CRANBERRY GROWING REGIONS OF WISCONSIN

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Richard K. Haugen

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BY

Richard K. Haugen

AN ABSTRACT

Submitted to the College of Science and Arts
Michigan State University of Agriculture and
Applied Science in partial fulfillment of
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MASTER OF ARTS

Department of Geography

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Richard K. Haugen

ABSTRACT

Wisconsin is second in importance in the national production of cranberries, producing about one-fourth of the total million barrels grown annually in the United States. Since 1945 the expansion of Wisconsin's cranberry industry has been greater than that of any other cranberry growing state.

The purpose of this thesis is to describe the similarities and differences of Wisconsin cranberry production in the three producing regions of the state. The most important factors affecting the pattern and appearance of cranberry growing establishments in the three regions are age and the physical setting. In the Central region many of the marshes are quite old and are constructed on continuously level land. The type of buildings and the uninterrupted gridiron pattern of the bogs reflect these facts. The Northwestern region is intermediate in age and the building types are not distinctive. The scattered pattern of the bogs reflects the undulating morainic topography. Individual marshes in this region are usually constructed in narrow stream valleys and have an irregular pattern. The Northcentral region is the newest of the three cranberry

producing areas. Buildings and marshes are of modern construction and reflect the mechanization of the industry in several ways. Most of the cranberry growing establishments in this region are constructed on level swampy ground bordering a lake. Marshes are widely scattered, but generally show a uniform rectangular pattern in the producing area.

The rate of expansion or the amount of expansion that can take place in the Wisconsin cranberry industry does not appear to depend to any great extent upon physical limitations or advantages. Some areas of the state are more favorable for the commercial production of cranberries than others, but usually the commercial cranberry marsh is based on an environment that approximates the conditions of a wild cranberry marsh. It has been shown that within the state of Wisconsin there is a variety of environmental circumstances in which cranberries can be and are profitably grown.

The amount of future growth of the Wisconsin cranberry industry will not be determined by limitations of the physical environment. Most of the growers in the state could double their existing bearing acreage on property they now own if the demand for cranberries would justify this. The principal governing factor in the growth of the industry has been and will continue to be the market for cranberries.

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PREFACE

This thesis is an outgrowth of a field problem in geography taken under Professor Henry W. Kolka at Wisconsin State College at Eau Claire. It was at that time I came into contact with some of the people in the cranberry business and became interested in this somewhat unique and highly specialized industry.

To acknowledge specifically all the help received from individuals during the course of this study would be impossible because of space limitations. Among these people are the growers who returned questionnaires and the many who generously stopped work long enough to show me their cranberry operation and answer questions. Individuals of county and state government, the University of Wisconsin, the National Cranberry Association, Indian Trail, Incorporated, and owners of independent cranberry growing establishments all contributed much.

Some persons were outstanding in their contribution. Dr. Charles W. Boas was my thesis committee chairman, and gave much appreciated help and encouragement throughout the development of the thesis. Dr. George L. Peltier, consultant to Indian Trail, Incorporated, gave generously of his time and knowledge throughout the field work. I am also indebted to Miss Frances Coe Reed for moral and material aid throughout the compilation, Ann Butler Reed for editing and typing the final draft, and D. John Beck, who made available the excellent cartographic facilities of the Lansing city planners office.

R. K. H.

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Chapter I

INTRODUCTION

Cranberry growing is one of the most intensive forms of agriculture in North America. This fruit was first harvested by the North American Indian who used it, together with dried meat,to make pemmican, a staple food of their diet. Since the First Thanksgiving, cranberries have become a traditional part of holiday feasts and are appearing more frequently in various forms on the American table throughout the year.

The cranberry is unique among fruit crops in many respects. Its native habitat is the moist peat bog of the cooler parts of North America. It is an evergreen vine which grows in a thick mat covering the bog surface to a depth of about six inches. Because these bogs are usually quite low in relation to the surrounding land, the cranberry is more subject to unseasonal frosts than are most fruits. Under cultivation cranberry vines are protected from frost by the application of water to the growing area, and from the winter cold by freezing in ice.

The capital investment required to bring one acre of cranberry vines into production may be anywhere from three to five thousand dollars, and up to five years may elapse before

Fig. 1. -- The cranberry plant. The picture was taken in late August, before the berries had begun to ripen.

Fig.2. -- Highway sign in the Cranmoor District. In the background a cranberry warehouse and producing bogs can be seen.

the first commercially productive harvest. In addition to the great amount of time and expense involved, profitable cranberry growing requires very specialized knowledge and equipment.

The commercial production of cranberries is confined to five states: Massachusetts, Wisconsin, New Jersey, Washington, and Oregon.[1] The eastern states have led the nation in cranberry production since the beginnings of the industry, but in recent years a greater share of the crop has been grown in the areas away from the east coast. This does not indicate a decline of the eastern industry, but rather the rapid expansion of new areas of production in Wisconsin and on the West Coast. In 1957 over one-third of the total United States production came from Wisconsin, Washington, and Oregon.[2] The expansion of the cranberry industry in Wisconsin has surpassed all other areas since 1945. In 1957 Wisconsin growers reported 4,000 acres of bearing vines,[3] about one-fourth of the national total.[4] There are about 150 growers in the state.

Statement of Problem

The purpose of this thesis is to describe the similarities and differences of Wisconsin cranberry production in

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[1] Wisconsin Crop Reporting Service, Cranberries of Wisconsin Special Bulletin No. 70, (Madison: Wisconsin State Department of Agriculture, December 1957) p. 17.

[2] Ibid., p. 19.

[3] Bearing vines are generally considered to be those five years old or more which have produced berries in commercial quantities.

[4] Wisconsin Crop Reporting Service, op.cit., p.19

three producing regions of the state.

The geographical pattern of the Wisconsin cranberry industry is examined in relation to its physical and cultural setting. Topography and drainage, climate, vegetation patterns, and soils are presented as being the primary physical factors affecting the geography of Wisconsin cranberry growing. The historical development of the present areal arrangement of the industry, characteristics of cranberry growing establishments within each region, growers' associations and marketing of Wisconsin's cranberries are presented as the principal considerations of a cultural nature.

The three cranberry producing regions of Wisconsin are the areal basis of description. The Central region consists of the concentration of bogs on the lacustrine plain of Glacial Lake Wisconsin and includes Wood, Portage, Jackson, Monroe and Juneau Counties, which together account for about three-fourths of the state production. The Cranmoor district in the south-central part of Wood County produces about one-third of the state's cranberries.

The second ranking area of production is in the North-central part of the state, including Vilas, Oneida and Price Counties. Most of the recent expansion of Wisconsin's cranberry industry has taken place in the Northcentral region, which now produces about one-seventh of the state's total crop.

