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## **Wisconsin State Cranberry Growers' Association. 23rd annual meeting, Grand Rapids, Wis., Jan. 11th, 1910. 22nd summer meeting, Mather, Wis., Aug. 17th 1909. 1909/1910**

Wisconsin State Cranberry Growers Association  
[s.l.]: [s.n.], 1909/1910

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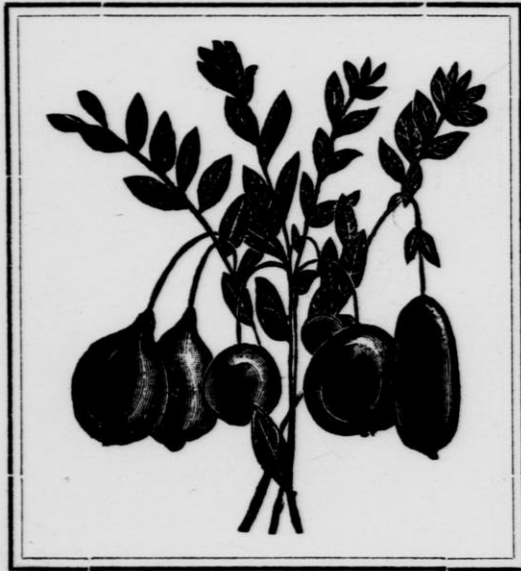
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....WISCONSIN STATE....

# CRANBERRY GROWERS' ASSOCIATION



## 23rd ANNUAL MEETING

Grand Rapids, Wis., Jan. 11th, 1910

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22nd SUMMER MEETING,

Mather, Wis., Aug. 17th, 1909

## LETTER OF TRANSMITTAL.

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To the Honorable James O. Davidson.

Governor of the State of Wisconsin:

Sir:—I have the honor to submit herewith in requirement of law, the Twenty-second Annual Report of the Wisconsin State Cranberry Growers' Association, containing papers read and discussions thereon, together with an account of moneys disbursed for the year 1909.

Respectfully yours,

Cranmoor, Wis., Jan. 28, 1910.

J. W. FITCH, Secretary.

# 23rd ANNUAL SESSION

## of the Wisconsin State Cranberry Growers' Association

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Tuesday, January 11th, 1910  
Held in Grand Rapids, Wis., Council Rooms, West Side  
President E. K. Tuttle presiding.

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### President's Address.

Members and Friends of the Wisconsin State Cranberry Growers' Association:

In large and successful business, it is desirable at stated periods to take an inventory of stock, close accounts and settle all unfinished business, making a statement of resources and liabilities. This statement compared with previous years determines the success or failure of our work and makes a valuable guide for the future.

We meet here today as Horticulturists, to take account of our knowledge, continue those things which have proven worthy and omit those things that give no promise of profit. We meet here today to settle the accounts of our experiences, bring the balance down for future use and, if possible, determine what progress has been made since our last meeting.

We know the ups and downs of our August meeting. Ask Dr. Johnson. The following are among the many questions naturally arising for our consideration today:

Have our bogs improved in quality and quantity?

And what suggestions can be made as to more promising varieties?

What about fertility of soil to produce crop and not over abundance of vines?

Clean, culture, insects.

Sanding, pruning and mowing.

Necessity of preparing bogs so as to harvest the crop at lowest price possible, in order to compete with Eastern growers.

Marketing.

Out of justice to consumers something might be said as to proper time to commence harvest.

The strife for pickers and fear of frost has driven some growers to want to commence harvest before berries are mature or half grown. These berries are a loss to growers and a detriment to consumption of berries.

On the other hand.—There are three things we have met here to do first, for the advancement and general welfare of the Society; second, for the mutual good received and the benefits to be derived from the interchange of thought and comparison of experience in regard to marketing and growing cranberries; third, the enjoyment of the society of each other.

We hope that the papers which will be presented here will be freely discussed and criticized; we want discussion for in this way we get valuable thoughts from some of these older growers to take home with us, and hope all will feel not only at liberty but will feel it to be a duty to freely discuss any questions that may come up for our consideration. E. K Tuttle.

### Minutes of 22nd Annual Session.

The twenty-second annual meeting of the Wisconsin State Cranberry Growers' Association was held in the Council Rooms, Grand Rapids, Tuesday, January 12, 1900. In spite of the severity of the weather there was a good attendance of growers.

President A. E. Bennett called the meeting to order at 9:30 The minutes of the previous meetings were read and accepted, also the reports of the Secretary and Treasurer, and the president appointed M. O. Potter, C. R. Treat and Richard Rezin a committee to audit the same.

The election of officers resulted as follows: President, E. K. Tuttle, Mather; Vice President, Oscar Potter, Grand Rapids; Secretary, J. W. Fitch, Cranmoor; Treasurer, J. J. Emmerich, Cranmoor; Member of Executive committee, S. A. Warner, Warrens.

The Secretary read a letter from Dr. C. L. Shear expressing regret that he was unable to be present at the meeting, that he might be able to attend the summer meeting, and stating that he would be pleased to send a short paper on Blossom Blight or Blast.

Dr. Shear's paper was read by the secretary and brought out many interesting and helpful points.

Prof. A. R. Whitson said that on account of illness and extra work he had not prepared any special paper, and as Dr. Shear's paper had covered some of the points he had in mind, he would again discuss them briefly.

Mr. O. G. Malde gave the results of the years work on the station which showed that methods advocated were a great improvement over the old methods.

Mr. Charles L. Lewis Jr. of St. Paul, Minn., sent a very interesting paper of his impressions of the industry gained from his summers work at the experimental station.

Mr. A. C. Bennett addressed the convention on the subject of Ditches, Dams and Sluices, and gave the growers the benefit of his many years experience, explaining in detail and with models some new ideas, in constructing the same.

Mr. O. G. Malde, who had superintended the laying out of the Lewis

bog in northern Wisconsin, read a paper on the possibilities for cranberry culture in northern Wisconsin which was very favorable to that region.

Hon. J. A. Gaynor read a paper on "How to Insure Keeping Qualities."

The report of the committee on The Nomenclature of the Cranberry read by O. G. Malde caused so much discussion that it was moved and seconded and carried to increase the committee by adding thereto M. O. Potter, A. C. Bennett, Clarence Searls and G. W. Paulus to the old committee, (O. G. Malde, C. B. Hardenburg and J. A. Gaynor) and have it report at the August meeting.

In regard to further advertising Hon. J. A. Gaynor thought that prices were too high now, that what was wanted was to raise more berries.

Mr. Andrew Searls said that as a number of our growers were suffering from lack of water, he felt that any money on hand could be best spent in testing the possibilities of getting water from beneath the first layer of clay, that he felt quite sure, there was a supply there, a three or four horse engine could pump from to supply sufficient water for flooding purposes.

It was moved, seconded and carried that a committee of four be appointed to confer with the officers of the station for the purpose of testing the possibilities of this means of obtaining water. The President appointed A. Searls, M. O. Potter, J. A. Gaynor and C. R. Treat. There being no further business the meeting adjourned. J. W. Fitch, Sec'y.

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### Report of Secretary.

Mr. President and Members:

It is certainly most encouraging to see so many growers present today and speaks well for the future of the industry, and it is not without the range of possibilities that, under improved methods, the necessity of which, the past two disastrous seasons, have brought so clearly to the attention of the growers, Wisconsin may, in the future, be a close rival to the east for the supremacy of the business. In regard to the low prices which prevailed the past season, it is safe to say that the high cost of necessities made many people feel that cranberries were a luxury even at low prices, and if no berries have to be dumped but pass into consumption, it will greatly widen the market for future crops.

The number of paid members, including the life roll, was 96.

