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Wisconsin State Cranberry Growers' Association. Thirty-fourth annual meeting, Wisconsin Rapids, Wisconsin, January 11, 1921. Thirty-third summer meeting, pavilion, near Nekoosa, Wisconsin, August 10, ...

Wisconsin State Cranberry Growers Association

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**Wisconsin State
Cranberry Growers' Association**

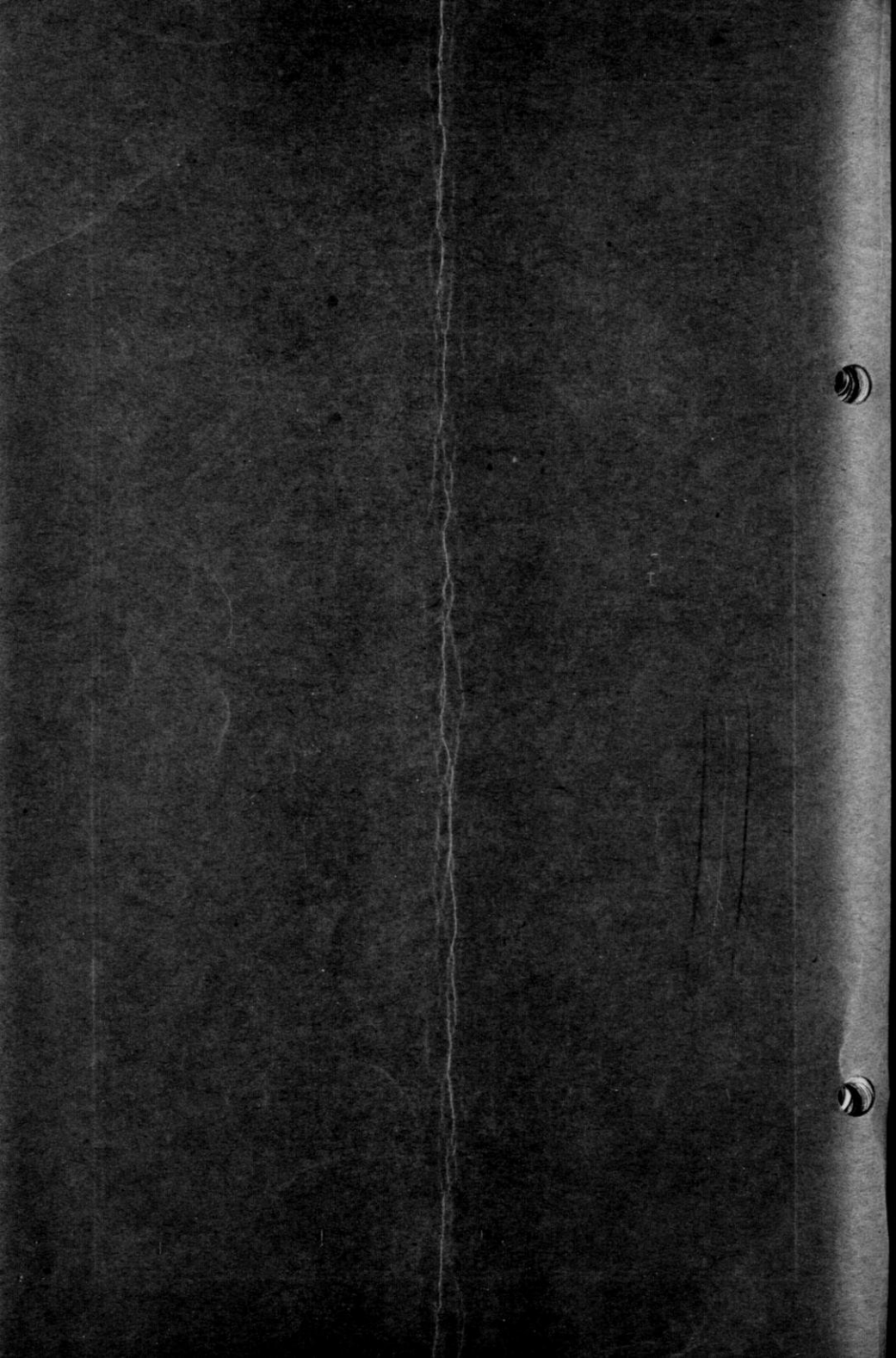
THIRTY-FOURTH ANNUAL MEETING

**Wisconsin Rapids, Wisconsin
January 11, 1921**



THIRTY-THIRD SUMMER MEETING

**Pavilion, Near Nekoosa, Wisconsin
August 10, 1920**



**Wisconsin State
Cranberry Growers' Association**

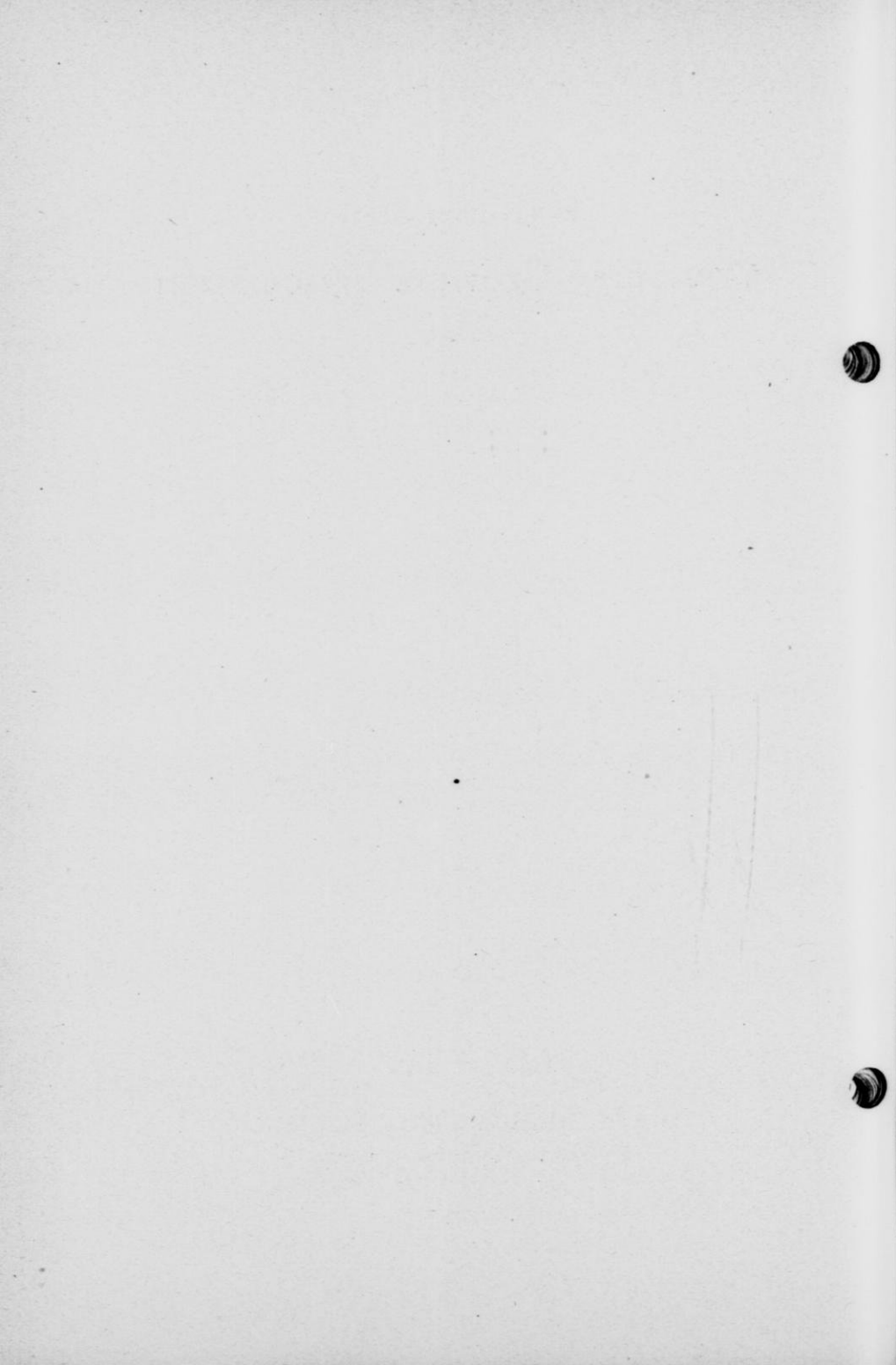
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LETTER OF TRANSMITTAL.

