came here to confer with the cranberry growers on a business proposal I have been fostering in Madison in connection with some of the departments there. It probably would not be an expedient thing to discuss it here. It has to do with the rehabilitation of the land which is not strictly swamp, i.e., again getting forests back on the highlands and areas adjacent. In this, the state has a large interest, as well as people of the community, because by so doing, the water shed again gets a cover of growth adequate to keep the ground cool and thereby reduces evaporation. If there are members of the county boards of Wood, Jackson, or Juneau counties present, or any members of the Land Committees that have to do with land now county owned in these counties, I would like to meet them at the close of this meeting and discuss with them the proposal I have brought here. It is not going to cost the local people anything, nor the state of Wisconsin, because the money that would be required to make this proposal function, is appropriated year after year, regardless of whether it is used in your community, or whether it is used elsewhere, because it has to be used somewhere.

I have also brought another matter with me that may be of interest to you. This is a little study we made up in the barrens of Douglas County. It has nothing to do with cranberries, except that it has to do with water shed protection, and is of common interest to people all over the state who need more water for crop production. The Regional Planning Committee of Milwaukee County are especially well informed on this matter and have worked to get such land covered with forests for the last ten years. They have substantiated the opinion in a practical manner in Milwaukee County, that everybody comes to finally, that dry open areas lose water more rapidly and forested areas retain water longer. That is illustrated in a graphic manner by the soil water measurements made after a rainy spell in June, 1931. This showed that there were fifty-three tons of water in the top twelve inches of soil after the last hard rain at the end of forty-eight hours on land that had a pine forest cover. There were thirty-seven tons in the open land out to one side, on identically the same soil and same exposure. The only difference was that one had an open grass sod and the other had a good forest cover.

You people who are producing a berry that is largely water are much concerned about water conservation, and I would therefore like very much to have you take one of these reports with you and study it carefully because by so doing you may be able to retain more water for your cranberry fields.

SUPPLEMENTARY REPORT TO THE CRANBERRY GROWERS OF THE MATHER COMMUNITY

JOHN S. BORDNER

The meeting of cranberry growers at Mather on December 6th has led me to make a further study on the behavior of water in the ground, and what becomes of water which falls to the earth annually in rain and snow.

As has already been said, the average annual precipitation for the region around Mather is about 32 inches with a shortage in rainfall for the years of 1930 and 1931 of over ten inches. Further, much of this shortage came in the winter months of these two years.

The summer seasons were very hot and the prevailing winds were dry. The very severe fire of 1930 also added to evaporation. These factors alone would have caused a water shortage. To these must be added the ease with which the flood water reached lower levels through the large outlet drainage ditches. The present water shortage can therefore be attributed to shortage of precipitation, excessive evaporation and rapid run-off.

In round numbers, scientists have found that about 33 per cent of the total rainfall in Wisconsin passes into the streams and back to the Great Lakes and the Gulf of Mexico. The other two-thirds pass directly from the land (soil and water surfaces) back into the atmosphere. In a region such as this vast marsh area, it is obvious, therefore, that those who are engaged in growing cranberries and sphagnum, must take into consideration two things, namely: First, how to reduce the total amount of evaporation, especially during years when weather conditions are most favorable to evaporation which also happen to be the years when there is the greatest shortage of precipitation, and second, to control as much as possible the flood water. This means, of course, nothing more than holding back much of the run-off, and thereby allowing it to seek lower levels gradually.

The grower has no control over the climatic factors, viz., over extreme heat, rainfall, and drying winds. He can, however, help by keeping the marsh from which he draws his water fairly well filled with water. This encourages the growth of sphagnum, which as a mat on the surface serves as an insulator keeping in the cold and thereby reduces the total amount of evaporation, for summer showers falling on warm earth are dissipated through rapid evaporation in much the same manner as water disappears when dropped onto a hot stove. These summer showers falling on a relatively cool sphagnum covered surface will be retained much longer than they would if they fell on a hot, dry marsh. All forest growth on the adjacent sand and sand-marsh areas of course also helps, by breaking the influence of strong winds. This forest cover also helps to keep this higher ground from becoming unduly heated. Keeping the surface of this region relatively cool will, of course, hold evaporation down to a minimum. The islands should therefore be reforested as quickly as possible with pine and spruce.