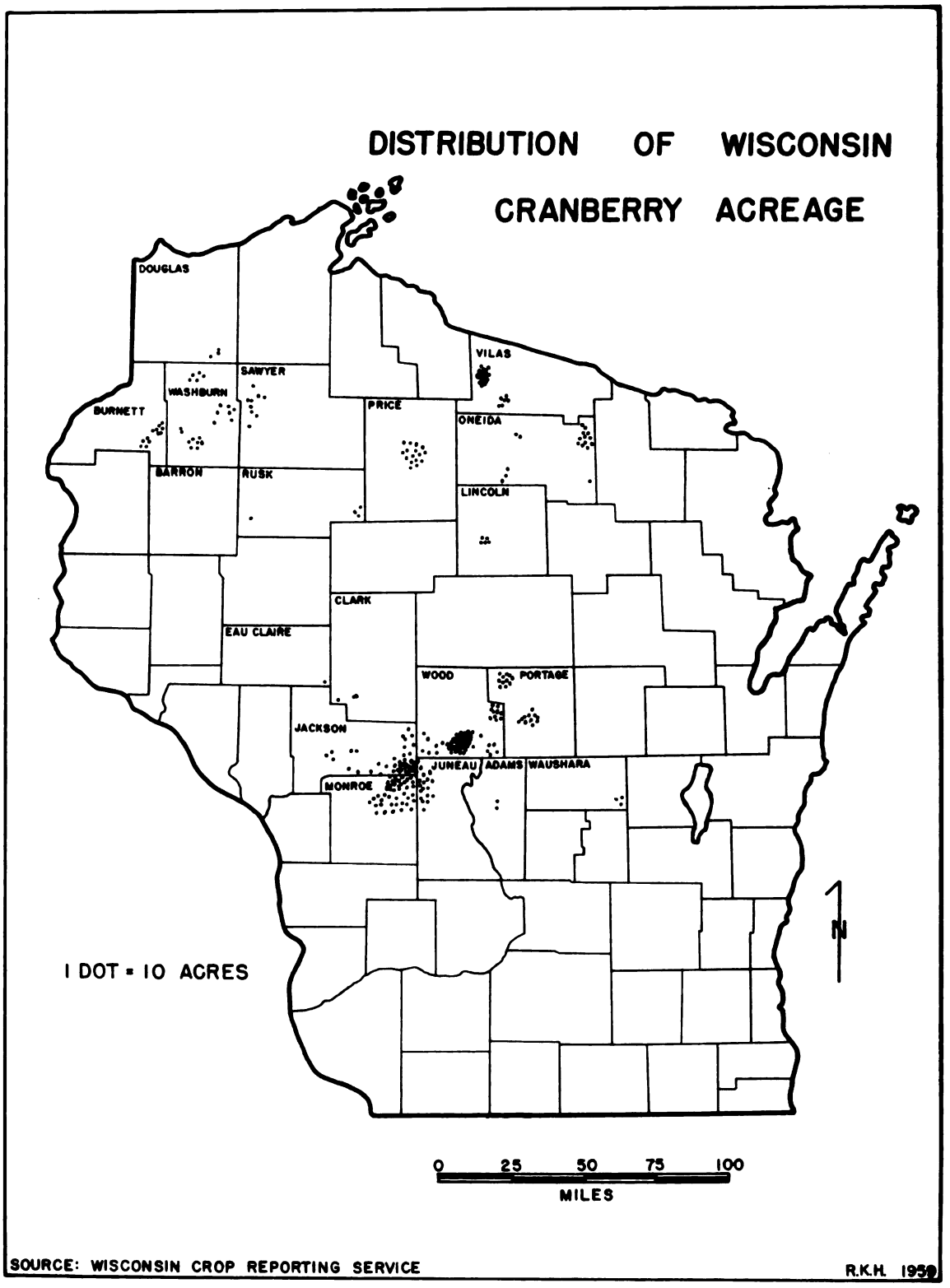

Fig. 3. Distribution of Wisconsin Cranberry Acreage.

The Northwestern region, with most of the bogs in Burnett, Washburn and Sawyer counties, and some acreage in Douglas, Barron and Rusk counties, produces about one-tenth of the state's cranberries. The first expansion of the industry into northern Wisconsin took place in this region.

An additional region is treated in the historical sense in that it was the first area of production of the state. It is near Berlin on the bed of Glacial Lake Oshkosh. Although present day production of this region is insignificant, at one time it was the most important of the state.

Methods of Investigation

This thesis is based largely on field work conducted during the summer of 1958. During the course of this study, approximately forty individual cranberry marshes representing the three producing regions of the state were visited. Interviews with the owners and foremen of these marshes were a major source of information, especially that pertaining to problems and variations in cultural practices in the different producing regions of the state.

Only one instance was found where commercial cranberry marshes were visible from a highway. This was on State Highway 54 in the southern part of Wood County, where it passes

through the Cranmoor district. Here, in a stretch of about five miles, one can see the buildings and producing area of five or six cranberry establishments. Quite often the individual grower places a sign on the highway indicating the presence of his marsh on a road leading off into the woods, but this is the closest most casual motorists come to seeing a cranberry marsh.

The isolation of the producing areas within the state is seen to be a definite disadvantage to the industry, for people are not constantly reminded of its existence , as they are of most agricultural production. Even a tourist rushing through the state at top speed could hardly escape noticing that he is passing through an area noted for dairying and general farming. Only a relatively astute observer would notice that he is passing through a cranberry producing area in Wisconsin.

Many natives of the state living within an easy Sunday's drive of several cranberry bogs had never seen one, although most said they would like to see such a farm someday. Most people not directly associated with the industry expressed considerable surprise to learn that Wisconsin is the second most important cranberry producing state.

Many of the bogs were visited while traveling with Dr. George L. Peltier, consultant to the Indian Trail Growers

Fig. 4. -- A sign such as this on one of the state highways is usually the only indication of the presence of a cranberry bog ever seen by the passing motorist.

Fig. 5. -- Sign erected by a group of cranberry growers on a township road in the Northcentral region. There is no indication of these marshes on the state highway, six miles away.

Association. Dr. Peltier generously supplied much of the technical and historical information, based upon his many years of experience with the cranberry industry.

Photography was a major tool of description throughout the field work. The forty-seven pictures appearing in this thesis have been edited from a total of more than 200 photographs, and are felt to be the most representative of the geographical setting of the Wisconsin cranberry industry.

Mapping of individual bogs in both field and office is based on aerial photography of the United States Department of Agriculture and the United States Forest Service. Although a few of the photographs were purchased, most were borrowed either from the growers themselves or from agencies of the counties in which the bogs are located. Where possible, the photography was field checked and developments which have occurred since the photos were taken, were added. United States Geological Survey topographic mapping does not cover most of the cranberry growing area in Wisconsin, therefore this source was seldom used.

Statistical and much of the other factual material was obtained through agencies and individuals connected with the University of Wisconsin. Some unpublished data were also obtained through this source.

In February of 1959 a questionnaire was sent to all members of each of the two growers associations in the state. The response to this questionnaire was excellent, with a 55 per cent return. Growers representing approximately 3,000 acres of the total 4,000 acres of cranberries in the state were contacted either through the questionnaire or by personal interview during the course of this study.

CHAPTER II

THE PHYSICAL ENVIRONMENT

Topography and Drainage

The pattern of cranberry growing in Wisconsin reflects to a great extent the differences in the glaciated and unglaciated landscape of the state. The drainage patterns associated with the moraine, outwash deposits, glacial lake beds, and the Driftless Area all have had their effects upon the nature of cranberry growing in the state. Variations in the physical setting from place to place pose special problems to the cranberry grower and have brought about differing agricultural techniques in the various regions.

In the northern producing regions most of the bogs are widely scattered and occur on the ground and end moraines of the Cary Substage of the Wisconsin Glaciation. There are hundreds of lakes in these regions formed in shallow depressions in the moraine or hollows in small outwash deposits. The drift mantle is quite deep here and there are few, if any, rock basin lakes. The swamps of the northern regions are of two types, those which are formed by the filling in of lakes by vegetation, and those resulting from poorly drained flat areas in the diverse glaciated