To the Honorable JOHN J. BLAINE,

Governor of Wisconsin.

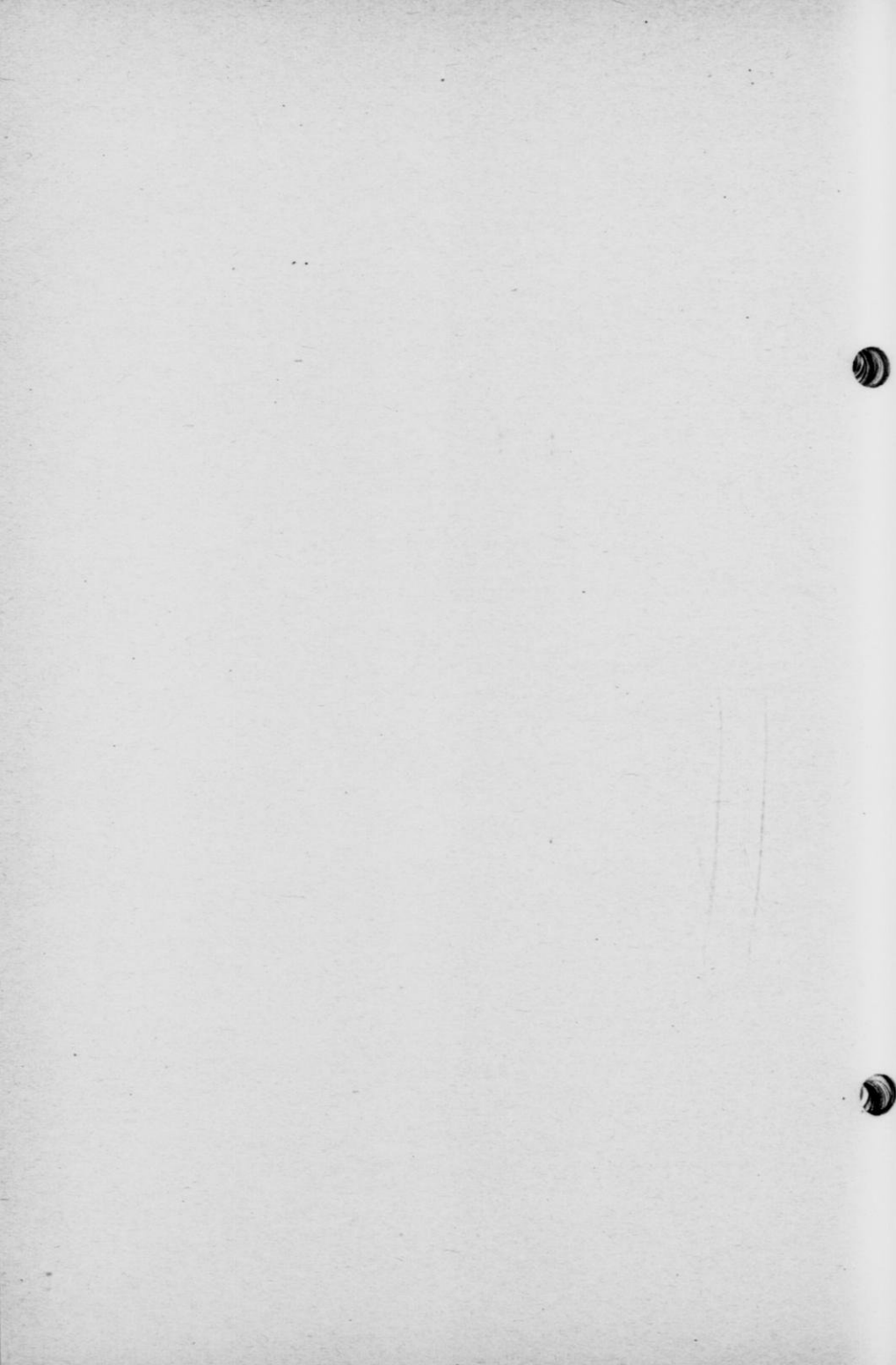
Dear Sir: In pursuance of law I have the honor to submit to you herewith the Thirty-Fourth Annual Report of the Wisconsin State Cranberry Growers' Association.

Respectfully yours,

MRS. S. N. WHITTLESEY,

Secretary.

Cranmoor, Wis., January 11, 1921.



THIRTY-FOURTH ANNUAL CONVENTION

of the

Wisconsin State Cranberry Growers' Association

Wisconsin Rapids, Jan. 11, 1921

PRESIDENT'S ADDRESS.

ANDREW SEARLS

Ladies and Gentlemen: Taking everything into consideration, the past season has been a successful one. While the crop was a disappointment to most of us, owing to the failure of berries to reach their normal size, the prices were very satisfactory.

Some of the growers suffered serious damage from the fireworm. This damage will be likely in most instances to affect the next season's crop. It seems to me we should be able to standardize, as it were, the methods of combatting this pest. For many years I have considered this pest easy to manage by flooding. Care should be observed to note the appearance of the worm—(black head fireworm)—which may be known by its shiny black head. It does not seem to be sufficient for the average grower to have a paper on the fireworm read in our meetings, so in addition to having a paper, I hope you will draw out by questioning, that everyone may be informed on this subject.

I believe it would be a wise move if we were to hold summer meetings and visit different marshes; the unsuccessful as well as the successful ones, for we probably would learn as much, or more, from some man's mistakes as by the successes.

I hope to have discussed today the putting on and taking off of the winter flood; its proper depth and the effects of deep and shallow covering, as well as many other items entering into the cultivation of the cranberry.

The subject of re-building and re-planting of an old bog will be brought up for discussion today. I have suggested Mr. Barber tell us something regarding this matter, as he has had some experience along these lines these last few years, but he seems to be inclined to be shy and willing to let Mr. Kissinger do the talking, as he did the actual work, although Mr. Barber furnished the sinews of war. I think many of the old bogs that were planted in an early day and not laid out nor planned and planted with the best paying varieties, should be overhauled and re-planted.

I think now will be a favorable time to undertake work of this kind, as labor is likely to be more plentiful and more reasonable in its demands. I had a report from one of our growers that he would

have a machine to do his harvesting next season. This would be good news, indeed, but I fear he will not be ready to tell us about it today, although I have endeavored to have him do so.

WATER RAKING AND KEEPING QUALITY.