Receipts from dues..... \$34.50

#### DISBURSEMENTS.

Order No. 136 Feb. 17, 1909 to Mrs. S. N. Whittlesey, labor and supplies August, 1908 convention.....\$49.75  
Order No. 137 March 23, 1909 to Grand Rapids Tribune, reports and printing..... 47.25  
Order No. 138 Jan. 11, 1910, to Grand Rapids Tribune, August invitations ..... 2.75  
Order No. 139 Jan. 11, 1910 J. W. Fitch, postage and salary 99.20  
Order No. 140 Jan. 11, 1910, Am. Well Works for supplies for

pumping experiment..... 151.80

Total

\$350.75

J. W. Fitch, Secretary. Jan. 11, 1910.

**Statement of Account of Wisconsin State Cranberry Growers' Association with J. J. Emmerich Treasurer.**

**DISBURSEMENTS**

	Dr.			Cr.	
	\$	c		\$	c
Jan. 12, 09' Blc.....	145	53	Ord. 136, Aug. '08 convention labor and supplies.....	49	75
Receipts during year 1909			Ord. 137 printing report and stationery .....	47	25
Feb. 3, State aid.....	250		Ord. 138 printing August invitations.....	2	75
Membership Fees.....	34	50	Ord. 139 secretary's salary and postage.....	99	20
			Ord. 140 for apparatus to experiment pumping.....	151	80
<b>Total</b>	<b>\$430.03</b>		<b>Total</b>	<b>\$350.75</b>	
January 11, 1910			<b>Balance</b>	<b>\$79.28</b>	

**Address of W. C. Devereaux. Weather Bureau, Milwaukee.**

"In opening his address, Mr. Devereaux said that he considered himself very fortunate to have the privilege of addressing such an intelligent body of men as the cranberry growers, men who have attracted attention all over the country due to their up-to-date methods of combating frost in the cranberry marshes. Mr Devereaux then explained the methods used in the fruit orchards in Colorado, Florida and other places in preventing frost during critical periods. In the Grand Valley in Colorado, the fruit crops amount to about three million dollars annually, and the orchards in this valley are often subjected to danger from frost. During the last season the temperature in these orchards was raised eight and nine degrees over 27 miles of territory by use of smudges. There were about 300,000 smudge pots of many different types throughout the valley. In some of these coal was used as fuel and in others oil. The operations were all directed from Grand Junction. When the conditions were such that frost was expected to form during the night, the growers all through the valley were advised to light their fires. So well did the smudge process work, that while the temperature outside of the heated area dropped as low as 20 degrees, within the orchards it did not go below 29½ degrees. 75 per cent of all the fruit trees in bloom were cared for by this method. There were about 40 to 80

pots placed on each acre, depending somewhat on the size and style of the pattern. It was figured out that the cost of equipping the heaters and other facilities for the first year is about \$45, and for the second year to maintain same about \$19 an acre."

## **Summer Rainfall in the Cranberry Region of Wisconsin.**

**Wm. C. Devereaux, Local Forecaster Weather Bureau, Milwaukee**

It is believed that this is an especially opportune time to consider the subject of the rainfall in the cranberry region. The unusual conditions which prevailed during the past season are still fresh in your minds, and therefore a comparison of the rainfall during 1909 and that of previous seasons should be of great practical value to you. If during the past season you lost a portion or all of your cranberry crop, due to the insufficient water supply for flooding the marshes when the frost was coming, it is well to determine as far as practicable whether the summer was unusually dry or a nearly normal one. You will probably answer that you already know that this was a very dry season, as you well remember the copious showers and the height of the rivers during 1908 and 1907 and the preceding years, some of you remembering the conditions for years back, but it is not always safe to depend on the "memory of the oldest inhabitants" in weather affairs. If the methods which you are now using for protecting the cranberry crop have proved ineffective, and it is found that in the past those summers have come quite often, it would seem advisable to increase the sources of water supply or change the method of protection, while on the other hand, if the season was a very abnormal one, it would not be good business to expend large sums of money in building great reservoirs that would not be needed probably more than one in a life-time.

The Weather Bureau maintains a cooperative station in practically every county in the State to obtain, among other things, an accurate record of the rainfall. I have used those reports entirely in obtaining the material for this paper, because some of the stations are located in the cranberry region. Fortunately we have two excellent stations in this region, Valley Junction and Meadow Valley, with practically continuous records since 1892. Besides being favorably located those stations have exceptionally reliable records. While it might be desirable to consider the records from a greater number of stations in a more exhaustive study of the subject, it is believed that those two are sufficient for our consideration. In fact, two rather than one, were selected to show the variation in the rainfall between two places in this vicinity 15 miles apart.

The rainfall has been charted for the months from May to August inclusive, each year from 1892 to 1909. The April rainfall is an important consideration in a few years, however it is believed that there is always sufficient precipitation during the spring months to fill the available reservoirs, and for this and other reasons the rainfall for April and for September have not been considered. The total rainfall for each of the four months from 1892 to 1909 is as follows:—



Data, Precipitation

Drought, length of  
in days

Inches

Year and Stations	May	June	July	Aug.	May	June	July	Aug.	Total
1892 Valley Junction			15	13	7.11	7.91	3.31	2.41	20.74
Meadow Valley			15	13	7.11	8.63	2.17	3.85	21.76
1893 Valley Junction		25	14		2.32	0.97	4.32	3.89	11.50
Meadow Valley	9	24	14	15	2.50	1.37	4.11	3.23	11.21
1894 Valley Junction		19	22 a	41	8.33	1.44	1.01	0.43	11.26
Meadow Valley		19	22 b	41	5.48	2.69	1.38	0.36	9.91
1895 Valley Junction			18		3.87	2.59	1.75	4.31	12.52
Meadow Valley	9	13	28	12	3.78	2.47	1.49	3.71	11.45
1896 Valley Junction			9		4.20	3.04	5.16	1.73	14.13
Meadow Valley			9	10	6.15	2.70	3.49	1.82	14.16
1897 Valley Junction			10		1.89	3.26	2.26	3.10	10.51
Meadow Valley			10		2.46	3.57	2.37	4.51	12.91
1898 Valley Junction	16		17	15	1.95	3.88	3.27	2.66	11.76
Meadow Valley	16		17	15	1.32	6.07	4.31	2.74	14.44
1899 Valley Junction			18		4.82	7.39	2.19	3.39	17.79
Meadow Valley	20		18		3.20	7.36	2.46	3.76	16.78
1900 Valley Junction		24			1.58	1.32	6.84	3.89	13.63
Meadow Valley	24	20		10	1.83	0.94	8.16	2.39	13.32
1901 Valley Junction		10		9	2.59	9.75	c4.50	1.58	18.42
Meadow Valley		11		14	2.75	5.03	7.40	1.84	17.02

a From July 21 to Sept. 5 except for 0.40 on Aug. 24th.

b From July 21 to Sept. 6 except for 0.21 on Aug. 23 and 24th.

c Estimated by W. C. D.

Data, Precipitation

Drought (length of)

Inches

Year and Stations	May	June	July	Aug.	May	June	July	Aug.	Total
1902 Valley Junction			20	16	10.64	2.94	5.33	3.24	22.15
Meadow Valley			11	16	9.45	2.35	6.53	2.39	20.72
1903 Valley Junction		22			4.88	1.84	3.40	6.28	16.40
Meadow Valley		18			5.99	1.33	5.34	7.40	20.06
1904 Valley Junction				22	5.64	4.00	3.66	1.05	14.35
Meadow Valley			30	22	4.71	5.23	1.52	1.54	13.00
1905 Valley Junction		13			7.20	6.52	4.33	4.38	22.43
Meadow Valley		13			5.96	7.20	3.12	5.69	21.97
1906 Valley Junction				7	5.43	3.95	4.03	3.68	17.09
Meadow Valley				10	5.63	7.24	3.04	2.62	18.53
1907 Valley Junction		10			3.29	2.91	9.28	7.40	22.88
Meadow Valley	15	10			3.35	2.99	11.27	6.40	24.01
1908 Valley Junction			11	15-14 a	8.40	6.59	4.92	1.73	21.64
Meadow Valley			6	15-19 b	6.30	3.58	4.56	2.14	16.58
1909 Valley Junction		13	34	7	5.33	4.20	0.99	3.89	14.41
Meadow Valley	14	19	32	7	3.24	2.82	1.32	2.52	9.90
Av.—Valley Junction					4.97	4.14	3.92	3.28	16.31
Meadow Valley					4.57	4.09	4.11	3.27	16.04

a. Followed by 25 days in September.

b. Followed by 20 days in September.