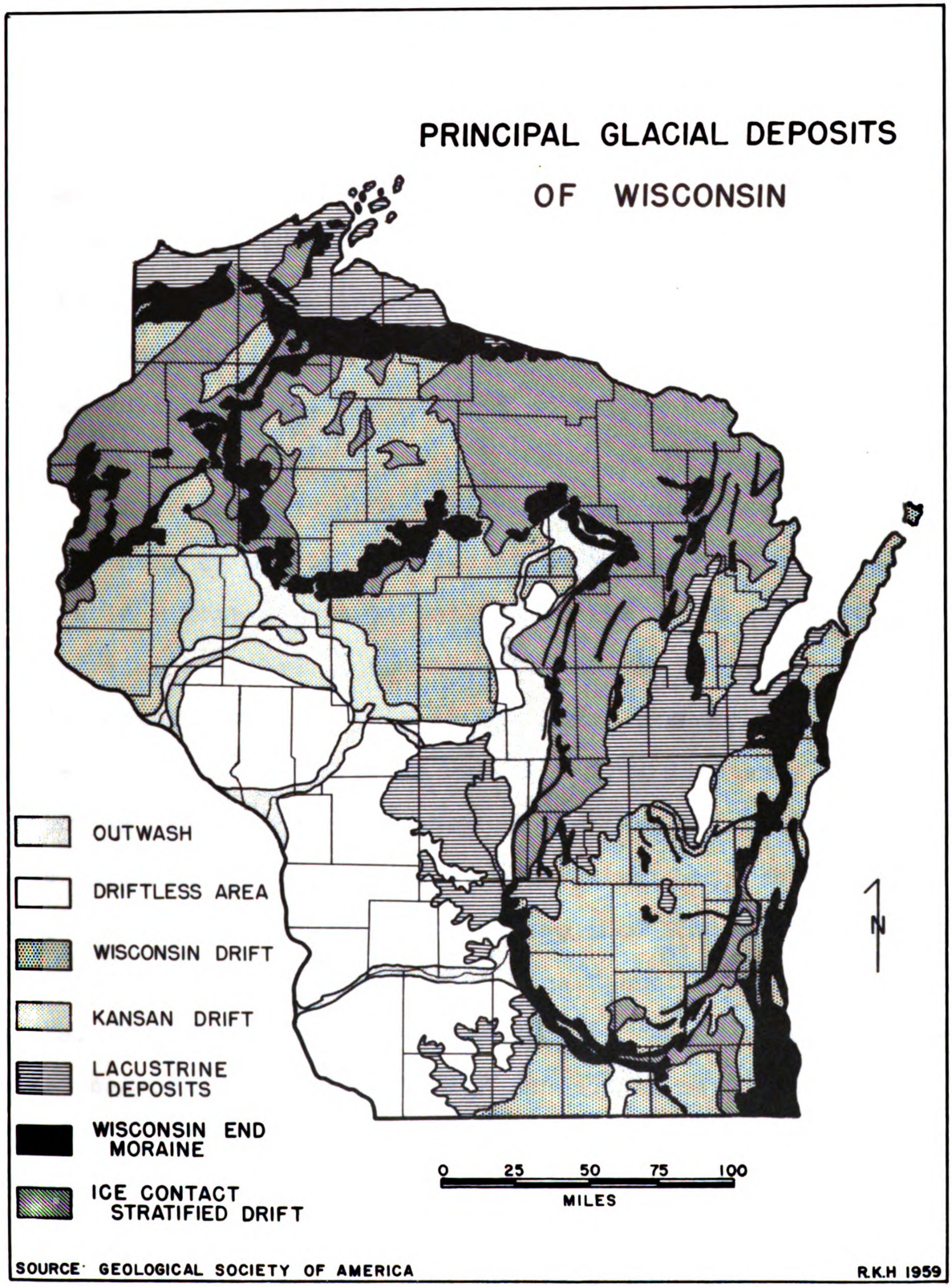

Fig. 6. Principal Glacial Deposits of Wisconsin.

landscape. The greater portion of the swampy land appears to owe its existence to the latter cause.

Throughout the northern part of the state the predominating underlying material is an unstratified glacial till of Cary age, although in numerous depressions and stream valleys stratified gravels of valley trains are to be found.

The Central Wisconsin cranberry producing region is found mostly on the bed of Glacial Lake Wisconsin and continues in a more scattered pattern to the south and west. The glacial lake bed is now the site of the Great Swamp of Central Wisconsin. This is the largest swamp in the state--over 300,000 acres in extent.[1] The cranberry industry is the economic mainstay of the area which is otherwise unproductive except for some forestry and moss gathering. To the west of the swamp the bulk of the lake bed is flat to gently rolling sand with dune formation in some parts. The greatest part of the lake bed has a cover of mixed oak-coniferous forest with occasional swampy openings.

The general area occupied by the bed of Glacial Lake Wisconsin can be visualized even on a state highway map.

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[1] Lawrence Martin, The Physical Geography of Wisconsin, Wisconsin Geological and Natural History Survey, Bulletin No. XXXVI, Educational Series No.4 (Madison, Wisconsin, 1916), p. 343.

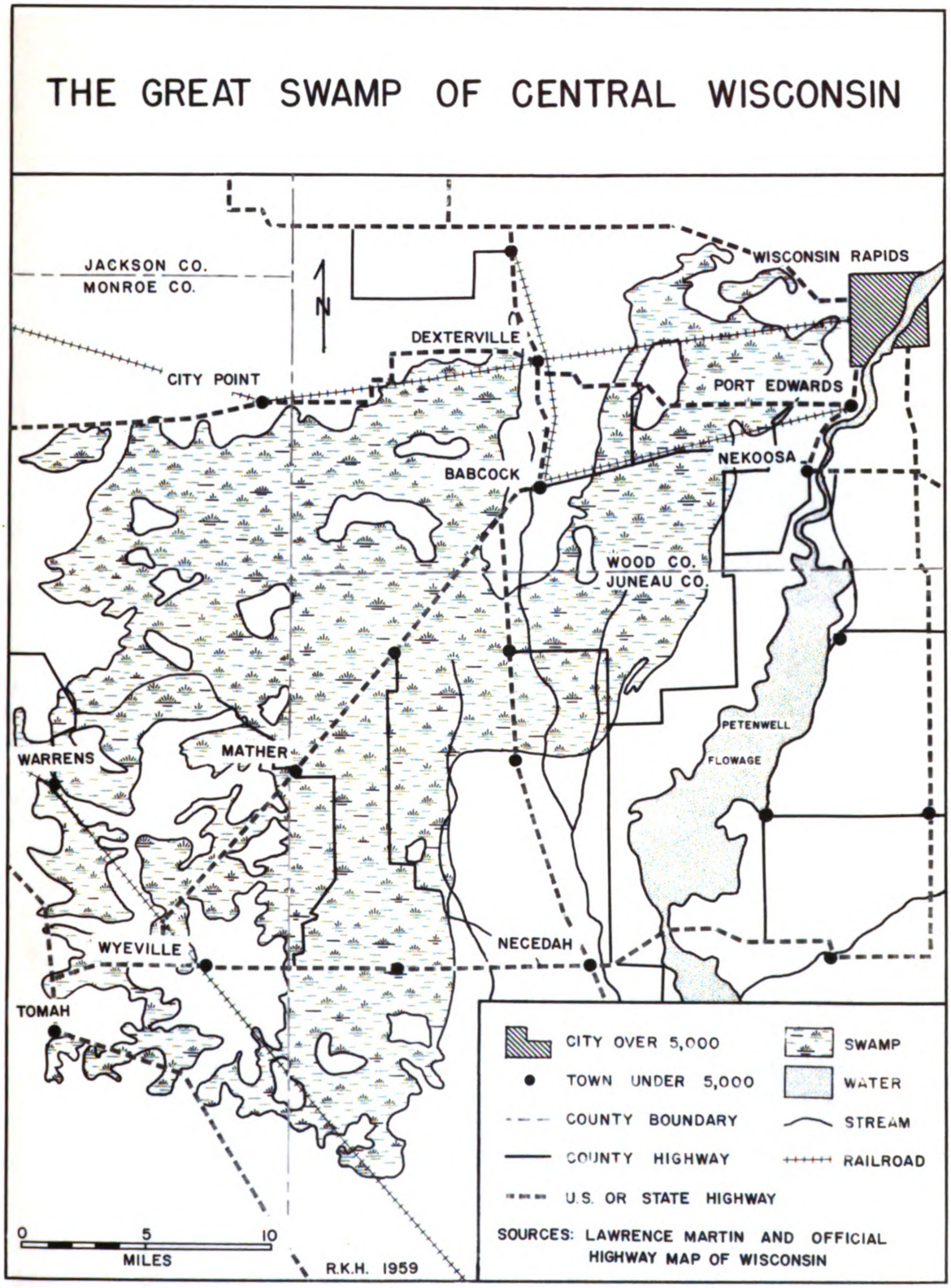

Fig. 7. The Great Swamp of Central Wisconsin.

Fig. 8. -- The driftless area. The cranberry marsh in the foreground is on the bed of Glacial Lake Wisconsin. In the background castelated bluffs break the monotony of the lake bed.

Fig. 9. -- View from a fire tower, looking east to the swampy lacustrine plain of Glacial Lake Wisconsin. One of the few agricultural clearings is nearby.

Nowhere in the state can an area be found with so few roads and other cultural features. The several roads that do cross the area, however, are of good quality and are almost completely straight.

Probably the most common deposit throughout the lake bed is sand. Lake bottom sand is a mineral subsoil of mostly peat deposits and may be seen exposed in the northern and western parts of the lacustrine plain. The sand is a white quartzite which came from the crystalline area directly north of Wisconsin Rapids. The finest material on the lake bed is a calcareous clay. The clay forms a thin impervious layer over the porous Cambrian sandstone substrata, and effectively minimizes subsurface drainage. The stratigraphy of a typical Central region marsh, then, would be peat, sand, a thin layer of clay, and sandstone.

The effect of topography on the pattern of cranberry marshes. -- The overall effect of the topography upon cranberry marsh arrangement has already been noted, that is, a compact continuous pattern in the Central region becoming more discontinuous to the south and west, and a widely dispersed pattern in the northern growing regions.