NEIL E. STEVENS

Pathologist, Bureau of Plant Industry.

Only one phase of the "water raking" problem is dealt with in the following brief summary of our work in Wisconsin during the season of 1920, that is, the keeping quality of water raked cranberries. Other important items, the cost of harvesting and handling, the practicability of proper drying, the available water supply, and amount and quality of available labor must be taken into consideration by each grower in deciding whether or not to practice water raking. Indeed, the question of the advisability of water raking must be decided separately for each marsh, making allowance not only for those factors mentioned above but for the report of the selling agent or customer on the carrying quality of berries from that particular marsh. Such experiments as those here described will be useful only when due allowance is made for the difference in marshes and in seasons.

The work of 1918 showed that while water raked berries were often inferior to dry raked or hand picked berries from the same marsh, there was wide variation in the keeping quality of water raked berries. Storage tests showed that water raked cranberries, like those harvested in other ways, keep much better in ventilated storage crates than in barrels, and that unripe (only partly colored) berries are more easily injured by water raking than ripe (fully colored) berries.

Dr. Bergman's study in 1918 and 1919 of the flooding waters of various Wisconsin marshes, showed that they differed widely in oxygen content. Part of the results of his work will be published later, and part is already in the hands of the members of this association as it was reported last year to the Cape Cod Cranberry Growers' Association. Of chief importance in this connection was the demonstration of the fact that the higher the oxygen content of the water, the less danger there is of injury to vines and berries from flooding.

The season of 1920 was devoted to a study of water raking on a single marsh, with special reference to the effect of the rate of drying on the keeping quality of the berries. For this work the marsh at Beaver Brook proved very favorable, as there are considerable areas planted to a single variety, water raking is regularly practiced, and both barrels and ventilated half barrel boxes were available for shipping experiments. In all, 21 experimental lots, including 76 boxes and barrels, were prepared, careful record being kept of the method of harvesting, the condition and time of drying and storage. Most of the experimental lots were sent to Chicago, though a few barrels were shipped to Washington, D. C., and some to California.

The results of the tests may be summarized as follows. Under the conditions existing at Beaver Brook in 1920 the keeping quality of water raked berries which were quickly dried under favorable weather conditions about equalled that of hand picked berries, but was inferior to that of dry raked berries, while the water raked berries which were slowly dried were decidedly inferior. The exact figures are given in Table I, which includes an average of all lots shipped to Chicago.

Table I. Average keeping quality, expressed as per cent sound berries, of cranberries (Searls Jumbo) harvested in various ways, Beaver Brook, Wis., 1920.

Date examined.	Hand picked.	Dry raked.	Water raked and dried under good conditions.	Water raked and dried under poor conditions.
Nov. 4-6	95	98	Sept. 14-17	Sept. 25-Oct. 1
Nov. 22-24	91.7	97	95.2	89.4
			91.5	83.0

At first glance it may seem strange that hand picked berries did not keep so well as dry raked. There were included in the test, however, only hand picked berries which came from the same or closely similar sections as the other experimental lots, and the evidence indicates that hand picking was attended with rather more bruising, with the resultant decay, than the raking. On this point Mr. Bert A. Rudolph, who examined the berries shipped to California, writes:

"The berries of this lot (raked) showed distinctly less bruising and mechanical injury than those in the barrels labeled 'H' (hand picked).

. . . I must conclude the larger proportion of bruising to be due to squeezing by the pickers."

That large berries are apt to be somewhat injured in hand picking, and show somewhat poorer keeping quality than similar berries when dry raked, is indicated by Mr. Wilcox's experiments with Centennials in New Jersey in 1916.

There can be little question that the more slowly water raked berries are dried the poorer will be their keeping quality. The difference between those reported in column three and column four of Table I is merely a difference in weather conditions. Even more striking results were obtained when water raked berries harvested the same day from the same section were kept wet in the picking boxes for different lengths of time. The results of these tests are given in Table II.

Table II. Keeping quality (expressed in per cent sound berries) of cranberries from the same section treated in different ways after water raking. Beaver Brook, Wis., 1920.

TREATMENT.		Per cent sound
Lot 1		Nov. 5-6, 1920
Sept. 17	Dried as soon as possible	95
	Kept wet over night	88
	Kept wet three days	84
Lot 2		
Sept. 25	Dried as soon as possible	90
	Kept wet over night	89
	Kept wet two days	85

No cranberry grower would expect to exactly duplicate the results of these tests on another marsh, or another year. Every marsh has its own conditions and no two harvesting seasons have the same weather. In fact, according to the records of the weather bureau few seasons have been so favorable for drying water raked cranberries as was that of 1920. The results may be taken, however, as giving some indication as to what may be expected under similar conditions elsewhere.

Conclusions.

The investigations of the last three years appear to justify the following statement regarding the various factors which influence the keeping quality of water raked cranberries.

The cooler the flooding water the more favorable for water raking.

Clear pond or spring water is more favorable for water raking than swamp water or that stored in reservoirs built over marshes.

Fully colored berries are less liable to injury in water raking than are green (partly colored) berries.

Ventilated crates are much better than tight boxes or barrels for the storage of water raked as of other berries.

The shorter the time the berries are submerged during water raking the better their keeping quality. This is particularly important when the water is warm.

The more quickly the berries are dried after water raking the better. The rate of drying depends to a great extent on the weather.

Under the best conditions that have been obtained experimentally thus far, the keeping quality of water-raked berries has not equalled that of dry raked berries, though under good drying conditions it has about equalled that of hand picked.

The keeping quality of water raked cranberries is so influenced by harvesting and drying conditions that it is doubtful whether they should be mixed with or averaged with those harvested dry.

PREFATORY.

O. G. MALDE

The article "Keeping Production Records by Growers of Small Fruit," written by Hon. William E. Schimpff, Secretary of the Oregon Cranberry Growers' Association, of Astoria, Oregon, is, I believe, a very concise and clear statement of a problem much ignored by the cranberry growers of Wisconsin, and I would commend it as a text for close study by our growers.

It is very evident to the investor and should also be very apparent to the cranberry grower that a close record on the cost of operations should be kept by them, together with records of the production of the cranberry bog, also any individual part of the bog.

I have used the consecutively numbered tickets for checking in hand picked berries and find it most convenient in recording the day's harvest and also the recording of the crop from any section or bed of the bog. For recording the day's harvest by scoops, tickets can also be successfully used, but even without the tickets the daily report sheet shown by Mr. Schimpff makes a record very simple, and makes the system commend itself.

From a business and commercial standpoint it is important that cranberry growers do keep accurate cost and production records so as to be able themselves to know definitely where they make their best earnings, and thereby remedy the items that show a loss. It is very evident that a cost and earning system once installed will not be found cumbersome, in fact at the end of a year I believe will be found to be a great time saver and a source of great satisfaction in the information such a system will yield.

If united action could be centered on this matter of better accounting in the cranberry industry, I feel sure that there would soon be more interest taken in the industry as a whole and this enterprise which for a number of years has practically stood still in this state will receive a new impetus that will put it on the level it should occupy in the industries of Wisconsin.

If the consecutively numbered tickets were used by a majority of the growers, a great saving could be made by buying the tickets collectively by the Sales Company or the Growers' Association, and lettered serially or the growers putting on their own stamp.

There is little doubt that with all things considered the cranberry industry in Wisconsin is the most favorably located of any in the United States owing to its climate which is least favorable to serious spread of fungus attacks and permits most favorable application of treatments for control and eradication of insect pests.