The difference between the summer rainfall at Valley Junction and that at Meadow Valley is remarkably small except during a few years. The mean rainfall for the four months, at Valley Junction for eighteen years is 16.31 inches, and at Meadow Valley is 16.03 inches, the difference being only 0.27 inch or less than 2 per cent. During the individual years, the variation ranges from less than 1 per cent in 1896 to 32 per cent in 1909, with a mean of about 10 per cent. This is comparatively small and is usually due to the larger amount of rainfall at one of the stations during one or two thunderstorms. It will be seen that the records for either station can be considered as a fairly reliable record for all places in this region. The driest summer during the past eighteen years was 1894 when the average rainfall for the two stations was 10.58 inches. In a bulletin issued by the Weather Bureau in 1897 the drought of 1894 is mentioned as the most severe one on record for this portion of the country. The second driest summer is 1909 with an average rainfall of 12.15 inches, which is only  $1\frac{1}{2}$  inches more than that of 1894. The July amount at both stations was slightly smaller in 1909 than in 1894, but the August amount was much smaller in 1894, being 0.43 inch at Valley Junction and 0.36 inch at Meadow Valley. The wettest summer was 1907 with about 23 inches at each station. The rainfall at Meadow Valley, 11.27 inches during July of this year, is the greatest monthly amount on record, and exceeds the total for May, June, July and August at the same station for 1909. Thus we find one of the wettest and one of the driest seasons during the past 18 years only two years apart, and so recent that you have a clear impression of the extremes to be expected in the vicinity.

It is important that we consider the length of the dry periods during the summer as well as the amount of rainfall. Your reservoirs must be large enough to store sufficient water to last during the longest dry period. I have charted the periods of more than ten days duration for the past 18 years when the rainfall was not enough to cause any runoff. It is difficult to fix a definite amount of rainfall as the least that will cause a runoff since so much depends on the kind of soil, the length of the dry period, and the rate at which the rain falls. Roughly, I have used 0.25 inch as the least amount to be considered in this discussion, where it has been preceded within 10 or 15 days by copious rains which at least saturated the soil. This limit has been increased as the length of the dry period increased, and all the other modifying influences have been carefully taken into consideration.

1802 1803 1804 1805 1806 1807 1808 1809 1810 1811 1812 1813 1814 1815 1816 1817 1818 1819 1820 1821 1822 1823 1824 1825 1826 1827 1828 1829 1830 1831 1832 1833 1834 1835 1836 1837 1838 1839 1840 1841 1842 1843 1844 1845 1846 1847 1848 1849 1850 1851 1852 1853 1854 1855 1856 1857 1858 1859 1860 1861 1862 1863 1864 1865 1866 1867 1868 1869 1870 1871 1872 1873 1874 1875 1876 1877 1878 1879 1880 1881 1882 1883 1884 1885 1886 1887 1888 1889 1890 1891 1892 1893 1894 1895 1896 1897 1898 1899 1900

Valley Junction, Rainfall

Seasonal Average 16.31

Monthly

Meadow Valley, Rainfall

Seasonal Average 15.04

Monthly

Longest dry periods exceeding 10 Days

41

34

10 Days

The length of the dry periods has been practically the same during the past 18 years at both stations, and therefore only one chart has been prepared, showing the longer period in all cases where there was a difference in the records at the two stations. Of course many of those periods cover portions of two or more months, but for convenience the record is placed under the month having the greatest proportion of the time.

The longest dry period during the past 18 summers was 47 days in 1894, from July 21st to September 6th. During this time practically the only rain that fell at either station was 0.40 inch at Valley Junction on August 24th, and 0.21 inch at Meadow Valley on August 23d and 24th. There were unusually long dry periods also in June and the first two decades of July of that year. The summer of 1909 was the second driest one on record, as shown by the length of the dry periods and also by the amount of rainfall. At Valley Junction in May 1909, there was only a slight rainfall from the 2nd to the 14th, but on the 15th 2.51 inches fell. Other dry periods during the past summer were 17 days from June 23rd to July 9th, and 34 days from July 11th to August 13th. The rainfall at Valley Junction on July 10th was only 0.59 inch, and this was probably not sufficient to produce any runoff, and in that case the dry period during the past season would extend from June 23rd to August 13th, making 52 days, which exceeds the record of 1894. However, at Meadow Valley, Mather, and other places in the vicinity, there was about an inch or more of rainfall between July 9th and 12th, and so the diagram has been made to show two dry periods rather than one. The length of the dry periods, both at Meadow Valley and Mather last summer was practically the same as that at Valley Junction.

Daily Precipitation, May to August, 1909.

Experiment Station near Cranmoor.

1909	May	June	July	August
1	T	0.40	0	0
2	0	0	0.05	0
3	0	0	0	0.01
4	0	0.21	0	0
5	0	0.23	0	0
6	0	0.25	0	0
7	0	0.39	0	0
8	0	0	0	T
9	0	0.04	0.32	T
10	0	0	0	0.92
11	0	0	0.49	0.03
12	0	0.03	0.01	0
13	0	0.15	0	1.49
14	1.17	0	0	0.01
15	0.52	0	0	0
16	0.00	0.47	0	0
17	0	0	0	0
18	0	0	0	0
19	0	0	0	0
20	0	0	0	0
21	0	0	T	0.56
22	0.03	0.46	0.19	0
23	0.24	0	0	T
24	0.00	0.01	0	0
25	0	0	0	0.04
26	0.05	0.03	0	0
27	0.00	0	T	0.49
28	0	0	0.03	0
29	0.06	0	0	0
30	0.00	1.04	0	0
31	0.51		0	T
<b>Sums</b>	<b>2.58</b>	<b>3.71</b>	<b>1.09</b>	<b>3.55</b>

In conclusion, I would say that so far as shown by the rainfall records the summer of 1909 was one of the driest during the past 18 years in the cranberry region, it being practically the same as 1894. It is the kind of a season that will come occasionally to this vicinity, it being 15 years since the preceding dry season. It represents the extreme, and if you are able to obtain a sufficient water supply for a season like 1909, you may feel reasonably secure as far as the water supply enters into the cranberry industry.

W. C. Devereaux.

As Mr. C. B. Hardenberg's paper did not come in time the following resume of Mr. Hardenberg's address was furnished by Mr. O. G. Malde.

### Summary of Insect Work for the Season of 1909.

As the growers have already been told of the work of insect investigation in connection with the experimental work at Cranmoor which has been carried on for a threefold purpose. First, in working out the life histories of cranberry insects; second, through the study of the occurrence and extent of insect parasitism as concerning cranberry pests; third, methods of control and prevention of injuries caused by insects.

After a season of great abundance (1908) the insect enemies of the cranberry were greatly reduced in number, in fact in the region around Cranmoor some seemed to be practically absent. This refers particularly to the yellow headed cranberry worm (*Peronea minuta*, Rob.), of which not a sufficient number of specimens could be secured to furnish material for breeding purposes. The different species of *Archips* (so abundant last season) were also very scarce this year, and only were bred from larvae found on the cranberry vines. This *Archips* is the large leaf roller so abundant that practically a new enemy in 1908, (oblique banded roller).

A heavy infestation of the black-head cranberry worm (*Eudemis vacciniana*) on the bog of Mrs. Ralph Smith furnished us with an abundance of material, and very complete data has been secured concerning the life history of the second brood of this insect.