Most of the cranberry growers in the Northcentral region get their water directly from a lake. There are

several advantages to having a lake as a water source, the chief one being that a lake represents a relatively consistent and dependable water supply--something many of the growers in the Central region do not have. Individual bogs may be situated so that flooding is accomplished either by gravity or by mechanical means, although the latter situation is more common. The marshes in this region appear in the typical gridiron pattern for there is usually an adequate amount of flat land surrounding the lake to permit a rectangular arrangement of the producing area. The cranberry beds may be separated from the lake by an area of wild marsh or they may be built up to the margin of the lake.

In the Northwestern producing region a somewhat different pattern is apparent. Most of the bogs investigated here depend upon rivers as their water source. The bogs are often constructed within the confines of a narrow stream valley, which is then reflected in the irregular arrangement of the producing area. This type of situation also has its advantages, for the grower may use the natural gradient of the stream bed for flooding and drainage purposes. One such bog visited had no pumping facilities whatsoever, depending entirely upon the natural downhill flow of water through the producing area. A major problem in this region is the gradual increase in both soil and water alkalinity towards the west,

Fig. 10. -- Bog formation in a kettle lake in the Northcentral region. There are hundreds of similar lakes in Northern Wisconsin, mostly formed by large chunks of glacial ice melting after they were buried in the drift.

Fig. 11. -- An old gravel pit in the Northcentral region, showing a cross-section of the unstratified glacial till.

the import of which will be discussed later in this chapter.

The Central region, and especially the Cranmoor district, is the most homogeneous of all the cranberry producing regions. Here there is almost no local relief; no hills or deep stream valleys to interrupt an almost continuous arrangement of the producing areas. To the south and west of Cranmoor the topography is somewhat dissected and individual marshes become separated by areas of waste land.

The cranberry marshes of the Cranmoor district would probably be even more continuous with one another except that each establishment must have access to a large area of wild marshland which serves as a reservoir for flood water. Growers in the Central region must depend upon the few small streams which flow into the area, seepage water from the marshes or, in some cases (Cranmoor), upon a canal which carries water twelve miles from the Wisconsin River. In times of peak demand or in periods of drought, the growers sometimes find themselves without enough water for flooding and irrigation.[2]

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[2] The water table of the Great Central Swampt of Wisconsin has been lowered in recent years by drainage and reclamation projects in the southern areas. Thirty years ago the water supply in the Central region was not a serious problem.

Fig. 12. -- Flood plain of the St. Croix River in the Northwestern region. One of the sites of cranberry marsh development.

Fig. 13. -- A cranberry marsh under construction on the flood plain of the St. Croix River. Note the dikes and ditches of the new bed.

Climate

The continental short summer climate (Koppen Dbf) which characterizes most of Wisconsin includes all of the state's cranberry growing regions. The summer maximum of precipitation, a relative winter drought, and the long, cold winters of the Dbf climatic region are assets to the commercial production of cranberries. Conversely, some of the aspects of Wisconsin climate are less than ideal for cranberry growing. Frequency of frosts and the shortness of the growing season are the most important of these factors.

Damaging frosts occur always in May and September, usually in June and August, but infrequently in July.[3] The shortness of the growing season means that some frost protection is always necessary, even in years with above normal temperatures.

A comparison of climatic factors in the two principal cranberry producing states better illustrates Wisconsin's climatic situation. Note in Table 1 that Massachusetts has a greater annual precipitation, but the amount received during the growing season from May to September is somewhat less than in Wisconsin. Warmer winter temperatures in

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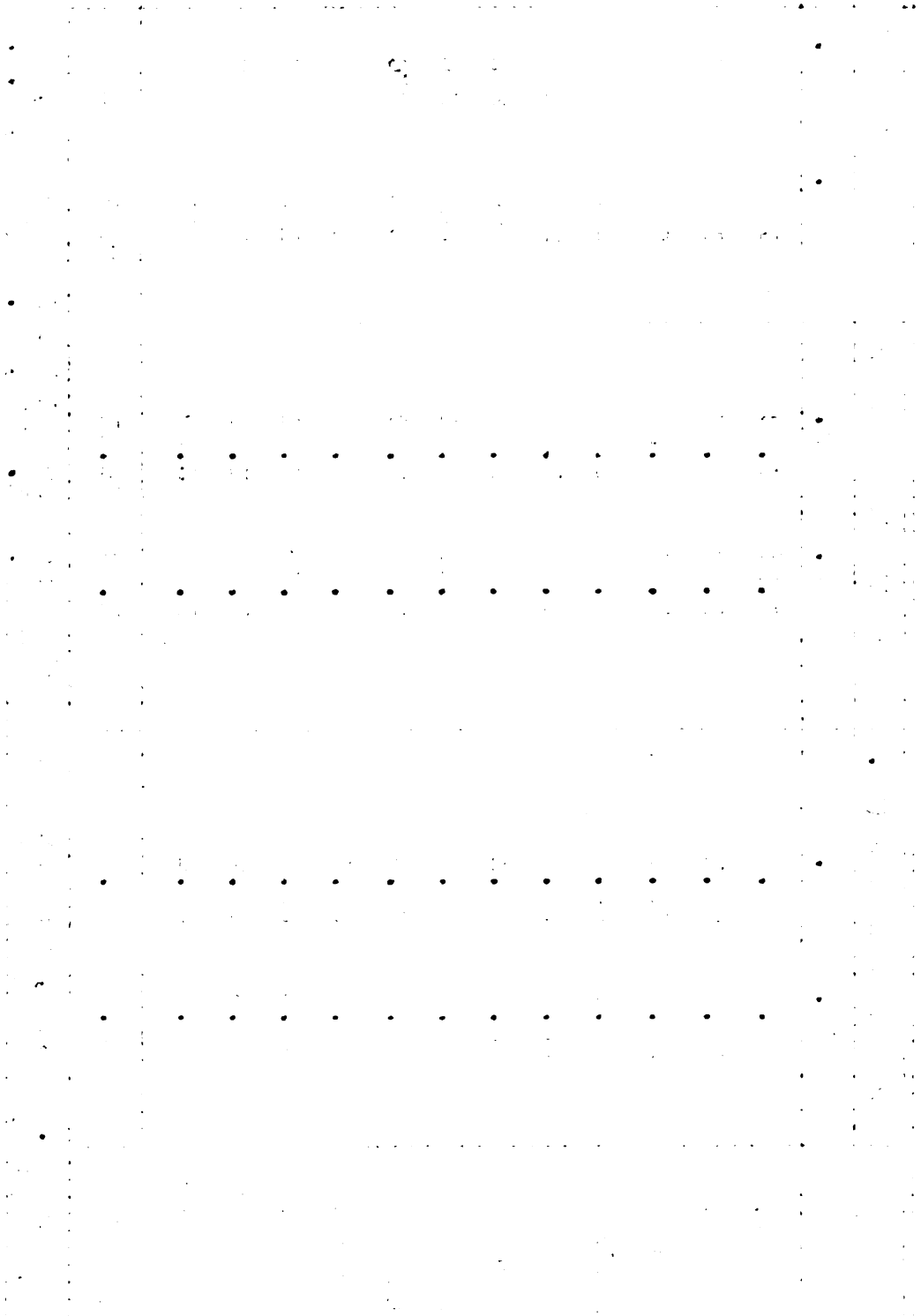
[3] Wisconsin Crop Reporting Service, op.cit. p.36.

TABLE 1 *

MONTHLY MEAN TEMPERATURES, RAINFALL, AND SUNSHINE IN THE CRANBERRY AREAS OF WISCONSIN AND MASSACHUSETTS

Month	Mean Temperatures (°F.)		Precipitation (Inches)		Sunshine (Hours)	
	Wis.	Mass.	Wis.	Mass.	Wis.	Mass.
January	14.0	27.3	1.11	4.12	138	144
February	16.6	27.1	1.12	3.67	162	166
March	29.4	35.6	1.64	4.39	208	212
April	44.0	45.0	2.51	3.85	235	227
May	55.9	55.7	4.12	3.18	277	267
June	65.2	64.1	4.76	3.21	304	283
July	70.0	69.5	3.24	3.21	341	290
August	67.3	67.8	3.75	3.60	292	270
September	59.8	61.4	4.18	3.56	220	227
October	47.8	50.8	2.40	3.74	183	196
November	33.3	40.7	1.94	3.89	119	142
December	19.7	30.4	1.16	3.90	111	134
Annual	43.6	47.9	31.92	44.31	2591	2558

* George L. Peltier, "Factors Influencing Cranberry Yields in Wisconsin," Cranberries, the National Cranberry Magazine, Vol. XXII, No. 8 (1957), p.9.