Climatically we are more subject to summer frosts but this phase is entirely controllable by the proper vigilance and application of irrigation principles if bogs are properly constructed, and the cranberry bog construction in any locality and especially in Wisconsin should not be a haphazard undertaking but a distinctly engineering feat.

In view of the available acreage and favorable conditions for cranberry culture in Wisconsin, I commend the attached article with the hope that Wisconsin's cranberry growers will more closely study their industry as a business proposition and thereby aid in boosting the industry to a larger production and its deserving position in the state and nation.

KEEPING PRODUCTION RECORDS BY GROWERS OF SMALL FRUIT.

WM. E. SCHIMPF

Secretary, Oregon Cranberry Growers' Association

The keeping of accurate production records has always been a serious problem to the fruit grower. During the exciting period of the harvest the best system is liable to be neglected and thereupon immediately ceases to be a system and becomes an aggravation. Accurate production records are desired by every fruit grower, and the problem has been to secure a system which would be accurate and yet so simple as to be practically automatic.

During the harvest season everything seems to be very much of a mad race. Where up to this time on a cranberry bog one or two people have been employed on a twenty-five acre bog, now a hundred or more are needed. Pickers of all ages, races and creeds assemble to gather the festive little berry. With this army of people we have the same old problems. The fruit grower has a strenuous though not altogether uninteresting time during this exciting period.

Now in order to know what he is doing, he should know what he is producing. It is just as important to the cranberry grower to keep accurate production records as it is to the dairyman. Fruit growing is a business just as much as selling hats. No one would think of engaging in any mercantile business such as selling hats without opening up a set of books. Fruit growers are willing to do this, and have been anxious to have some simple method devised which would really be of assistance to them in the keeping of such accurate records. One advantage the fruit grower has over his fellow business man, and that is he is selling but one commodity.

The average fruit grower is well above the average person in intelligence and it is not from ignorance of their value that precise production records are not kept, nor is it from unwillingness. When the end of the harvest day comes the grower feels that he has earned a well deserved rest, and though he knows that he should tabulate the results of his day's work, he is usually so tired physically that the very thought of bookkeeping appalls him.

A system that in itself would be so simple as to keep its own record, was the problem which demanded solution. One of the members of the Oregon Cranberry Growers' Association has devised just such a system. It has been in use by him for three years, and last season was adopted by every member of the association. The dominant feature of the system is the use of consecutively numbered tickets similar to those used in the movies. At the beginning of the picking day

it is only necessary to make a memorandum of the opening number for the day, and to record the closing number at night.

This in itself gives a correct record of the number of boxes picked during the day, and shows what the picking cost should be. The difference between the number on the ticket at the end of the ribbon in the morning and number on the ticket at the end of the ribbon in the evening, must agree with the number of boxes taken from the pickers. Slight discrepancies will occur, and these discrepancies are at once called to the attention of the checker, who gives out the tickets. There can be no dispute, and there is none. An explanation should be had. It will happen that a ticket too many will be given out by the checker, but this fact is immediately recognized by the grower.

Checkers really like the system, for they know that their work is automatically audited. Not only is this system a perfect check upon the person giving out the tickets, but it can be used as a check upon the picker as well. One bright young lady who was giving out tickets for a Clatsop cranberry grower, would always ask to see all of the tickets of the picker whenever the question arose as to whether a ticket had been given for the last box or not. An examination of the tickets usually showed one ticket with a number just preceding the one on the ticket roll, and the picker was satisfied.

Pickers' tickets can be obtained from the moving picture supply houses, they are printed in various colors, and can be had with the name of the grower, the denomination and of course the serial number. Stores in the immediate locality are glad to cash these tickets, as they bring business to their places of business. Later the grower takes them from the storekeeper in lots, issuing his check for this purpose. If such an arrangement can be made it is of decided value to the grower, as it will mean that he must keep but little cash on hand.

Sometimes it is advisable to furnish some store with a working capital of a sufficient amount so that the storekeeper will not have to use too much of his own funds. From time to time as the tickets come in to the store they can be taken up by the grower in good sized lots. This system has the advantage of keeping the picking money distinct and separate from the grower's own cash. Every grower realizes the difficulty in keeping his own money distinct from the picking money during the rush of the harvesting season. The grower usually gets all of his wife's spare change, as well as his children's savings into his harvest fund before he realizes it.

With a system of serially numbered tickets, the difference between the first number of the season and the number left on the ribbon at the end of the season, indicates the exact number of boxes picked during the season. This at once shows him his harvesting cost, that is, it shows him exactly how much money he is to pay out for fruit picked.

In connection with these tickets a daily report sheet is used by the cranberry growers of Clatsop County. This report has a space for recording the first ticket given out in the morning, and the last in the evening, a check in the way of the actual count of the number of boxes taken into the warehouse. Distribution of the costs of picking, trucking, checking and other harvesting costs can be made on this daily sheet if it is so desired.

Practically this same sheet is used for the season's report. To make out a report for the entire season will take but little longer than to make the daily report. The tickets given out by the checker to the pickers have kept right on numbering themselves throughout the entire season, and it is but a matter of simple subtraction to determine the whole number of boxes harvested for the season. In fact a season's report can be made out and has been made out in fifteen minutes.

The report is really in two parts, one part on which the statistical records are kept, as has just been described above, while the other part of the report sheet is a diagrammatic representation of the bog itself, on which the particular section being picked that day is shaded, and such other remarks made which will be of interest to the grower in the years to come. The purpose being to give the proper production credit to those particular sections of the marsh which so deserve the credit. This being very much in the same manner as the dairyman tries to give every cow her proper credit.

The advantage of this can be readily seen. To illustrate, during the past season one Clatsop cranberry grower, who had kept accurate production records of his marsh for the preceding year, was able to estimate his entire crop to a surprising degree of accuracy after picking a single acre. The variation between his estimate and the crop actually picked being about one per cent.

The use of this system is strongly recommended to every grower of small fruit, where the picker is paid by the piece. The system is not theoretical, but is intensely practical. Its results are final and absolute. The numbering on the tickets is as accurate as an adding machine's computations. It is simplicity itself and will be found not only interesting but fascinating as well.

The use of the numbered tickets will well repay the grower as against the old method of using the same tickets over and over again. The tickets should be used but once and destroyed. Their cost is but slight, and their use so very satisfactory, that once the grower uses them, he will never go back to any other system. Should the grower use only the tickets and not the daily report sheets, he will have at least accurately kept the number of units of his fruit, whether boxes, measures or carriers, for the entire season, and this information is worth the price of the tickets many times over.

Specially printed tickets can be had in rolls of 2000 tickets each. The larger the lot ordered the better the price. A grower should estimate his needs for some years to come and order enough to cover his needs for several years. In this way his ticket cost will be but little each year. Five dollars would supply tickets enough for a very large crop. Five dollars would not be too much to pay for a bookkeeper that would keep exact count of the total number of tickets given out throughout the entire season. The movie people have been awake to the value of this ticket and have used it for several years, and the mere fact that these successful business men use them universally, should be sufficient recommendation as to their value. We have no doubt but that the fruit grower will be using them just as universally within a short time.

FIRST YEAR DEVELOPMENT ON BIRON BOG.