The egg laying of the black head as observed has shown that 91 eggs could be deposited by one female.

Breeding experiments and observations on the bog, under natural conditions have given us a fairly complete account of the life history of the cranberry fruit worm and have shown us that in some respects the opinions thus far published were probably erroneous. Egg laying has been observed on the bog under natural conditions: length of egg state determined and the hatching process observed. The number of eggs laid by one female was found to be greater than originally supposed, and some interesting facts regarding pupation have been brought to light.

The Chain dotted Geometer (*Cingilia catenaria*) or yellow cranberry looper or span worm has been found in great abundance on a piece of wild marsh. Its life history has been worked out in more detail than we have been able to do heretofore, and eggs have been secured for hatching next spring.

As you all know, Doctor C. W. Hooker was sent me from Washington early this season for assisting in experimental work and he has taken charge of the investigations along the line of parasite determination.

From the data thus far gathered along the line of parasite investigations it is plainly evident that the grower cannot depend upon parasites to keep the insect pests sufficiently in check.

Although the infestations by the fruit worm have been very light this season (the highest degree of injury noted being 13 per cent on some of the

unsprayed areas), our spraying experiments both at the Experiment Station bog and on bogs outside of the Cranmoor district have given results which are in accord with the data previously obtained and have shown conclusively, that given a marsh in a condition approaching clean culture, **SPRAYING IS AN EFFECTIVE MEANS OF CONTROL FOR THE FRUIT WORM.** On the bog of Mr. Rudolph Steenbeck, where spraying on a large area was attempted, injury by fruit worm was reduced two from 12 per cent for unsprayed areas to .88 or less than 1 per cent on the sprayed sections.

On the bog of Mr. Geo. Gebhardt at Millston, Wisconsin, where the entire marsh was sprayed with the exception of a few areas, reports "from complete failure to complete success," and the results on the Experimental Station, though not so striking on account of the small sections sprayed, showed beneficial results.

A series of experiments planned at the beginning of this season in the use of water as a check at the time of the emergence of the millers, had to be abandoned, owing to the fact that no water for flooding was available during the past season, which you all know was quite dry, and it would not be practical for us to apparently waste water for this purpose as we had no means of getting the water back so as to use it more than once, and it is hoped that the Station may be equipped with a pump the coming season so as to facilitate such experiments and so be able to use the water for more than one experiment.

Next year (which will perhaps be our last year of cranberry insect investigations in the state of Wisconsin) we shall probably discontinue spraying at the Station bogs for experimental purposes, as our results have been practically the same for the three past seasons, but direct all our energies toward cooperation with outside parties who desire to try spraying and to demonstrate wherever is necessary the methods to be found most practical for spraying on a commercial scale.

We hope in the early part of the season to have contracts or agreements drawn up with such parties as wish to cooperate with us in the spraying and thus be able to start the work early enough in the season to avoid any injurious results from too much rush or too late application of any spraying experiments that may be tried.

We hope to conduct some of these cooperative experiments in the Cranmoor district and also in the Mather and Warrens districts.

## **Report of the Cranberry Experiment Station for the Season 1909**

**O. G. Malde, Superintendent**

Members of the Wisconsin State Cranberry Growers' Association:

The cranberry season of 1909 has been a very successful one for the Station. During the early part of the season vigorous vine growth was secured and also a good setting of fruit.

The drought during July and August was rather detrimental to the very best results at the Station, owing to the experimental plots becoming abnormally dry, and therefore undoubtedly affecting the size of the fruit

which was raised.

Had the reservoirs contained ample supplies of water the Station would have been reflooded at intervals of one or two weeks as it may have seemed expedient for the good of the crop. Such a reflooding I would have made use of in the evenings by letting on water sufficient to cover the bog one inch, then shutting off the supply and allowing the water to settle into the bog, thus giving practically the same results as would have been obtained from a good rainfall.

It can practically be said that light frosts occurred in each of the five months of the growing season on the average Wisconsin bog. There were some nights when the minimum reached 32 degrees F. or  $32\frac{1}{2}$  degrees F. that necessitated flowage as there was too much of a risk for the grower to allow such low temperatures to prevail when it was not known just how low the temperature might drop. The severe frost the nights of Aug. 31 and Sept. 1, arrived at such a time that only a few, with the very best natural or artificial advantages, such as the best reservoir facilities or with well equipped pumping outfits could hope to escape severe loss.

Probably no one dared try to get along without flowing, while but six or eight bogs in the state had an ample amount of water in their reservoirs to adequately protect their crop.

On the Experiment Station no water was used for flooding between the dates of May 5 (when the winter flood was dropped) and the time when the crop was harvested, Oct. 8.

Only one other instance do I know of where an area that could have been flooded was left unflooded, and that was a 4-acre tract, rather thinly vined and with one inch of sand on it. The whole area escaped injury from frost. This was a small area of Mr. A. Searls & Son's bog at Walker, Wisconsin.

It must be remembered that on the experimental station where approximately no damage was done on the nights of Aug. 31 and Sept. 1, two small areas, one low, heavily vined and with about three-fourths of one inch of sand, was damaged some 60 per cent, while another, rather high, thinly vined, and with three inches of sand, some 25 per cent damage was done. On other parts of the Station not 1 per cent of damage could be estimated.

It must be remembered, however, that this escape from the frost was not altogether due to the sand, but the fact that the areas had been kept clean from grasses and thus allowed the fruit to ripen and color up much more than the fruit on the average bog. In fact the Station crop could have been harvested Aug. 25 in as ripe a condition as the average Wisconsin crop is when harvest starts, Sept. 8.

During the five months of the growing season of 1909 there was a total of 14.68 inches of rain as against 18.90 in 1908. The AVERAGE MONTHLY RAINFALL FOR THIS PERIOD IN 1909 is  $\frac{3}{4}$  INCH LESS than for the AVERAGE MONTHLY RAINFALL FOR THE PREVIOUS FIVE SEASONS.

The following table shows the dates of the minimum for each of the months of observation in 1909, and compares the minimum at the Station



and on the Gaynor Cranberry Co. bog where observations have been taken the past four seasons. In degrees F.

Table No. 1.

Minimum		Date
Gaynor Co. -6 2''	Station Sec. F. V. 2''	
18	19	May 10
32	37	June 18
32.8	39	July 19
27.6	35.0	Aug. 29
21.2	27.2	Sept. 30
5.7	13	Oct. 19

(Note: Max. range in the Minimums of two locations noted for season.)  
(18.0 : 32.5 : Oct. 1)

Table II, showing fluctuations on three plots on the Cranberry Station and two on the Gaynor Co. bog.

Air temperature for frost of Aug. 31 and Sept. 1, taken during night at hour indicated.

Location	August 31			Sept. 1		Sept. 2	Sept. 3
	hr. 6:30 p. m.	hr. 8:50 p m	hr. 10:30 p m	hr. 1 a m	hr. 5 a m	hr. 5 a m	hr. 5 a m
Exp. Sta.					Min.		rain. 17'' Min.
Sec.—F V 2'' over surf.	49.8	36.3	34.4	27.8	27.3	28.5	51.4
F—V 7'' above surface	50.5	39.8	35.5	29.2	28.8	29.1	51.4
F—V 3' above surface	51.0	38.9	36.8	30.5	29.4	29.4	51.2
B—2'' above surface	47.9	36.9	32.8	29.2	26.9	28.5	53.5
K—2'' above surface	49.0	34.5	30.5	28.8	27.4	26.6	51.5
Gaynor Co.							
—6 2'' above surface	48.5	28.7	26.0	25.3	24.0	26.2	51.5
—6-7'' above surface	49.5	31.6	29.0	25.0	25.0	water on 27.9	51.8
—6-3' above surface	49.4	36.2	35.5	27.8	27.2	water on 28.2	49.9
—2-2'' above surface	48.9	29	26.9	23.7	20.0	water on 19.1	50.7

On the Experiment Station the crop was about 100 to 105 barrels, including the crop from the nursery plots. Only seven barrels of this is from areas that did not bear in 1908.