Massachusetts tend to be a climatic disadvantage to that region. Alternate freezing and thawing during the winter often results in a high percentage of winterkill.[4] Winterkill is a problem in Wisconsin only when the winter flood is held late in the spring. (See Chapter IV). The shorter growing season of Wisconsin is to a large extent compensated for by the increased amount of sunshine received during the summer months (see Table 1).

Hailstorms are not uncommon in the Wisconsin cranberry producing regions, but they are more frequent in the Central region than in the northern ones. The greater share of hailstorm activity occurs in the late spring and early summer when convectional disturbances are at maximum intensity. Thunderstorms accompanied by hail also occur later in the growing season, sometimes damaging nearly mature fruit.

Although hail is a menace and sometimes a very serious problem to Wisconsin cranberry growers, there are few subscribers to hail insurance to be found. Probably a major reason for this is that most hail damage occurs when the plant is in the budding stage rather than after the fruit has developed. Also, the perrenating buds of the following year's

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[4] Freezing and thawing of water decreases the amount of oxygen content. Even dormant vines need a certain amount of oxygen for survival.

crop are present at the same time as the current year's fruit. It is virtually impossible to ascertain the amount of damage that the hail has done to the buds that will produce next year's crop.[5]

It has been pointed out that frost is the major climatic problem to the Wisconsin cranberry growers. Associated with the frost problem is that of the availability of water. Seasonal droughts, usually occurring in either early spring or late summer, are also quite detrimental when there is not enough flood water available for both frost protection and irrigation.

Some growers protect the vines in early spring by retaining the winter flood water for as much as a month after the ice has melted. Although this method saves water, it often proves to be damaging to the vines which, having completed their winter dormancy, will suffer from further lack of oxygen. It is considered a better practice to drain off the winter flood early in the spring and to reflood when necessary for frost protection. This is possible only in

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[5]So far, insurance coverage only protects the grower for damage to his present crop. Hail-marks on the developing cranberry may or may not cause the berry to spoil. Younger berries are sometimes able to recover completely from minor hail damage. Usually one can tell whether or not the berry will be spoiled by the hail mark by cutting open the fruit and noting if the bruise extends into the central cavity. If it does, the berry can be considered ruined. Hail damage is then measured by marking off a given area within the bog and counting the number of damaged berries or buds within it.

Fig. 14. -- Water pump between reservoir and main canal. These pumps are usually of a screw type as can be seen by the parts in the foreground.

Fig. 15. -- A few marshes in Wisconsin use pipes to carry water to the vines rather than ditches. Water is sprayed on the vines, frost protection being furnished by a thin film of ice which forms in cold weather.

areas where there is a plentiful water supply.

Since the cranberry plants are native to moist bogs the grower must maintain this moist condition to some extent throughout the growing season. The second important use of water, then, is that of irrigation to maintain the water table within the growing area. In regions where water is scarce, particularly late in the season when the berries are filling out and the weather is becoming colder, it is a very real problem to the grower to know whether to use his precious water for irrigation or to save it as protection against a sudden frost. A problem of this type is the most typical of the southern part of the Central producing region.

The cranberry weather forecast. -- Because of the absolute necessity of being informed as to when frosts will occur in the marshes, the cranberry grower is among the most conscientious of weathermen. Almost every cranberry marsh visited had at least one "minimum" thermometer on the premises. Sometimes regulation weather bureau instrument shelters are used to house the instruments, but most growers place the thermometer in a small box at the level of the vines. It has been found that there can be a difference of as much as fifteen degrees between the level of the vines and the level of an ordinary instrument shelter.

The grower's main protection against frost, however, is the cranberry weather forecast, a service of the United States Weather Bureau in cooperation with the Wisconsin cranberry growers. Predictions of cranberry bog temperatures in addition to the usual weather forecasts, are a well- known feature of most radio stations in cranberry growing areas of the state throughout the danger period. This is the only special weather service offered by the Federal government to a private group. The justification is that cranberry growers are among the few people that "do something" about the weather.

Because of the combination of the general frost warnings available to them, and their own instruments which give them more specific information, present day cranberry growers are rarely caught unawares by frost.

Vegetation

The distribution of natural vegetation in the various cranberry producing regions is considered an important element in the description of these areas, for most cranberry bogs are isolated within forested areas and seldom are they in close proximity to towns or good agricultural land.

The vegetation pattern associated with the cranberry industry will be discussed in two major categories: that

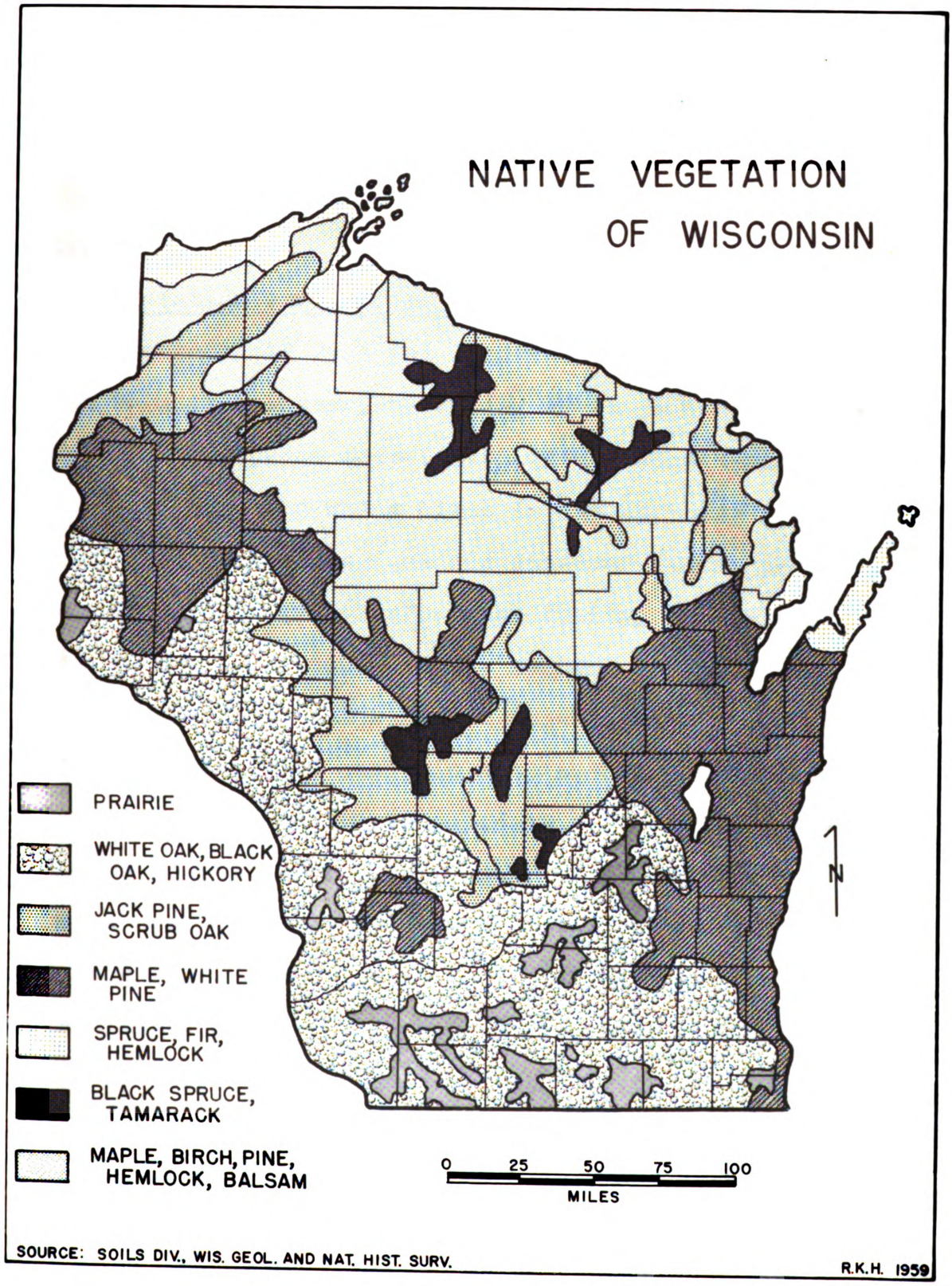

Fig. 16. Native Vegetation of Wisconsin.

surrounding the bog areas, mostly in upland situations; and that occurring within the bog itself, along with the cranberries, and falling into the general category of weeds.