GUY NASH

No two cranberry marshes are alike in quality and depth of peat, underlying soil and drainage, surface and water supply, and best development methods must likewise differ. What has been adopted at Biron might be eminently unsuited elsewhere, nor perhaps has the last word been said at Biron as to what is best for Biron. The only thing here offered is a brief account of what was done during the last season, in the hope it may be of service either in accomplishment or failure to some other grower. It is with this spirit of helpfulness I have been met on all sides since my entry into the ranks of the cranberry men.

The Biron marsh was drained six or eight years ago and is under cultivation for hay and grain. Except in the early spring, horses can work on every part of it. The part so far worked was a fine clover field perfectly drained and hard of surface when development began.

The start was late; May 3d, more than two weeks later than planned. More frost was in the ground May 3d than March 1st, and in many places plowing was impossible.

The first job, leveling the sections, was started with horses and wheeled scrapers, but we were dissatisfied with both speed and cost, and purchased four six-cylinder Avery tractors after preliminary tests with small tractors made us believe they could be worked. The experiment was successful the tractors fill and haul a larger size wheeler, travel twice as fast, are no expense when not working, pull as strong at 6 P. M. as at 7 A. M., don't have to be watered in the middle of the morning and middle of the afternoon on company time, and are not troubled by nose flies. The men started with a profound conviction of failure and ended with a hurt feeling if we asked them to fill a little while behind horses, the steady pull of the tractor making both dumping and filling easier.

At one time, to finish up a wet corner we put the tractors where they would mire alone every trip, using another tractor as a snatch team,

so to speak, with excellent results. Once I saw both tractors spinning, but the lead tractor backed and sheared off in another direction and both tractors and wheeler pulled out. If the haul is not too short one man can fill and one dump and spread, but if the loads are crowding two at each place are necessary. Plowing is needed and we find it best done by our farm tractor, 14-28, and four-bottom plow. Fill on our soil to allow for settling must be about 65% excess, that is a 6" low spot takes 10" of dirt when placed first. Final leveling has so far been by hand with shovels and cords stretched from grade stake to grade stake, after disc or spring-tooth harrowing and dragging with a "planer" or surfer, a ladder-like arrangement with 3x12- 24 sides and rungs 6' wide the slope of the planks which constitute the rungs being adjustable. This hand work is expensive, but is the best method we have yet tried. We find heaps of grade stakes pay for themselves in evenness of final surface.

Ditching was done with a small Rood dredge leased from the Rood Construction Co., and the same machine was used for loading sand into the dump cars.

Sand was hauled to the marsh in 1½-yard dump cars on 24" industrial track. Owing to the fact that the locomotive purchased a year ago this time for April delivery was not started on its way till May 28 owing to the outlaw Chicago switchmen's strike, was then lost in transit and finally reached us the very day after sanding was finally completed, the hauling was done by teams and tractors. A team could handle six cars and a tractor the same number, but the tractor made better speed and had better endurance. Both teams and tractors spoiled the surface of the peat and mushed up the sand and peat. Distribution of the sand was by shovels, by wheel scraper horse drawn, wheel scraper tractor drawn, and by slip scrapers, Fresno scrapers also being used. None of the methods were very satisfactory, and next season we expect to mount our rails on wooden ties for greater clearance and spread by hand with a short throw only.

Planting was by hand in check rows 7x7 and was done by boys. The only novel feature in this connection was giving the boys, who worked from 7 A. M. to 4 P. M., ten minutes off at 8, 9, 10 and 11 A. M. and 2 and 3 o'clock P. M. in the fashion of soldiers on the march. The balance of the time they were held strictly to their knitting. This system developed a fine lot of boys, and figuring work accomplished per boy per hour approximately the same was accomplished as others have obtained by working straight through. Much of the result was due to the excellent work of Frank Whitrock in handling and disciplining the boys. Vines were "pulled" to straighten them and made into mats which were cut to length in a hand-power paper cutter such as print shops use, technically known as a ream cutter. The vines were hauled to the marsh in cranberry boxes, kept carefully covered and moistened. They dry out very quickly. The vines were cut by A. Searls & Son about the middle of May, baled and stored in their warehouse till the last of May, shipped in a box car and immediately dumped in the

drainage ditch whence they were withdrawn as needed. Many delays made planting very late, this starting June 14th and proceeding intermittently as half sections were completed, leveled and sanded, until August 20th.

This late planting was a matter of necessity entirely and not of choice; as stated above the vines were cut the middle of May, a few days after we started work and before it was possible to foresee all the delays which finally eventuated, due to shortage of men, delay in getting delivery of tractors after order was placed and the delay in getting the locomotive. Of these labor was chief and the locomotive least; one crew, partly boys, would first level, then finish the black earth, then sand, then spread and level the sand.

Naturally the late planting did not do so well as the early planting. The first five acres planted which were completed before the Fourth of July show practically no difference. If you will recall June was cool and rainy and there was a big rain storm during the Fourth holiday, making the marsh so soupy we could not work till the middle of the month, starting planting again on the 17th when the drouth was on which continued all summer.

The vines in storage began changing color of leaves by the middle of July, and tiny rootlets were first noticed the first week in August. Parts of the last planting in August are as prosperous as any except the first five acres, depending apparently on the vine vigor, as we could not determine any difference depending on position in bales or in the ditch. Vines at the bottom of the bale covered with the mud certainly lost their leaves sooner, and bales which contained appreciable quantities of moss or grass started growing much earlier than clear vines did. A couple of bales left over in the ditch were examined in December and found to be mostly dead, but partly fresh and green as when first put in the ditch, some still bearing green leaves, and I am satisfied would have grown well if planted.

We were troubled during the summer by too much drainage, one plot in particular getting too dry before we could get water on it, having to put a stop in the drainage ditch before it was possible to do this. Stops were necessary in the drainage ditch also to hold a winter flood.

No connection was made to the river this summer, our water coming from the ditch. This connection will be made the coming season.

16 WISCONSIN CRANBERRY GROWERS' ASSOCIATION

FINANCIAL STATEMENT OF THE WISCONSIN STATE CRANBERRY GROWERS' ASSOCIATION FOR THE CALENDAR YEAR 1920.

1920		Receipts	Disbursements
	Balance on hand January 1, 1920.....	\$234.52	
Jan. 23	Collections	9.00	
Feb. 2	Collections	7.50	
Mar. 2	Emma Jacobson, services and expenses.....		\$ 64.00
Mar. 25	Collections	7.50	
Mar. 27	Collections	7.50	
Apr. 22	Collections	7.50	
Apr. 22	Grand Rapids Tribune, circular letters.....		1.75
Apr. 22	Mrs. S. N. Whittlesey, salary July 1, 1919, to January 1, 1920.....		40.00
Apr. 22	Badges, postage and other expenses.....		30.53
Apr. 25	Collections	7.50	
July 1	Appropriation by legislature.....	250.00	
Sept. 1	Grand Rapids Publishing Co., circulars.....		2.50
Sept. 1	Mrs. S. N. Whittlesey, salary and expenses January 1, 1920, to July 1, 1920.....		46.96
	Balance January 1, 1921.....		345.28
		<u>\$531.02</u>	<u>\$531.02</u>

MRS. S. N. WHITTLESEY, Secretary.

MINUTES OF MORNING SESSION.

WISCONSIN CRANBERRY GROWERS' ASSOCIATION.
JANUARY 11, 1921.

Meeting called to order by President Andrew Searls.