The so-called blight was hardly perceptible the past season, and what there was acted just the reverse of what has commonly been observed in that it was the LATE blossoms instead of the EARLY ones that blighted. After doing some comparative work with the past season's, as regards temperatures and general conditions, of the atmosphere, compared with some of the seasons previous, it is hoped we may get closer to the real cause of this so-called blight.

The insect problem, as Mr. Hardenberg has told you, also was of little importance the past season.

For the state, it is safe to say that between 50 and 60 per cent of the 1909 crop was damaged by frost, and the remaining 40 or 50 per cent was much below the normal in keeping quality. The Wisconsin crop as marketed represents about 5 per cent of the total output for the United States and if the crop had been harvested before the frost damage, it would perhaps have reached 75,000 barrels, and represented the normal 12 per cent of the total United States crop, as it has for several seasons past.

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.

A long Course student in the College of Letters and Science of the University of Wisconsin is now doing some thesis work on this so-called "false blossom" and it is hoped that he may further aid us in getting on the right track as to means for combatting this peculiar condition of plant growth. It is also hoped that before long the state pathologist may be interested along this line and further aid in studying out the cause and cure for this same peculiarity.

The fertilizer tests which have been carried on by the Station in previous seasons were continued the past season though no new fertilizers were applied, but memoranda kept of the condition of the vines and fruiting on areas where the fertilizers have been applied the previous season. We had hoped to try some rock phosphate during the season of 1909 but for certain reasons were unable to secure the phosphate in time for proper application and it was therefore decided to postpone this experiment until 1910, when we hope to also start experiments on a few additional bogs.

The fertilizer test as observed practically verify what has been observed in previous seasons. The acid phosphates standing first as a single fertilizer, and the acid phosphate and nitrate of soda standing first as combined fertilizers.

Rock phosphate was applied on a small area of the Arpin bog a year ago and the past season showed up very well, although the different amounts applied to areas of the same size did not show any particular difference. This is undoubtedly due to the fact that the rock phosphate is only very slowly available for the plants. At Mather the fertilizers applied on the F. Hoffmann bog, where the area treated was practically new planting, or

at least had never yielded a crop, responded very favorably in vine growth where acid phosphate alone had been applied, and still better where acid phosphate and potash had been applied. Application of nitrate of soda did not seem to make much showing in this case, showing a decided need of potash in the case of this experiment.

It is to be regretted that the cranberry growers with whom we have been co-operating on this fertilizer work do not realize the value of keeping account of the actual yield from the different areas as staked out in the experiments, for although it is true that they get all the fruit that may come as an increase on the areas, the experiment itself is practically worthless as far as Station work is concerned, owing to the fact that we have no actual data as to yields on these areas.

We have found that it will be necessary for us in further carrying on these fertilizer experiments to have the cooperative grower sign a contract in which he agrees to keep account of the actual yields in boxes or fractions of boxes as harvested from the various areas as staked out in any experiment that may be carried on on his bog in connection with this fertilizer work. We hope that the growers will see why we find this necessary and do their best in the future to cooperate in the way of securing accurate data as to yields.

On the Station nursery No. 80 was during the latter part of May, propagated to another plot of equal area for the purpose of obtaining more vines for future distribution. Another plot was this season planted to Centerville Bugle, the vines for which were secured from Mr. Geo. C. Gebhardt of Millston, Wisconsin, on whose bog, he states, these vines did not do well.

While looking over some cranberry lands in Vilas county during the latter part of the season some very fine varieties of wild berries were found and a few samples were brought to the Station for planting the coming season. Of these berries one was a moss berry, but differing from the ones found in Wood county, being a cherry instead of a bell. The other three are different types of the common cranberry.

We hope some time in the near future to get out a small publication concerning the nursery work so I will not go into further detail at this time.

During the fall of 1909 the Station planting which was over three years of age was pruned and made ready for setting some time during the coming winter or early spring and the nursery will also be sanded during the spring. We hope in this way to partially increase the yield of the Station and secure a more healthy and vigorous vine.

During the latter part of the season an engine and one of the Menge pattern of shaft pumps were shipped to the Station, from Madison, where they had previously been used, and will be installed for facilitating in pumping back any floods that we may have on the Experiment Station during the summer season.

During the part of the season there has been somewhat of a shortage of water in the cranberry district and it has not seemed advisable to use much water for flooding for insects later than June 15. We hope after the installation of the pumping plant just mentioned that we may try such

water treatments as we deem expedient and pump the same back into the reservoir when the experiment is completed, thus allowing us to use the same water for several experiments. We have arranged to put our pump in the new bulk-head which we put into our reservoir dam last season and by means of a combination of gates, we can pump the water in or out of the reservoir, or bog, as we desire.

Experiments with the eradication of weeds by the use of iron sulphate were conducted during the season of 1909 and results show that the iron sulphate 20 per cent solution, viz. 100 lbs. of iron sulphate to 50 gallons of water made a strong enough solution for killing any weeds of the rough foliage or rag weed type, when applied with a spray. On the smaller ferns and some of the sedges one spray simply seemed to give the effect of a light frost, while consecutive spraying at intervals of ten days or two weeks for three or four times was quite effective in killing the parts of this vegetation above ground. It remains to be seen, however, if the roots will continue to grow.

It is very probable that where the foliage of these plants is killed during the growing season and continued to be kept down, the roots may perhaps succumb before the season is over so that the season following they would not be in evidence.

The weed known as the "Drilecium" or by some of the growers called "star grass" and by others "leafy sedge," which is becoming quite abundant on some of the bogs of late and which is easily noticeable by its numerous stems shooting from an underground root seems to be somewhat affected by the iron sulphate but it requires several applications to successfully combat this weed, and we have not yet gone far enough to know to what extent it will assist in eradicating the same.

It is very evident that iron sulphate as a means of killing or eradicating the grasses is somewhat insufficient in strength to do the best work along this line. We hope that by the opening of the season of 1910 that we may be able to make arrangements with some of the manufacturers of the so-called weed killers or oil of vitrol (sulphuric acid) so as to test out the value of these chemicals in connection with continued experiments in the use of iron sulphate and thus be able to state more definitely the kind of article that will be most successful in cleaning the dikes and roadways on the cranberry bogs from their foreign and undesirable vegetation.

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Grand Rapids, Wis., Jan. 3d, 1910.

Mr. J. W. Fitch,  
Cranmoor, Wis.

Friend Fitch: Your letter of Dec. 12, 1909 received requesting me to give a talk at our annual meeting Jan. 11 on Sanding or the new method now being followed by myself and son. I certainly will be glad to be of service to our friends and fully realize how discouraging the past season has been to the most of the Wisconsin growers it is only a few years since I was up against the same problem, I realized then we must abandon methods being followed in the west and get down to business, I must make good I

must abandon at least for the time broad acres and be content with a few sure acres, I realized our dams were defective and wasteful of water I drew sand winter times and built substantial sand dams. I had a heavy growth of grass growing among my vines I dug it out, not until I had spent considerable sums trying to pull it out and in other ways trying to get rid of the grass, I also had a heavy growth of feather leaf and wild sage and some willows the combination was something fierce. As fast as I was able to get a piece cleared of these foreign growths I sanded at first as heavily as 2 inches, which I soon found was far too heavy a covering to apply on vines. The next trial was one inch which still seemed too much partly owing to the vines not having been properly dressed up. Our present method of treating vines is first take out all grass and feather leaf and any other like growth, then with a common hand hay rake comb the vines out in as natural standing position which is a leaning to the southeast, being careful to shake out all clusters of vines. They are now ready for the sand. It has been our custom or rather we are compelled to draw our sand hauling during the winter months and usually towards spring when the snow is hard so the sand may be spread evenly. When the snow and ice melt in the spring the sand sifts down through the vines without weighting them down and covering them up if the work has been done carefully.