Precipitation Required to Fill Marsh With Water

The saturation point for this swamp on the higher portion, i.e., north and east of Bear Bluff, would require at least one-half of a year's rainfall, i.e., if none escaped except in even run-off. Unfortunately, rain comes very erratically. Heavy rains cause surface flow before the water can all sink into the ground, and of course this water follows the line of least resistance into the open ditches and there moves rapidly beyond where it will do any good to this region. When the earth is again saturated with water, it is all right to have this surplus water move. Its rapid surface movement of course increases the total run-off to where it is far above normal, i.e., the one-third total precipitation. The normal run-off in this case would be the water which by natural drainage finds its way southward. This should come largely from the ground water of the marsh which lies above the level of the ditches.

Ground Water Flow

This ground water moves relatively very slowly as compared with water in an open ditch. This is due to the fact that a great amount of friction has to be overcome as the water comes in contact with the

soil particles. Since the passages between the soil particles are small, authorities on ground water movements in sand such as the sand of this marsh, estimate a flow of water through this sand would probably not be more than from 10 to 50 feet every twenty-four hours. Our own investigation of this past season would indicate that the latter figure is probably more nearly right for the rate of water movement in this sand.

It is obvious from these figures that as long as the soil is saturated with water, discharge from the earth into an open ditch would be sufficient to fill the ditch every twenty-four to seventy-two hours. Further that when the saturation point drops from near the surface toward the level of the bottom of the ditch, the discharge is proportionately reduced. When the level of the bottom of the ditch is reached, very little water will feed into the ditch, and this is just what has happened this season, thus reducing the normal flow to a minimum, as the water table had dropped from near the surface to a depth of six to eight feet over this entire area. Frequently the question is raised, as to why the water does not more often come to the surface as it slowly flows through the soil from a higher level to a lower level. For example, the marsh in the vicinity of Bear Mound approaches an elevation of 1000 feet. The drainage is to the southeast and yet the water is below the surface near Mather, which is 40 feet feet lower. The answer is that it does not flow fast enough to overcome evaporation at the lower level, i.e., gravity tends to pull the water down and only capillary movement tends to lift it. In time gravity outweighs capillary actions and the water level drops except at such points where some barrier stops the flow of water in the earth. At such points water may actually be forced to the surface by pressure from higher levels and if some porous material happens to be in its course springs result.

It is difficult to determine where rock barriers may exist beneath the surface in this region. That these barriers exist in the islands is, however, known. In any event the retention of a greater amount of the quick run-off will shut air from the soil, and so will reduce heating and evaporation. A reserve water supply in years of plenty will therefore help to overcome a shortage in years like 1930 and 1931, as this reserve slowly works its way in a southeasterly direction within the soil at a rate of probably from 10 to 50 feet per day. Open ditches or reservoirs at the lower levels will of course remain filled with water only to the level of the ground water table.

Any cross dams in the open ditches will therefore make these ditches very similar to the saturated soil adjacent except that these reservoirs may in times of urgent need discharge their content of water very rapidly. while the soil discharges its content relatively speaking very slowly. The soil if filled with water will, however, discharge its water sufficiently rapidly to again fill the ditches or reservoirs within a few days. Where the water table is as low as the bottom of the ditches, this will not occur because the flow out of the ditches may just about equal the water flowing from higher levels into the ditches and no water would accumulate in the ditches for use in flooding fields. This is exactly what has happened during these dry years.

Conclusion

The combined and coordinated effort of the cranberry growers for water regulation therefore may be summed up as follows:

1. Regulatory dams in open ditches to maintain a higher ground water table. This will tend to produce a normal discharge or run-off annually rather than an excessive run-off in wet years and in seasonal flood periods. It will also tend to reduce excessive evapora-

tion in dry years due to free air circulation in the upper soil and the excessive heating of the soil.