After a general talk on the loss of space in the Wisconsin Horticulture and the doubling of the annual dues, whereby no benefit was derived and the fees could be used to material advantage elsewhere, it was moved by Mr. Jacob Searls, seconded by Mr. M. O. Potter, and unanimously carried that this association sever connection with the State Horticultural Society. Mr. F. E. Kassel was invited to state his method in starting his new marsh at Prentice, Wis.

After the election of officers which made Capt. Guy Nash vice president and re-elected Mr. Andrew Searls president and Mrs. S. N. Whittlesey secretary, Captain Nash closed the meeting with a very complete account of "The first year development of Biron Bog."

MRS. S. N. WHITTLESEY,
Secretary.

Mr. Lucian J. Fosdick, of Dorchester, Mass., regrets inability to attend the meeting. Extends cordial greetings and compliments of the season to all members present.

Mr. George Gebhardt is working on a cranberry picking machine, which in his estimation will be an absolute certainty of success when done. Little difficulties come up which are not foreseen, but which he is overcoming one by one. Further than this Mr. Gebhardt does not care to state.

Everyone we know will wish Mr. Gebhardt perfect success in his undertaking. It means a bonanza to the man who achieves a perfect-working harvester and an implement every grower desires.

Memorial

EMORY C. BENNETT.

This association suffers irreparable loss in the death of Mr. Emory C. Bennett, eldest son of Mr. and Mrs. A. E. Bennett, which occurred January 29, 1920.

He was young, enterprising, efficient and congenial.

To his young wife and little children and other bereaved members of his family this association extends sympathy and condolence.

By its President, ANDREW SEARLS,

By its Secretary, MRS. S. N. WHITTLESEY.

MINUTES OF SUMMER MEETING.

AUGUST 10, 1920.

In sending out notices for this summer meeting, the secretary urged a visit to the work of Capt. Guy Nash at Biron, Wis., which is converting a hitherto wild, worthless piece of land and marsh into a systematically laid-out cranberry plantation, where every method employed is the best and latest, and where no expense is spared to meet the requirements.

The attendance was large, and the entire morning taken up in viewing the work already done and in course of construction.

After dinner all repaired to the pavilion south of town, where President Searls called the meeting to order at 2:00 P. M.

The minutes of the January, 1920, meeting were read and approved. The secretary read telegrams of regard from Dr. E. D. Ball, assistant secretary of agriculture, and Dr. N. E. Stevens, of the same department, of Washington, D. C., and regrets from Prof. A. R. Whitson and E. R. Jones, of the University of Wisconsin, and Field Agent Jos. A. Becker, of the State Department of Agriculture.

The president's address was then listened to with marked interest.

Mr. O. G. Malde gave us facts and suggestions on "the Dew point and local weather forecasting for the cranberry man."

Mr. B. A. Rudolph, of the U. S. Department of Agriculture, presented an illustrated address on "Some diseases of the cranberry" with much information new to most of us.

Considerable time was then spent in general discussions on the fire worm, tip worm and state fair.

Owing to the very early date set for state fair this year, it was voted not to attempt an exhibit, as a creditable showing could not be made with berries so immature. Resolutions to that effect were ordered sent to state fair officials and to our state legislators.

A vote of thanks was extended to the concessionaires for the free use of the pavilion.

A motion to adjourn was made at 5:30 after a unanimous vote to hold the next annual meeting at Wisconsin Rapids.

MRS. S. N. WHITTLESEY,

Secretary.

ADDRESS OF PRESIDENT SEARLS.

Our time is somewhat limited so my remarks must be brief to make time for the more important subjects which may come before the meeting. I am glad to be able to say the Wisconsin crop of cranberries promises to be about normal. Considerable damage has been done by the black head fireworm. Some complaint is heard from blight, cutting down what had seemed to promise a bumper crop to about a normal one. I have not the estimated figures, but only estimates from different sources, some of the new bogs having come into bearing. This increase will be offset by some of the older bogs, which having produced a heavy yield last season, seem to be laying up for repairs, or taking a rest.

I presume you have spent the morning looking over the different marshes in this vicinity. Among them I hope you have seen the bog at Biron which Captain Nash is building. This is quite a departure from the old-time methods when stamping the vines into the grass was thought to be the proper course to pursue. The extra care and labor which it takes to build such a bog is amply repaid by the increased yield, and the dependability to grow a good crop each year of the finest berries going to market.

The fire worm has done considerable damage this year and bids fair to give still further trouble next season. I am going to call on the different growers and hope to bring out ideas that may be helpful in combating this pest.

I hope any grower having knowledge of methods for successfully controlling this pest will give us the benefit of his experience.

We might have asked for a paper from some of the growers, but it seems to be difficult to get papers written by some well-informed growers, they preferring to be called upon, when they seem perfectly willing to give us the information desired.

This is a very good place to bring our problems. I shall expect every grower to be willing to contribute his mite to make this meeting a profitable one.

DISCUSSION ON FIRE WORM.

C. D. Searls advised flooding 24 to 36 hours late in May or early June whether worms are seen or not. As there are two broods in a season, if any evidence after first flood, repeat ten days later. Worm begins to work as buds begin to swell.

A. U. Chaney left flood on a section till July first. Had a fair crop of berries the next year. Expects to repeat and eliminate all worms.

O. E. Malde urges keeping bogs and borders clean. Hardhack, feather leaf, etc., furnish good bed for worms. Yellow head has three broods in a season, starting earlier. Cure is same as for black head.

J. D. Potter kept on a three-day flood in blossom time. Killed the worm; crop also.

THE PRINCIPAL DISEASES OF CRANBERRIES IN WISCONSIN.

BERT A. RUDOLPH

There are few commercially grown fruits that present more varied types of disease than the cranberry, and possibly none whose diseases present so few definite characteristics which will permit of a correct diagnosis by superficial examination. One may readily and correctly identify many of the diseases of the peach by the superficial appearance of the trouble—"brown rot" or "scab," for instance, or in the case of the grape, "anthracnose," "mildew," "black rot" and so on. But with the cranberry superficial appearances are very tricky and misleading. Possessed of a tough, resistant skin the fruit may harbor many destructive parasites which manifest their presence in no such superficial eruptions as mark the presence of parasites in other fruits. With the cranberry absolute identification of a disease may be made in virtually all cases by cultural methods only. However, there are a number of cranberry diseases which ordinarily present certain symptoms which are constant enough to make diagnosis reasonably certain, and it is possibly best to speak of them first. But it must be borne in mind constantly, as has been said above, that superficial appearances are frequently misleading, and not too much confidence must be placed in them. Absolute identification lies in the use of the microscope and culture tube.

Possibly the disease most easily identified by superficial appearances, and certainly one of the most serious with which cranberry growers must contend is "end rot." End rot is a fungous disease and is distinguished from other cranberry diseases by the complete destruction of the inner fleshy structure of the berry. There is no fungus which so completely disintegrates the inside of the berry as the end rot fungus (*Fusicoccum putrefaciens*. Shear.). Many other fungous parasites destroy the flesh beneath the skin of the cranberry, however. The end rot fungus most frequently starts at the blossom end and also at the stem end, but rarely at the side of the berry, hence the reason for its common name. It is primarily a storage rot, although it may also be observed in the berries in the bogs. It does its greatest damage, however, after the berries have been put in storage. In Oregon and Washington end rot is by far the most serious disease with which the growers have to contend. Growers there state that last year certain varieties were destroyed so quickly by the disease that boxes of berries packed for market had to be opened and rescreened before they could be disposed of. The disease has been so generally met with from year to year that some growers mistook the disease for an over-ripe condition of the berries. It is primarily this disease that has given the berries of the far west their reputation for poor keeping quality. How-

ever, the growers there are a progressive lot and now apparently appreciate the cause of their trouble. They are systematically inaugurating a proper and thorough spray schedule, and there is no reason to believe that they will not produce berries that will compare favorably with any in keeping quality.