After a summers growth the vines should be pruned lightly, the berries having been gathered by hand care being taken not to pull or tear the vines up. The following winter it is well to add another light coat of sand of one half inch, all ditches being deep enough to insure good drainage which is very important. After the second sanding there should be little danger from frosts for some years or until a very heavy coat of vines have formed. We had several acres of vines which had been treated to but one coat of one half inch of sand which went through the past season without flooding. We had other sections that are heavily vined and a full crop of berries which has been treated to more than two inches of sand which was not flooded and showed no frost injury. I think if the cranberry growers had harkened a little to Mr. O. G. Malde's reports of the experiment station they would not be feeling so discouraged.

I have been speaking of pruning. I think most of the growers have misunderstood the meaning of the word.

Most men imagine it is to thin out the vines. I admit that may be the case in some instances but in most cases all that is necessary is to cut out running vines. Sometimes where vines have got away from the ground and cannot be fastened down by sand it is necessary to do some severe cutting to put them in shape or allow a new growth of vine nearer the ground, after years, pruning being merely to trim out all runners as they only obstruct the raker or picker and of no possible benefit.

Ordinarily I would not think of using the pruner without first straightening out my vines with a hand hay rake after the picker or raker has gone over the field, if I did I should expect to cut out a great many of the stands or bearing vines for they would be more or less tangled up and so easily cut off. It has been our custom to hand rake and shake out after each harvest (we have been guilty of using a horse hay rake but hope to be

forgiven for having done such a thing along with our other sins )

Thus far I have been talking of reclaiming a marsh that has seemed to be the quickest way to results, we did scalp about one half acre of vines that have small inferior berries and applied about two inches of sand and planted a better variety. This is a very much cheaper method only we shall have to wait longer for a crop but shall console ourselves with the thought we will have a much more valuable piece of ground in three years then it would have been had we treated it as we had the remainder of our vines.

We are now ready to adopt Mr. Malde's suggestion offered us some years ago to first scalp and sand at least two inches or more (we expect to put on three inches) and plant our vines on this foundation, planting our vines in rows and keeping all grasses and weeds out by hand as the quickest and cheapest and surest road to success. We have a very expensive lesson on our hands now. The past season we planted some acres in the old way spreading the vines on the muck thinking it the quicker way to get a stand of vines. I now think from comparison it will cost us at least six times as much and doubt very much if it will be as far advanced in three years as the piece that was planted in the sand, both pieces having been planted only a few days apart or having nearly an equal start.

Mr. O. G. Malde's report on the experiment station shows I think that no frost damage has occurred for several years although no flooding excepting for early May frosts has been done for frost protection and the berries have been allowed to remain upon the vines most seasons until the last days of September or some seasons until October.

The berry's growth when they can be allowed to remain upon the vines for two weeks later than is usually allowed is another item in favor of clean culture I think. Mr. Malde's records shows a growth of about 20 per cent besides the improved grades

Our own tests have shown about the same increase in growth.

Yours truly,

A. Searls.

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## POLLINIZATION

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### U. S. Farmers Bulletin No. 317, 1908.

#### "Pollination of Forced Tomatoes."

It is a well known fact that greenhouse tomatoes do not set fruit freely during the mid winter season. The only satisfactory method for correcting this trouble is to fertilize them by hand.

It is here desired to emphasize the importance of pollinating carefully and thoroughly. In house grown tomatoes there is often a considerable percentage of one sided fruit and of small fruit which detracts greatly from the value of the crop.

The general inferiority in size of winter grown tomatoes can un-

doubtedly be attributed to the comparatively short periods of sunshine at that season of the year. On the other hand the results of station investigations along this line show that imperfect pollination is an important cause of one sided and small fruits.

While working at the Cornell station in the state of New York, W. N. Munson found that the amount of pollen used may have an important bearing in determining the size and form of the fruit. In the winter of 1900 and 1901 while crossing tomatoes two stigmas in the same cluster of flowers were given different amounts of pollen. The first was given a very small amount, 10 to 20 grains on one side of the stigma. The other was given an excess of pollen, the stigma being well smeared. The effect on the size and form of the fruit was very marked. The fruit receiving the large amount of pollen was of normal size and nearly symmetrical in form while the other was small and deformed. The larger fruit produced an abundance of seeds and all of the cells were well developed. The smaller developed seeds only on one side, while the other side was nearly solid. These experiments were repeated several times during the following winter and similar results obtained regardless of the position of the flower treated. In no case was there any fruit secured when all pollen was excluded.

The conclusions deduced from this work were that when pollen falls upon one side of the stigma only a one sided tomato always results. The larger the stigma the greater the irregularity. The amount of the pollen applied to the stigma determines to a great extent the size and smoothness of the tomato; but after applying a certain amount of pollen no further increase in size or weight results by applying more.

The small irregular tomatoes grown under glass are caused largely by insufficient pollination. All the experiments, however, do show most conclusively that the setting of a good crop of smooth heavy fruit depends very largely upon the care taken in distributing the pollen, but very little advantage was secured by cross fertilization of the tomato only a small gain in weight. Why expect even this when Burbank of California, the originator of the Burbank potato and the cross between the red and black raspberry, and many others, after many years of experience, declared that in cross fertilization only about one in fifteen thousand proved to be better than the parents that produced them. Yet the United States are paying him ten thousand dollars a year for ten years so that he may continue his investigations more extensively, and no doubt the money will be well invested.

Now having shown clearly the absolute necessity of Pollination let us now ask ourselves, as cranberry growers, the vital question by what means is the cranberry pollinated. Aside from self Pollination I know of only one insect that I am positive aids materially in that work and is producing cross pollination of the cranberry, and that is a bumble bee which I first saw on my marsh at Cameron, Wis., which was certainly gathering pollen from the cranberry blossoms and putting it in little balls on his hind legs exactly as the honey bee does. This they can only do while on the wing. They first enter the blossom and smear themselves all over with the pollen then when on the wing, going from flower to flower, they use their fore

legs like hands gathering the pollen from every part of their body and placing it between their two hind legs on the small pads with which nature has furnished them, then they rub these two hind legs together by a movement almost too rapid for the eye to trace until the pollen becomes waxy, then by crossing the hind legs one over the other, it is quickly transferred to the outside of the hind legs where it is pressed into neat little balls by the use of the bee's fore legs which it uses for hands.

About the only motion that the eye catches is the rubbing together of the hind legs. I discovered the entire process by mortally wounding a honey bee that was covered with pollen and holding it by the wings when it went through all these motions slower and slower until it died. When I first saw these bumble bees on the Cameron marsh, I was sure they were a different variety from the common upland bumble bee, and I still think so. They were smaller, very uniform in size, slimmer in body, with yellow bands, no black on their bodies. They often build their nests right on the marsh, utilizing an old marsh mouse's nest or bog or tuft of bunch grass. The past summer at the Grand Rapids marsh, I found on the upland, that apparently the big black bumble bee had mixed with the marsh bumble bee, producing some strange mixtures.

I used to think that the fruit worm miller, in hunting for a place to lay its eggs, might also aid in the distribution of the pollen, but when I came to visit some bogs in New Jersey, where there were no fruit worms, and yet producing good crops year after year, and when I came to learn that in some parts of Oregon and the state of Washington where neither the fruit worm nor the vine worms exist, although repeatedly brought there with vines from the east, they soon perished, yet their yield of cranberries per acre often far exceeds the yield of the same varieties in the east, both in quantity and in uniformity of bearing, so I had to abandon the idea of the fruit worm aiding us in pollinating the cranberry. In the summer of 1907 I noticed that the marsh at Cameron had a good many of these swamp bumble bees on it, one to every square rod on the section that I had examined, and there was a fair crop of berries that year and very little blight. The next year 1908, I do not remember of seeing any, and the crop was very light and the blight heavy. I also observed a very large number of fruit worms in Wood County in 1908, and it was predicted that a still larger crop would be here in 1909, but reports from all parts, east and west and here, showed that there were very few fruit worms.