Vegetation surrounding the bogs. -- Most cranberry bogs are surrounded by a wet land forest association. Common to most cranberry-producing areas in Wisconsin is a tamarack-black spruce association with a considerable admixture of aspen and white birch in the northern areas. Most of the forested regions are cut-over lands, predominantly the second growth after the cutting of the pine forest in the late 1800's. Many remnants of this original forest can be found scattered in patches among the second growth and more often near old settlements and farmsteads.

The vegetational setting of bogs in the Northcentral region is predominantly coniferous. Black spruce and tamarack are the usual occupants of the wetter areas, while aspen and white birch can be found in both wet and dry environments. Jack pine, scrub oak, maple, hemlock, and balsam are also quite common in this region, particularly in the drier sites. The Northcentral cranberry region is in the heart of Wisconsin's resort country, and efforts have been made to preserve much of the original forest. The Manitowish Waters section of this region is within the Northern

Highland State Forest, and the Thunder Lake marshes in northeast Oneida county are within a few miles of Nicolet National Forest.

The pattern of vegetation in the Northwestern region differs from the Northcentral region in that it is predominantly deciduous, with scrub oak and jack pine being the most common trees. In the marshy areas black spruce, aspen, and white birch are dominant.

In the Central producing region, the pattern of vegetation is somewhat more diversified, mostly due to its greater area extent. Various kinds of scrub oak are the dominant species in the area, although small patches of conifers, often white pine, are found. Some areas of considerable size near the Wisconsin River have been planted by paper companies with red pine. Jack pine, black spruce, fir, and hemlock are also found within the region.

Vegetation within the bogs. -- The cranberry plant is a low-lying, small-leafed, grayish-green vine which grows out in all directions over the surface of the bog until it forms a dense mat about six inches in height. It principal method of reproduction is the sending out of runners over the surface of the bog. The cranberries grow on "uprights" about six inches long, each upright usually producing from two to four berries.

Fig. 17. -- Wet land vegetation association in the Northcentral region. Leather-leaf, black spruce, and white birch are seen here.

The cranberry is a member of the Heath family (Ericaceae) which also includes such familiar bog dwellers as leather-leaf (Chamaedaphne calyculata), and bog rosemary (Andromeda glaucophylla). The genus Vaccinium to which the cranberry belongs includes the blueberry (Vaccinium spp.), another commercially important fruit. The cranberry, originally known as the craneberry, is said to have gotten its name from the appearance of the bud just before it expands into a flower. The graceful curve of the bud and stem of the cranberry give the appearance of the head and neck of the crane. The crane was at one time a common inhabitant of marshes where cranberries were found, hence the comparison.

The cranberry plant is an evergreen and has the special ability to survive long periods with very little oxygen during its winter dormancy.

Of great importance to the cranberry industry is the matter of weeds. "Weed" is defined by Dansereau as being "a plant that grows where it is not wanted (by man); e.g., weeds are usually exotic, but not always."[5] Most of the weeds occurring in cultivated cranberry bogs are not exotic but rather are as much a native to the environment as is the cranberry plant itself. This fact considerably complicates the matter of control, for methods of controlling weed population without injuring the cranberry vines growing in the same area must be used.

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[5]Pierre Dansereau, Biogeography: An Ecological Perspective, (New York: The Ronald Press, 1957), p.356.

Fig. 18. -- Hand weeding a recently planted cranberry bed. Hand weeding is feasible during the first season of growth. (Central region).

Fig.19. -- A motorized knife clipper in action. Grasses and other weeds growing above the level of the vines can be controlled by this machine. (Northern part of Central region).

The extent of the weed problem in any given bog is attributable to not one but many factors. The major considerations are the age of the bog, the source and acidity of the flooding water, the type of soil and its general geographical location. The kinds of weeds that infest bogs are different from region to region, but in all regions it is generally agreed that the control of weeds is the single greatest cultural problem connected with the raising of cranberries.[6]

Visitors from the eastern cranberry producing areas are usually amazed at the amount of weeds on some Wisconsin bogs. Although weeds are common to eastern bogs they are not nearly so abundant. The greater amount of water applied to the bogs in Wisconsin during the growing season is probably the main reason for the great abundance of weeds.

No more than three or four bogs in Wisconsin were observed to be actually free of weeds. Very often weeds were in evidence as much as the cranberry plants, and in a few instances were so thick that the cranberry vines could not be seen without pushing the weeds aside. It should be noted, however, that the last case was observed on bogs producing almost two hundred barrels per acre. A high weed population does not necessarily indicate a low cranberry yield.

The effect of the presence of weeds on the cranberry yield has not been determined, but it is generally agreed

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[6] Appendix I.

Fig. 20. -- A test strip of one of the new chemical weed sprays. Note the tremendous difference between the sprayed strip in center and the untreated strip to the right.

Fig. 21. -- The latest in cranberry marsh mechanization, the "bridge." Trucks on each end move forward as carriage moves back and forth, clipping or spraying. Need for beds of uniform size and levelness is obvious for a modern marsh.

that controlling the weed population does result in increased yields. Certainly the uncontrolled growth of weeds would soon ruin a bog for commercial cranberry production.

Most new marshes in any part of the state are relatively free from weeds. During the first few years after cuttings are planted in a new bog, it is feasible to weed the bog by pulling up the offending plants by hand. After the cranberry vines have formed a thick mat over the surface of the bog, however, other methods of control must be used. These will be discussed later.

Certain generalizations can be made about the weed problem in each of the cranberry producing regions. In the North-central region, most of the bogs are new (constructed since the Second World War) and most growers get their flood water from lakes rather than streams. Both factors, together with the fact that the soils and water here are among the most highly acid in the state have resulted in a small weed population. Sedges and grasses are the most common weeds here, but they are quite easily controlled and do not present a serious problem. Some poorly drained marshes in this area have considerable weed growth, however.[7]

Marshes in the Northwestern region have a greater weed problem than the other northern marshes and in a few instances it is quite severe. Both the water and soil in this region

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[7]Malcolm N. Dana, "Small Fruits, Their Improvement, Culture and Handling," Annual Research Report, Department of Horticulture (Madison: University of Wisconsin, December, 1953). Unpublished.

tend to become more alkaline to the west, and more weed species are present. The usual water source here is a reservoir made by a dammed-up stream, a good carrier of weed seeds. This is the oldest producing region in northern Wisconsin, with some bogs as much as fifty years old. Age of bogs, water source, and acidity of the water, then, are seen to be the major factors contributing to the quite serious weed problem in this area. The most common weeds here are grasses, sedges, and several broad-leaved species.[8]

There is a great diversity in the weed population in the Central region, both in number of species and in amount of plants. The bogs in this region are among the oldest and the youngest of the state. Flood water in the region is supplied by three major sources: reservoirs made by dammed-up creeks, reservoirs created by dredging and damming seepage water from the swamp, and water carried by canal from the Wisconsin River, about twelve miles away. Many of these bogs use more than one of these sources for their water, some use all of them. Soils vary considerably here also. Peat and muck are quite common and usually furnish the base for the bogs, but most of the older bogs are now producing mainly on sand, resulting from the successive applications through two or three generations of growers.

No accurate generalization of the weed problem can or should be made. The average situation is intermediate between

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[8] Ibid., p.7.

the two northern regions, but one may point out bogs in the Central region that have a very serious weed problem, and other bogs that have no problem at all. Certainly the seriousness of the problem will vary, not only according to the natural factors listed above, but also to the cultural methods employed by the individual grower.

Weeds are generally controlled by any or all of the following methods: clipping, weeding by hand, sanding, or applying chemical weed killers.

Clipping is probably the most commonly used weed control method and is especially effective on sedges and grasses. A rotary bladed clipper is used, the cutting height of which must be constantly varied by the operator. Any weeds which project above the height of the vines can be clipped by this method. There are two major reasons for clipping: the first is that the tall weeds which prevent sunlight from reaching the vines are disposed of at least temporarily; and the second, certain grass sedge species can be prevented from reproducing if they are clipped before they are able to disperse their seeds. Clipping is generally done two or three times during the growing season by practically all growers.

Weeding by hand is, of course, a very effective method of weed control but it is not economically feasible unless

the weed population is very small or the bog has recently been planted. Year-old bogs are usually weeded by hand.

Weed control by sanding is discussed in the following section on soils (p.42.).