2. Forest growth on the islands should be encouraged and conserved in every manner possible for increased forest growth on these islands as well as sphagnum growth on the marshes serves as an insulator against atmospheric heat and thereby reduces evaporation.

ADDRESS

MR. HEFLY

I feel that perhaps I may be just a little out of order here, after I have heard these men talk about growing cranberries. That is something I know little about. Furthermore, I have talked a lot about cranberries in the last ten or twenty years, but I have always talked to men whom I was trying to sell cranberries to. We are operating an exchange at Minneapolis, as many of you know.

I was down here at your sales company meeting for a little while last summer, and just at that time it looked to me as though there was a very hard job ahead. I knew the conditions prevailing in the markets, and other commodities were getting a very low price. At one time there were over 8,000 cars of California grapes on wheels that didn't average freight charges, to say nothing of the cost of growing and packing, and the same thing applied at times on vegetables from out West; but I don't want to talk to you about those things, because they aren't pleasant to think about. I would rather talk about cranberries, which were sold at, I think, a very good price, everything considered. Last summer when I was here, I was a little doubtful. I wondered how far we were going to get in the West and Northwest when we tried to sell cranberries, when people were paying the price of a bushel of wheat for two pounds of cranberries, or the price of a bushel of potatoes. It seems to me it has been done, however, although I don't know how. Several things came along that helped. One thing that helped a lot was advertising. I think this year's advertising campaign was the best I have ever seen on cranberries. Another thing is the good quality of the cranberries this year. That was important—I should have put that first. A lot of the credit for the good price you got for cranberries this year belongs to Mr. C. M. Chaney and Mr. Kelleter. They did a mighty fine job in selling and holding prices in face of conditions which made it seem almost impossible to hold a price on anything. I would like to have everyone give them a lot of credit. It is due them.

I want to take a few minutes to talk about another thing here which concerns all of us. I am not going to pretend I am doing this entirely unselfishly. We represent the Exchange in a great many places, and we take a lot more pride in getting a good price than we do in selling another car or two. You have heard this from Mr. Chaney, I expect, many times. The three main elements in the market are supply, demand, and price. They are all very closely related; in fact, they are inseparable. The Exchange has done an uncanny job in pre-determining the demand, and increasing and keeping up the advertising. Of course, just before the shipments started, the growers furnished very reliable estimates that made it possible to determine the supply. After the supply is known, and the probable demand is determined, then the price is set. A very accurate price has been arrived at almost every year for the last fifteen or twenty

years. Now that price can be maintained only so long as the supply is regulated to meet the demand. It is absolutely essential to regulate the supply according to the demand if the price is to be maintained. During the past two or three years conditions have been changing, of course. As we all know, there are certain things that have arisen in the trade and distribution of cranberries and all commodities. We saw that coming, to some extent, when the quarter-barrel box came into popularity. The retailer wanted to buy smaller quantities. He wanted to carry a smaller stock; he preferred to buy often and less at a time. Now the wholesale dealer, because of trade conditions, credits, etc., wants to buy in smaller quantities, too, whenever he can. Another thing that has come along during this time is good roads and trucks. The time has come right here in Wisconsin this past fall when the truck has really entered into the cranberry industry. A great many people in some districts are inclined to resent the truck and try to fight it, because it really is an interference—something they don't like to see. I don't think that is just right. I think the truck has a place in transportation, and I believe it can be used advantageously in marketing the Wisconsin cranberry crop. We have to keep the cranberries "in the family", and see to the trucks ourselves, if we are going to regulate the supply. We can do that, I am sure. It is just a simple matter of making a few necessary arrangements. I told Mr. Chaney we could sell truck loads just as well as we could sell carloads. We will sell them oftener, and not so many at a time, and in the end we will sell just as many cranberries. I am sure something can be, and will be, worked out before the next season, so that we can use trucks just as we are using cars, and not upset the marketing scheme at all.

I believe that is about all I want to say to you folks, except to tell you I am very glad to be down and see you all again, and I hope we can have another season next year that is just as good as this past one has been, and I believe that is hoping for a whole lot.