The question now comes up How can we increase the number of these swamp bumble bees and so protect them, instead of destroying them that we may have our cranberries all pollinated every year? The little sub-tailed swamp mice which take to the water, equal to the muskrat, used to be very numerous all over the wild marshes, their run ways crossing nearly every square foot and destroying many vines in making them, but our winter flooding compelled them to take to the dams. Our burning around our marshes as a protection against fire, has materially reduced their numbers. Skunks and other animals destroy them and their nests, also the nests of the bumble bee. I am satisfied that this bumble bee is not the only insect



that helps to cross pollinate the cranberry.

But when I see a barrel of cranberries picked from vines grown from seed of the Bell and Bugle variety and find them nearly every one differing from the other I have good reason to believe that each blossom, as a rule, does not pollinate itself; if they did, I would expect to see them all uniform as peas or some kinds of beans.

I write this to induce others to watch out for others and to report facts. In order to encourage the bumble bee to locate their nests near my marsh at Cameron, I sowed alsike clover on the hard land near the border of the marsh to which the bumble bee is quickly attracted by its fragrance and the honey it produces. The bumble bee gets its pollen quicker and easier from the cranberry blossoms and uses more of it in building its nests than the honey bee does

I have given much thought to this subject and believe it is of vital importance in preventing blight and increasing our crops. Certainly without pollination there would not have been a single berry. I have no doubt in my own mind but what the imperfect crop of apples the present season is the result of imperfect pollination. If you cut these small apples open and examine them, you will find them to contain a small amount of seeds if they are not of the normal size of that variety of apples showing a lack of pollen. The object of the pulp of the apple is to feed the seeds until they are perfectly developed. When your cranberries blight next summer cut some of them open, and if no seeds are found you can be sure they have received no pollen and would not mature any fruit.

A. C. Bennett.

Mr. A. U. Chaney of New York gave a short talk on the condition of the market, also of the prospects for the future which he considered good and also gave an interesting description of the new scoop used in the East.

### **Some Important Points Brought Out in Discussion.**

Orchardists consider that one spraying is sufficient to kill the codling moth. With cranberries it is different, as unlike the codling moth the fruit worm hatches at different times but the first spray is most satisfactory. The best time to spray is one or two days after the berry is set. No eggs are laid on berries on which the petals have not fallen. The eggs are laid on the calyx cup, never on the side.

On being asked as to the cause of the lack of fruit worms the past season Mr. Hardenburg replied that the several light rains which came at the time they were emerging from the ground might have been the cause. This brought out considerable discussion as to the advisability of light flowing at this time and it is to be hoped that this cheap method will be thoroughly tried by growers. Mr. Hardenburg predicted that in 1910 and 1911 the fruit worm would be abundant.

### **Business, Etc.**

The committee on pumping reported having purchased almost every-

*On motion carried the Sec. cast the ballot for the old officers*

thing necessary for the experiment, but that on account of the cold weather it was waiting till spring to make the trial.

Mr. Malde stated for the committee on Nomenclature that he was expecting to get more material in better shape and thought it advisable to postpone the report till later. There being no further business the meeting adjourned.

J. W. Fitch, Sec'y.

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### Estimate of 1909 Crop.

East.....	350,000 bbls.
New Jersey.....	175,000 bbls
Wisconsin.....	30,000 bbls.
Total	555,000 bbls.

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## The Twenty-Second Summer Meeting, Mather, Wisconsin, Tuesday, August 17th, 1909.

The twenty-second summer meeting of the Wisconsin State Cranberry Association held at Mather, Aug. 17, 1909, was one long to be remembered by all who accepted of the bountiful hospitality of the growers of Mather and vicinity. The day was a beautiful one and arrangements had been made to have the St. Paul railroad place two coaches on one of the freights leaving Grand Rapids at seven in the morning. Both coaches were well filled by the time Mather was reached and it was a huge undertaking to transport the many members and guests to the bog of the Crauberry Moss and Peat Co., which is four miles from Mather, which is the summer home of Mr. E. K. Tuttle, President of the Association. Many of the members stopped and viewed the bog of Mr. F. G. Hoffman and were greatly impressed with the method of renewing an old bog by mowing, which many growers greatly favor.

Mr. E. K. Tuttle had a piece of McFarlins of seven acres, which had been mowed the year before, which was loaded with berries and all were greatly surprised at the heavy growth of vines.

A little afternoon dinner was ready in the cranberry house which had been beautifully decorated for the occasion, and over four hundred partook of the boundless hospitality of the entertainers and Dr. Shear certainly voiced the sentiments of all, when he said, in opening his address, that he was too full for utterance. At about half past two the guests assembled and the afternoon program was given. The president introduced the Hon. W. S. Braddock of Mather who gave the address of Welcome and spoke of the past and present history of the Association and said that Mather was glad to have them again with them, where the Association was organized.

Prof. C. L. Shear gave a most interesting and instructive address on the Cross Pollination of Cranberry Flowers and the Manner in which the Cranberry Plant Obtains its Food from Peat. This address brought out some radically different facts in regard to this matter.

Mr. Hardenburg gave a very interesting talk on the subject of Insects and laid great stress on the necessity of spraying, but said the problem was not yet solved. The grower had nothing to fear from fire worms as it could be controlled by water, but it must be taken in time, but it was a different matter with the fruit worm. He could not advise the use of water, it could be drowned when coming out of its cocoon, but it would have to be kept up for a month to get them all. Found a miller on the first of July lays 30 to 40 eggs, each worm good for four to six berries. Spraying had reduced losses of from 95 per cent and 60 per cent to 14 or 15 per cent. It don't pay to spray a foul marsh. Eggs are laid from July 1 to August 13th but it depends somewhat on climatic conditions. They lay their eggs about sunset, flying from berry to berry.

Mrs. F. R. Barber of Warrens favored the meeting with a solo which was greatly enjoyed and called forth an encore.

Mr. O. G. Malde gave a short summary of the season at the station which was more favorable than last year. The early bloom was the best, but there had not been much sign of blight in July.

Mr. A. C. Bennett was unable to be present and Judge Gaynor gave a short talk on the necessity of raising the grades of berries. The reports of the committees on Pumping and Nomenclature were postponed till the next meeting. The band from Pittsville played several selections which were greatly enjoyed.

Again all partook of a bountiful supper and teams were soon conveying the visitors to Mather where many stayed to the ball which had been arranged to close one of the most enjoyable mee ings ever held.

J. W. Fitch, Sec'y.

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## **Cross Pollination of Cranberry Flowers and the Manner in Which the Cranberry Plant Obtains Food From Peat.**

**C. L. Shear, Ph. D., U. S. Dep't. of Agriculture, Washington, D. C.**

In order to understand the abnormal or diseased conditions of plants it is very essential that the healthy or normal condition of the plant should be thoroughly known. This is true in the case of the cranberry as well as any other plant. I have, therefore, thought that it might not be entirely unappropriate to speak of one or two important features of the cranberry plant which have a direct bearing upon its health and productiveness.

As mentioned in our previous paper, the flowers of the cranberry are adapted to cross pollination by insects. Those who have carefully observed the cranberry flower have, no doubt, noticed that the small, slender pistil, with its slightly expanded and roughened apex, is surrounded by five stamens which have minute pores or openings at the upper end from which the minute spherical, whitish pollen grains, which fertilize the flowers, are expelled. If you examine the flower when it has just opened, you will find the apex of the pistil, which leads down to the unfertilized ovary, is not yet exposed but is surrounded by the anthers which project beyond it.