A berry having been attacked by end rot its destruction is rapid and complete. It may be observed at first as a small, soft, watery-looking spot at either end of the berry. This diseased area rapidly spreads until the entire berry is involved. There may be a slight brownish discoloration of the affected berries, but this characteristic is not constant. Many berries do not discolor, and except for a slightly dull appearance, present no difference to the eye than normal berries. But to the feel it is an entirely different matter. The affected berries are reduced to a mush or slime inside, and considerable gas, also a watery juice is present. A slight pressure of the fingers will explode them, leaving only the tough skin and a little watery or mushy substance behind. The writer has heard such berries referred to in the trade as "water bags," "snappers," "balloons," etc. Their presence in a barrel or box may readily be detected by simply running the arm deep down in the berries when the affected ones will be heard to explode. There is only one other cranberry trouble that may be possibly confused with end rot and that is the result of severe freezing. Very severe freezing will also reduce the flesh of certain types of berries to a mush, but this will be discussed later.

When berries affected with end rot are separated from the sound ones in the screen house and thrown out on the refuse heaps, they may retain their natural shape all winter. The writer has found old berries in which the tissue, first reduced to a watery mush or slime by the end rot fungus, had dried up leaving the tough skin distended by gas alone. Only a few seeds remained to rattle about loosely. Usually when berries affected with end rot and broken or crushed on the refuse pile, the fungus itself will make its appearance at the surface of the skin near the wound in a very characteristic tuft of tawny or mustard yellow, cottony or web-like mold. The presence of end rot may be determined very readily long after the harvest and storage period by examining the old refuse piles for this bright, mustard-colored fungus.

The end rot fungus propagates itself by means of spores which are produced by countless thousands in minute fruiting bodies which generally appear on old affected berries which have been exposed on the refuse piles all winter. These fruiting bodies usually appear beneath the calyx lobes of the blossom end of the berries and are dull black and so small that they may be overlooked readily by the inexperienced eye. When the spores are ripe they are expelled from these black fruiting bodies and are finally carried back to the healthy plants in the bogs by wind, insects, water, etc. The end rot fungus also attacks the old runners and uprights of the plants. This is particularly noticeable in the far west. The writer has observed it there on the McFarlins and other varieties where it was doing some little damage. There is also a

second spore form produced by the fungus which is quite unlike the first. It is more hardy than the first and serves to tide the fungus over winter. So the organism is amply endowed by nature with reproductive powers and may be relied upon to establish itself whenever proper conditions present themselves.

Dr. C. L. Shear, of the U. S. Department of Agriculture, has devised a spray schedule that is very effective in controlling end rot. Bordeaux mixture (4-4-50, plus two pounds of commercial fish oil-resin soap) is applied just as the flower buds are expanding in spring. A second application is made when most of the petals have fallen. A third about ten days later, and the fourth when the fruit is about three-fourths grown. Thus it will be seen that the berries are virtually covered with a fungicide from the time they are blossoms until they are mature, ripe fruit. End rot must be controlled in the bogs. It is next to impossible to control it in storage where it does its greatest damage for the reason that the fungus which causes the disease is very resistant to cold and actually will grow at freezing temperatures. The ideal storage temperature for cranberries is 32° F. (freezing temperature). The end rot fungus is the only cranberry parasite of any real importance that can withstand this low temperature. All others of importance are checked at some few degrees above this and cannot develop. But not so with the end rot fungus which goes on growing at freezing temperature. Hence control lies along lines of prevention of infection in the bogs.

End rot confines itself to no particular varieties, all commercial varieties apparently being susceptible. It is generally worse in Early Blacks, Cape Cod Beauties and other berries of this type. It also does considerable damage to the Howe, also berries of the Jumbo type.

The next disease-producing organism of great importance to cranberry growers all over the United States is known as *Guignardia vaccinii*. Shear. It is regarded by many as the most destructive of all cranberry parasites. It has not been unusual in the past for this fungus to destroy as much as ninety per cent of a crop, but it may be effectively controlled by the same spray schedule recommended for end rot. *Guignardia* may destroy the very young buds and blossoms. This is known as "blast." It was first believed to be due to cold or excessive heat and other causes until the real nature of the disease was determined. Then, again, the fungus attacks immature berries, particularly along ditches or in over-moist conditions, and this injury is still believed by many to be due to a sun scald. There is no doubt that when berries are allowed to remain covered with water for a long period and subjected to a hot sun that a condition known as "scald" will develop. But this injury is far less prevalent than most growers believe it to be. In the great majority of cases the injury which growers believe to be "sun scald," "watersoaking," etc., is really due to the fungus *Guignardia*. Young green berries when subjected to protracted periods of flooding are very quickly attacked by the fungus and rapidly turn brown and take on a water-soaked appearance. On more mature berries the dis-

ease is characteristic and distinct from end rot in that the rot may start at any part of the berry, but usually at the side. The rot usually appears as a small, circular brown spot on the side, which quickly enlarges until the entire berry is involved. At times a distinct zonation of light and dark bands or target board effect is observed on the rotten spots. Affected berries turn a dark brown and continue to grow darker as they age, and they usually shrivel soon after the disease is well under way. There is never or rarely the hollow, gassy condition associated with end rot, and the diseased berries have a firmer feel. Usually they are more rubbery or pliable, and while easily crushed are not so explosive as those affected with end rot. Although the tissue of the affected berries may be broken down, it is less disintegrated and usually less watery than in the case of end rot. Late in the season old diseased berries become coated all over with minute, black pimples or blister-like bodies which are the fruiting bodies of the fungus. In these fruiting bodies the spores are produced and expelled from them when mature and carried away to healthy plants by insects, wind and water. The leaves and twigs are also killed by this fungus, the under side of the former eventually being covered with the same minute, black, blister-like fruiting bodies. The old blasted flowers and buds are also covered with the same minute bodies, giving them a black or carbonous appearance. This disease and end rot are probably the most important in the bogs of Michigan and Wisconsin.

Another disease which may be distinguished quite readily from the others by its superficial appearance is that known as "black cranberry" due to the fungus *Ceuthospora lunata* Shear. This fungus attacks the leaves to some extent but is of little importance in this connection. Its action on the fruit is very characteristic. The mature berries are affected primarily and become blotched irregularly with brown and black markings. The blackening spreads until the entire berry is inky black both inside and out. The rotten berries are usually quite tough or rubbery. The writer has observed some little of this rot in old berries left in screen houses over winter at various places in Wisconsin. The disease is of slightly more importance in the far west than in the middle west. The old black berries eventually become covered with equally black spherical fruiting bodies of the fungus. These fruiting bodies are possibly twice the size of those of *Guignardia*, but even so are very small. No particular spray schedule has been worked out for this disease, but in all likelihood should it ever become serious, the same spray schedule recommended for end rot would control it. "Black cranberry" has been observed in practically all the better-known commercial varieties.

The disease known in the past as "anthracnose" and now known under the new name of "early rot" from the fact that it develops early in the season is due to *Glomerella cingulata vaccinii* Shear. This fungus disease is far less easy to identify by the usual microscopic or superficial examination than any of those which have been mentioned above.