Chemical weed killers are built around three types of materials: petroleum products, 2,4-D, and various mineral salts.[9] The materials applied by the spraying method must be carefully timed so as not to injure the vines which are especially susceptible to injury during certain stages of growth. Herbicides such as 2,4-D are applied by swabbing the individual weed plants. The usual applicator is a device carried by two people through the bog from which a canvas applicator moistened with the herbicide hangs. The swab must be carefully held so that it does not touch the cranberry plants.

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[9] Ibid., p.9

Soils

Cranberries are grown on a variety of soils. The three types found in Wisconsin are peat, sand, and muck. There appears to be no direct relationship between the soil type and the degree of success of the cranberry growing operation, although methods and problems associated with the various soils will differ somewhat.

The soils in the different cranberry growing regions of Wisconsin have been characterized by G. L. Peltier[10] as follows:

1. Shallow peat, some muck and sand, sometimes underlain by clay. The pH averages near 6.0 while the flood waters are 7 or above.

2. Peat of variable depth intermixed with muck with little sand. The pH of the soil and flood waters are optimum for cranberries (pH 4.5-5.5).

3. Sphagnum moss peat built up through the ages and very acid (pH 3.5-5.0). While the depth of the peat varies; usually it is underlain by sand (Millston).

4. Undecomposed wood peat of some depth and of an acid nature (ph 5.0-5.5).

Many of the commercial cranberry bogs in Wisconsin operate on two or more of the above mentioned soil types. In the northern part of the state, the soils are geologically younger, usually a slightly decomposed peat. Although peat is the most common soil in the Central region also, its state of decomposition is usually more advanced

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[10] George L. Peltier "Indian Trail Letter to Growers," Indian Trail Inc. (Wisconsin Rapids, Wisconsin, January, 1952). (Mimeographed).

and in many cases it has turned to muck. In the western and southern part of the Central region it is not unusual to find large areas of sand with no muck or peat at all.

There is no such thing as a uniform bog soil in Wisconsin. The wood peat bogs in the Northcentral region are the closest to being uniform, but even these vary in depth and composition. The soil types to be found in the various regions are described in general, however, as follows:

The Central Region. --

1. The Wisconsin River valley area is characterized by shallow peat, occasionally muck and sand, sometimes underlain by clay. The soil pH averages about 6.0, the water is usually alkaline although it varies somewhat according to the discharge of the paper mills along the river.

2. Cranmoor is a flat, poorly drained area where the depth of the peat is somewhat variable but does not contain muck or sand. There are some "islands" of sand that rise above the general level of the bog. The pH of both soil and water here is optimum for cranberry growing, ranging from 4.5 to 5.5.

3. The Warrens area has been developed on sphagnum bogs, which are naturally quite acid. The depth of peat varies considerably and is underlain by a white (Millston) sand.

4. The western and southern parts (near Millston and Tomah) of the Central region are almost entirely sand. The pH of the soil ranges from 5.0 to 6.0

The Northwestern Region. -- The soil here is mostly a wood peat, but the depth may vary considerably. Deep and shallow pockets of peat and sometimes patches of sand characterize most of the region. Several of the bogs here are subject to sinking in spots as the deep pockets of peat are not stable. This usually necessitates relèveling and replanting of the affected bog, an expensive process.

The Northcentral Region. -- The soils here are the most homogeneous of the cranberry growing regions of Wisconsin. They are generally a highly acid wood peat with a few pockets of sand. The soil acidity ranges from pH 3.5 to 6.0, but the average is about 4.5.

One of the most important aspects of the soil for the growing of cranberries is that it be on the acid side of the pH scale. Cranberries can be grown on neutral and sometimes even alkaline soils, but the rate of abandonment of bogs is roughly proportional to the higher pH numbers.

Sanding. -- Sanding is a common practice on almost all Wisconsin bogs. The sand is applied during the winter when trucks are able to drive on the ice of the winter flood and

do not injure the vines. The sand is spread over the ice and sinks to the surface of the marsh with the spring thaw.

Sanding is said to accomplish several things. A layer of sand over the vines causes the runners to root in new places, thus sending up new uprights and increasing production. The sand is also credited with killing some weeds by smothering them. A layer of sand over a peat bog may increase the temperature on cold nights by several degrees due to increased radiation of heat. Some of the older bogs may have up to a foot of sand over the original peat soil and thus have a sand soil for all practical purposes.

Most bogs in Wisconsin are within a reasonable distance of a good source of sand. Were this not true the source of sand could be an important locational factor since much is used by each grower.

Summary

The physical setting of the Wisconsin cranberry industry is generally quite favorable, although regional variations create special problems in each of the three regions. The vegetation surrounding the cranberry marshes is seen to be an important element of regional description here, but weeds that occur within the marshes are of greater significance as they directly affect cranberry production. There appears to

be no direct relationship between soil type and the degree of success of the cranberry growing operation, although methods and problems associated with the various soils will differ somewhat.

CHAPTER III

HISTORY

The widespread distribution of the Wisconsin cranberry industry today can be better understood by reviewing its historical development. Four stages or periods in the areal development of the industry to the present can be distinguished. The first period is the harvest of the wild berries by the Indians and at a later time by both Indians and white settlers. The rise and fall of the Berlin producing area comprises the second period. The third stage in the industry's development was the movement into the area southwest of Wisconsin Rapids which remains to this day the chief producing area of the state. The last phase of movement in the industry is the development of the northern producing areas which began about forty years ago and continues to the present.

The Beginnings of the Wisconsin Cranberry Industry

The earliest records of the use of cranberries in Wisconsin are the journals of the early French explorers and later of the fur traders who were familiar with the use of cranberries by the Indians.[1] The first record of a movement of cranberries to market is in a journal kept by D. Whitney

[1] Personal notes of Dr. George L. Peltier on the history of the Wisconsin cranberry industry.

who noted a consignment of several boatloads of the berries from the mouth of the Yellow River to Galena, Illinois where they were exchanged for supplies.[2] These cranberries probably came from the Cranmoor area in Central Wisconsin. That the harvest of wild berries became at least fairly important is evidenced by a Wisconsin law which imposed a fifty dollar fine for the picking or possession of unripe cranberries before the 20th of September.[3] The earliest record of an arrest under this law was September 8, 1859.[4]

The first development of the wild marsh land for commercial cranberry production involved only a small amount of improvement. Ditches were dug and dams were built for the draining and flooding of the bogs, but other than this, the marshes were essentially in their native state. Improvements of this nature first occurred in the Berlin area, on the poorly drained bed of Glacial Lake Oshkosh and shortly thereafter in the Cranmoor area. The developments of the marshland in the Berlin area began in the 1850's and by 1865 about 1000 acres of cranberry vines could be considered in the "improved" category.

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[2] Ibid.

[3] George L. Stevens and Jean Nash, "The History of the Wisconsin Cranberry Industry," Wisconsin Historical Magazine, Wisconsin State Historical Society, Vol. XVI(March 1943) p. 277.

[4] Ibid. p. 277.

The Berlin Region.

The early commercial cranberry production in the Berlin area was a "boom" type of development. High prices received in Chicago for the first commercial crop in 1865 and the years following attracted more growers into the business and by 1870 production in this area was well established.[5] Based on tax records in the town of Aurora, the following figures indicate the rapid development and later decline of the Berlin cranberry producing region.

Cranberry Production in the Berlin Area.[6]

1870	10,000 barrels
1871	20,000 "
1872	30,000 "
1874	30,000 "
1879	16,000 "
1881	6,000 "
1882	5,000 "
1883	a very poor crop
1884	3,000 barrels

The cranberry industry surrounded Aurora (about ten miles north of the town of Berlin, which is usually called the center of the region) and expanded rapidly until 1874. Land values in the area also increased, with formerly worthless land bringing from $100 to $300 an acre.[7] Years of good crops and high prices inspired many people to go into the cranberry business, some of whom developed holdings of

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[5] Ibid. p. 279.

[6] Ibid. p. 279.

[7] Ibid. p. 279.

Fig. 22. -- Buildings at the Berlin Marsh, the only one remaining in this region. Much of the produce is sold at this roadside warehouse.