Examine this same flower about a day later and you will find that the apex of this pistil now protrudes beyond the tips of the anthers about one-eighth of an inch and the pollen which comes from the anther pores at this time would not, under ordinary circumstances, on account of the drooping of the flower, reach the apex of the pistil as is necessary in order to fertilize the flower. If the weather is clear you will observe bumble-bees, honey bees and sometimes other bees very busy passing from flower to flower, gathering honey. You will also notice that the bees alighting upon the nodding flowers grasp the stamens and petals with their legs and in probing for the honey at the bottom of the flower, press the end of the pistil against the thorax, thus bringing in contact with the stigma, as the apex of the pistil is called, the pollen grains, with which the under surface of the bee's body has become more or less covered in its visits to other flowers. In this way the pollen from different flowers is carried by the bees to other flowers and applied to the stigmas, and thus in a large percentage of cases, no doubt, cross fertilization of the flower is accomplished. We do not know, as yet, just how essential to the setting of fruit cross pollination in this case may be, as no careful experiments have yet been conducted to determine what percentage of fruit would set from self-pollination only. This is a subject which we hope to investigate further.

Another matter of great importance in the economy of the cranberry plant is its manner of securing its food supply. Some of you may have examined the root system of the cranberry with sufficient care to notice that the small, white root hairs, which are so abundant on the roots of a great many cultivated plants, are entirely wanting on the cranberry plant. Instead, we find a mass of very slender, much branched fibrous roots and rootlets, with smooth surfaces. In the case of many cultivated plants, like corn, which is provided with numerous root hairs, the inorganic substances dissolved in the soil water, are taken up through these root hairs and supplied to the growing portions of the plant. In the case of the cranberry, however, its method of obtaining food has been shown by investigation to be quite different. Instead of root hairs gathering inorganic material from solutions, it is provided with a means of obtaining much of its food supply from the decaying vegetable matter in the peat by means of what is known to botanists as endotrophic mycorrhiza. When sections of the rootlets of the cranberry are examined under high powers of the compound microscope, it is observed that the superficial layer of cells covering these rootlets are largely filled with a compact growth apparently of a fungous nature which, instead of causing injury to the plant, as in case of the many parasitic fungi, gives it material aid and assistance by supplying it with food material, especially nitrogenous substances which it takes directly from the surrounding humus and decaying vegetable matter which is so abundant in all good cranberry marshes. This may also help to explain what was not clearly brought out in our paper last winter in connection with the statement we made, that it was our belief that some Wisconsin cranberry marshes were suffering from an excessive vegetative development due to an over supply of nitrogenous food. Of course, in the case of most culti-

vated plants which obtain their food wholly through root hairs, an excess of water in connection with an abundance of humus, would not necessarily provide an excess of nitrogenous food materials, but in the case of the cranberry securing the bulk of its food in the way it does, the case is quite different and we are still of the opinion that too great a water supply upon a peat marsh is one of the principal causes of an over stimulation of vegetable growth which tends to produce abnormal developments of the plant, such as the so-called "false blossom," and to prevent the highest fruit production.

This method of plants obtaining food through the assistance of lower forms of vegetable organisms, as mycorrhiza, is quite general among ericaceous plants or relatives of the cranberry which inhabit marsh lands where there is an abundance of humus. Other forms are also found upon oaks, pines and various forest trees. In many cases instead of the fungus being found largely in the interior of the surface cells of the roots, it forms a thin layer over the outside of the rootlets.

This means of obtaining nitrogenous food materials through the aid of fungi, is very similar to that which is now quite generally familiar to you in the case of the nitrogen gathering nodules which are found on the common cultivated leguminous plants, such as the various clovers, vetches, cowpeas and others, and which are being so profitably utilized at present in the growing of these crops by means of artificial inoculation of the seed with pure cultures of the organisms producing the nodules.

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### Report of the Committee on Pumping.

To the Wisconsin Cranberry Growers' Association:

We, the Committee appointed at the last January meeting to investigate the feasibility and practicability of getting water out of the sand below the bogs for the purposes of supplying our bogs with water for cranberry purposes, would respectfully report, and recommend the location of one well at or near the location of the wells formerly sunk on the Experimental Station, and to secure such a well we propose to use heavy, galvanized iron in one single tube  $2\frac{1}{2}$  feet in diameter, and 25 feet long. We expect to sink this tube with a sand pump down to the clay a depth of about 32 feet, pumping out all of the sand down to the clay. We propose then to insert in the center of this galvanized pipe a six foot, six inch well screen, and surround the same with coarse gravel to the top of the well. We expect then to withdraw the casing or tube to be used again for the purpose of sinking other wells, if we deem it advisable after testing the well.

Now this proposed tube of galvanized iron will cost \$50.00. The labor for getting it on the ground and sinking it will be, we estimate about \$30.00.

The proposed well screen will cost about \$28.00.

The proposed 26 feet of 6 in. pipe and other necessaries will cost about \$70.00.

The rotary pump will cost about \$53.00.

A four horse power engine might be necessary for testing the full capacity of the well, but probably a two and one half horse power engine would be quite sufficient for permanent use on a single well at the cost of \$125.00.

We unanimously agree that work should be begun on this experiment well immediately. All of which is respectfully submitted.

A. Searls J. A. Gaynor

M. O. Potter O. G. Malde

Dated this 12th day of August, 1909.

## **A Model Screen House.**

### **Proposed Structure of the United Cape Cod Cranberry Company at South Hanson, Massachusetts.**

The following description of the proposed new screen house of the United Cape Cod Cranberry Company at South Hanson taken from the Bryantsville News will be of interest to our Wisconsin growers. Plans for the building are now completed and it is expected that two of the south sections will be built this year 1910 which, will be ample for about 15,000 barrels of cranberries and considered sufficient for several years. It will be enlarged as the new set bogs come into bearing. This will be the one store and screen house for some 500 acres of bog owned by the Company in this vicinity. It is to be built of salt glazed terracotta having a double air space to exclude moisture and provide an even temperature. The frame will be of steel reenforced concrete floors and roof, all fire proof.

The internal arrangements provide fast and economical handling of the fruit which together with the ideal location on both Main street and the railroad with private side tracks, makes up the most complete and perfect house of its kind in the country.

The Company has been figuring for some time to determine if the economics of the large house based on the present amount of fruit which the Company now raises in this vicinity, would show a profit on the expense involved in such a building. The south section will be 60 by 150 feet, two stories high, costing about \$8,000, and that if this is not built several wooden buildings must be provided at the bogs. It seems that the saving on this year's crop will warrant the erection of the new house. In addition to this must be considered the protection of the fruit, the better appearance of the berries handled under these conditions, also the advantage of quick shipments. We have already received applications from several growers for screen house facilities and have stated that we shall be pleased under proper conditions, to have the advantages of the building enjoyed by any growers during the cranberry season, or any one else at any other time which may contribute to the greater success of any grower or make the building more profitable to its owners or of greater value to the community. No new untried scheme will be installed.

Experts on the interior arrangements of packing houses have been consulted, however and many appliances successfully used by others for similar purposes will be provided here for the first time in a cranberry house.

As this screen house subject was discussed at our meeting and more fully taken up by our Board of Directors and A. U. Chaney at their evening meeting, I thought this article printed in the report might be of service to help the Wisconsin growers.

This is the way citrous fruit is handled in California and Florida. There are ten packing houses in one small place. The sorting, packing and loading on the cars is all done by experts at much less cost than the growers could do it. This makes the grades uniform and establishes a permanent reputation.

Yours truly,

A. C. Bennett.

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# Fruit Trade Journal

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NEW YORK





## Wisconsin State Cranberry Growers' Association

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

The annual due of fifty cents [which may be sent in postage stamps,] entitles one to all our reports, bulletins, crop estimates, etc., and a membership, it is believed, will be of interservice and benefit to those in any way connected with the industry.

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