Yet the writer has worked in the laboratories at Washington with large amounts of berries affected with this disease and has observed certain characteristics which will enable one to recognize it. Many varieties are affected but the Howe is very susceptible and the fungus working in this variety produces a more uniform type of rot than it does in other varieties. Howe berries rotted by *Glomerella* usually show a distinct though very light brown spot of indefinite outline at some point on the berry. Usually it appears as a faint streak or blotch near the blossom end. The general color of the affected berry remains the same as that of sound berries but diseased ones have a dull or lusterless appearance. The affected berries are distinctly tough and rubbery, having a much drier rot than berries affected with diseases already described above. In fact, affected berries are not explosive as in the case of end rot, and they will withstand considerable pressure before they break. The inside of a berry rotted by *Glomerella* retains to some little degree the semblance of the original structure of the berry. Very frequently in the inner chambers of the affected berry a soft, ashen, cottony web of mold may be observed when the berry is broken open. This must not be confused with the "cotton ball" disease which will be discussed next. *Glomerella* produces its fruiting bodies on old affected berries as well as on old leaves which it has killed.

The "cotton ball" fungus (*Sclerotinia* sp.) has been observed by local growers in the Mather district. It is of some little importance in the far west where it is quite destructive of berries on young McFarlin vines. It is apparently at its worst on young plants, and as the vines mature they are less susceptible to its attacks. The fruits are infected while growing, but usually do not fall until they have reached full size, but before they have developed color. Sometimes a brownish spotting is observed on affected berries, but this is not constant. The presence of pale or whitish berries among fully colored berries will attract the attention of one looking for this disease. If an affected berry is broken open it will be found to be literally filled with a dense whitish, cottony mold. On drying, affected berries remain rather spherical, though considerably wrinkled and shriveled. They are tan or light brown in color and feathery or corky. If broken open they will be seen to still have the cottony mold inside. These old berries are a menace, for eventually the fungus fruits on them and thus propagates itself. This fungus is of the same genus and probably is the same species that attacks the young uprights in very early spring, causing them to wilt and eventually become covered with a creamy or gray powdery mass of spores.

There are many more important parasitic diseases of the cranberry, but their characteristics are so indefinite that it would be unwise to attempt to describe them on paper. *Acanthorhynchus vaccinii* Shear, *Sporonema oxycocci* Shear, *Pestalozzia Guepini vaccinii* Shear and others all have their place in a properly selected list of important cranberry parasites, but time and space will not permit of their discussion here.

A few words possibly should be said of non-parasitic diseases of the cranberry at this point. "False blossom," a non-parasitic disease is so well known in this region where it apparently originated that it may be passed by quickly with the simple statement that it seems to confine itself to no particular varieties, all being attacked to a greater or less degree. 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 particularly true in Oregon. Searls Jumbo is probably the most resistant of all commercial varieties to the disease. No wholly satisfactory remedy has as yet been discovered. The application of ground rock phosphate to the soil in some instances has been known to reduce the amount of the disease in the bogs to which it was applied. Diseased plants should be removed and burned whenever found.

Very frequently growers send frosted or smothered berries to the laboratories at Washington, D. C., believing them to be diseased. Frosted and smothered berries are so much alike in superficial appearances that it is almost impossible at times to tell just which factor is responsible for the damage. One must know the history of the berries to clear up such problems definitely. Or the location of the trouble in the barrel may give a clew. For instance if the berries in the center or core of the barrel are lusterless and wilted and somewhat sticky one may suspect smothering. But if the berries in the center of the barrel are bright and firm while the berries at the outside of the pack present a wilted and lusterless and somewhat sticky appearance we may suspect a touch of frost in transit. Smothering or asphyxiation is brought about when berries are subjected to poor ventilation. Berries packed in unventilated barrels frequently show smothering. The injury produced by frost is virtually identical in appearance. The berries become wilted but not very soft; they are rather tough or rubbery, and assume a dull lusterless appearance. However, the inner structure is not broken down. If a frosted or smothered berry is cut in half with a sharp knife the original structure of the berry will be seen to be intact—that is, the four carpels of the berry remain the same as in sound berries. The tissue, however, will be seen to be brightly colored with pigment from the skin. Sound berries are creamy white inside. The color of the cranberry lies in the region of the skin. But when a berry is frosted the cells holding the pigment are apparently ruptured and the color diffused throughout the tissue. Smothered berries display the same characteristic. Severely frozen berries do not present the same appearance that frosted berries do. Frost injury has just been described. In the case of severe freezing the inner structure of the berry is completely broken down and reduced to a watery mush. The writer has seen Cape Cod Beauties and Early Blacks reduced to a "water bag" condition that was identical in appearance with

the fungus disease "end rot." Not the slightest trace of the original inner structure of the berry remained, and the separating machines were badly gummed up in attempting to separate them from the sound ones. Severely frozen berries, while reduced to a slime or mush inside as in the case of end rot, are somewhat lighter in color than berries having true end rot due to the loss of color from the skin into the inner tissue.

In conclusion a few words concerning bog sanitation should not be out of place. The writer has observed a tendency on the part of many growers to permit their old screened berries to lie exposed throughout the year on refuse piles. This is a very serious mistake. All old berries should be buried. It will take one a few moments only to dig a shallow pit in which they may be covered with a few inches of earth. It is upon these old, exposed, festering berries that the disease producing organisms largely reproduce themselves. For the same reason old vines and prunings should not be piled up on the dikes or used to make road beds or for other purposes as is frequently the case. The writer has found from time to time the very finest specimens of fruiting bodies of cranberry fungi on old vines used to build road beds. Burn the old vines as quickly as possible. No intelligent person would permit the sputum cloths of a tubercular patient to lie around the house. He would burn them at once knowing that the disease is highly contagious and that the sputum of such patients is a menace to healthy persons. There is likewise no reason why a careful cranberry grower should permit old, diseased berries and vines to lie around since it is now known that it is on them that the cranberry disease organisms reproduce themselves.

Lastly a few old reminders that all have heard many times before but which are vital in the production of good cranberries: Handle the berries as little and as gently as possible. Use "Easers" of some sort to break the fall of the berries from the screening tables into the barrels. An old sack properly used for this purpose is better than nothing. Never pack berries wet, and keep the temperature as low as possible during all operations subsequent to harvesting. Give the berries sufficient ventilation at all times. Ventilated barrels prevent smothering and lengthen the life of the berries. Ventilated half-barrel crates have been found by experiment to keep cranberries in fresher condition than any other container of practical size. Never permit berries to lie around in the sun on the bogs after picking. They absorb heat readily and retain it for some time after the surrounding atmosphere has cooled. Warmth favors the development of disease. Lastly keep the berries in the chaff as long as possible, screening them only as required for market. Berries keep better untouched in the chaff than berries which have been screened and packed in advance for the market.

WISCONSIN STATE CRANBERRY GROWERS' ASSOCIATION.

An organization having for its objects: Improved quality of fruit, better grading, packing, and extension of market, increased consumption by making known the wholesome and medicinal virtue and value of the cranberry, better methods of cultivation, and the collection and publication of statistical and other information of interest and worth to all concerned.

January 1921, report, now ready for distribution, will be sent to all entitled to same on application to Mrs. S. N. Whittlesey, Secretary, Cranmoor, Wisconsin.

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