Fig. 23. -- Canal from Berlin marsh to Fox River, completely choked by grasses. The alkaline water of the Fox is chiefly responsible for the serious growth of weeds.

bearing acreage larger than any of today's. The boom in Berlin cranberries was relatively short-lived, however. A series of bad years for growing, with droughts, floods, and fires discouraged many and after 1874 the producing acreage dropped rapidly. The first of the major disasters occurred in 1871, the year of the Chicago and Peshtigo fires. This was a very dry year and marsh fires were common throughout the growing region. Some growers sustained heavy losses because of stored cranberries that were burned in the Chicago fire. In 1881 flood waters covered the growing area, inflicting heavy losses by causing the decay of the partially ripened fruit. The following year there was only half a crop, and in 1883 flood waters again covered the area. Most berries not ruined by the water were damaged by a frost that September, and some marshes were not harvested at all.[8] The final blow to the area was the tapping of the Fox River in 1885. It is now believed by most authorities that the alkaline nature of this water was the chief contributing factor in the virtual extinction of the cranberry industry of Berlin.

The Central Region.

The development of cranberry growing in the Central region was to a certain extent contemporaneous with that of the Berlin marshes. As in the Berlin area, the first

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[8] Ibid., passim.

Fig. 24.--Cranberry warehouse at the Gaynor marsh, one of the oldest in the state. (Central Region).

Fig. 25.--Cranberry drying sheds at the Gaynor Marsh. They are now used for equipment storage. New bed is in foreground.

cultivation involved only the ditching of wild cranberry marshes and the harvesting of the berries. As the Berlin area declined in importance, the Cranmoor area increased its prominence. The movement to this area actually started in the early 1870's when some of the young men who came to Berlin, lacking sufficient capital to buy the now expensive land near Berlin, bought acreages of the inexpensive land in the Cranmoor area. Much of this land was available for the payment of back taxes as it had been settled previously by people interested in general farming on the sandy "islands" of the area. These farms failed soon after they were started for the most part.[9]

Expansion in the Cranmoor district continued, as did improvements in techniques and equipment. In 1900 approximately 1200 acres were under cultivation on the former bed of Glacial Lake Wisconsin. Disaster struck the area during the years 1892-1895 when a succession of drought, frost and fire caused many of the weaker-hearted growers to quit. A large marsh fire occurring in 1895 was particularly damaging and burned most of the productive acreage of the region. The effects of this fire were not all bad, however, for when the bogs were rebuilt a more orderly arrangement was established and a new and better variety of cranberry replaced the native plants.

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[9] George L. Peltier, op.cit., passim.

Fig. 26. -- Housing for seasonal laborers in the Cranmoor district. Most such structures are now vacant all year because of mechanization.

Fig. 27. -- The Cranmoor siding. At one time this was a major cranberry shipping center. Buildings are now gone, The produce is taken to market mostly by truck.

The Central Region and the Cranmoor district in particular, became and remained to this day, the most important cranberry producing region in the state. Many of the marshes are very old, in fact, some of the profitably bearing beds of today contain the same "natives" which survived the great fires of 1893, and have existed for over seventy years.

As the acreage in the Cranmoor district expanded, the demands for water at peak seasons became greater than the supply. In 1933 the growers of the Cranmoor area constructed a $50,000 canal from the Wisconsin River to the Cranmoor district, as distance of twelve miles.[10] The canal has alleviated the water problem for most growers in the Cranmoor area, but to the south and west in the Mather-Warrens district the water supply is still a serious problem in dry years.

The Northern Regions

The expansion of the industry into the northern areas began following the First World War. These new bogs were constructed on a "modern" basis, that is, the bog was scalped of vegetation and leveled, and dikes wide enough for the passage of machinery between the beds were built

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[10] Wisconsin Crop Reporting Service, Wisconsin Cranberries, Bulletin No.322, Wisconsin State Department of Agriculture, (November-December 1953), p.5.

instead of the narrow type only wide enough for foot travel. These bogs were not developed from wild vines, but rather were planted with new varieties that had been developed by that time. The first bogs to be constructed were in the Shell Lake-Spooner area in Burnett and Washburn counties, but soon after the producing areas were expanded to include parts of Barron, Burnett and Rusk counties.

The bogs of the Northcentral region are the newest in the state, most, if not all, having been constructed after World War II. The expansion in this area was inspired by inflated prices of cranberries during the war, when they reached thirty-five dollars a barrel. This area is now one of the most prosperous in the state.

Summary

The historical development of the present areal arrangement of the Wisconsin cranberry industry has occurred in four stages: first, the harvesting of wild berries by the Indians and early white settlers; second, the rise and fall of the Berlin producing area; third, the development of the Central region to the most important in the state; and, finally, the recent expansion of the industry into northern Wisconsin. Periods of high prices were the greatest stimulants to areal expansion of the industry although the rate of expansion through the years has been quite constant.

CHAPTER IV

REGIONAL DESCRIPTION

Wisconsin Cranberry Culture--A General Description

The characteristics of cranberry culture in Wisconsin vary in some respects from region to region. The following general description of Wisconsin cranberry culture serves as a basis for the regional variation.

Cranberry vines are planted on prepared beds which vary from less than one hundred square feet to over four acres. The usual size is from two to four acres. The area to be planted is first scalped of the original bog vegetation and is then carefully leveled, for it is important that the height of the flood water in relation to the vines be constant. A dike is constructed around each bed, about two or three feet high and wide enough for the passage of heavy machinery and vehicles. Dikes are constructed mainly from the materials obtained by the leveling and ditching of the bog. Most dikes are surfaced with sand or gravel. The cranberry bed is constructed so that the bog level will be slightly higher than the level of the water supply to allow for efficient drainage.

Planting involves the broadcasting of vine clippings obtained from old beds over the scalped and leveled surface of the new bed. The clippings are impacted into the moist bog surface by a disking machine or by a caterpillar type

Fig. 28. -- The Upland Cranberry Company. This was an experiment in growing cranberries in dry, upland sand. Water was pumped from the river below. Winter protection was provided by a straw cover. Several owners all failed to make a profitable return. (Central region, near Black River Falls).

Fig. 29. -- Bee hives. Most cranberry growers maintain a colony of bees to aid pollination. Cranberry bed and flooding ditch in foreground. (Northcentral region).

tractor with special wide treads. Manual tampers are sometimes used.

The vine clippings begin to sprout soon after planting. During the first two years of their growth they send out horizontal vegetative runners, which soon cover the growing area quite thoroughly. Three years after planting the vines have formed a dense mat about six inches deep on the surface of the bed. During the third and fourth years some berries appear but commercial quantities do not appear until the fifth year.

The cranberry plant blooms for about ten days in the middle of July, usually with four blossoms on each upright. The flowers, and therefor the berries, appear on each upright every other year. Of course not all the uprights bloom at the same time, and the harvest is equaled from year to year. Most growers maintain a colony of bees near the growing area to assure adequate pollination.

During the growing season the operators' main concerns are frost protection, the control of weeds and insects, and the maintenance of canals, dikes and equipment.

The first harvest takes place five years after the bog is planted and every year thereafter until the bed is approximately seventy-five years old. By that time it has become so crowded with plants that they tend to choke each

other out and become unproductive. At this time the bed is cut and replanted. The beds are thinned each spring with a motorized knife rake. This operation gives the vines more room to produce and combs them in one direction to facilitate harvesting in the fall.

Flooding is one of the most interesting of cranberry cultural practices. The application of water to the cranberry bed is precisely controlled to serve one of four purposes: frost protection, irrigation, floating the berries at harvest, and for winter protection.

Water flows into the marsh area from its source by gravity or pumping, depending upon the situation of the particular bog. The water flows into canals within the bog and is released from there through bulkheads as needed into ditches within the producing area. Drainage as well as flooding is accomplished by gravity flow or pumping, according to the bog's situation.

Frost protection is achieved by flooding the bed two or three inches deep. The tops of the vines and most of the berries are protected by radiant heat from the water rather than by direct contact. During most of the growing season the beds must be irrigated to maintain the water table about twelve inches below the surface of the bed. Only the ditches are flooded for this purpose.

The harvest flood must be deep enough to float the berries. The picking machine removes the floating fruit from the vine by means of a revolving drum with projecting teeth. The teeth come up from beneath the berries, strip them from the vine and transfer them to a conveyor belt within the machine.

After the harvest and the arrival of cold weather the winter flood is applied. This is a deep flood which covers the tops of the vines. The water is allowed to freeze until a thick layer of ice has been formed . The excess water is then drawn off. The vines are either frozen into the layer of ice or are directly covered by it . They remain in this condition until spring.

The winter flood water is drained soon after the spring thaw, for during the winter the oxygen content of the water becomes quite low and will injure the vines if allowed to remain. The marshes are reflooded during the spring when the temperature drops below 20°F. After the new growth starts the bogs must be reflooded whenever the temperature drops below freezing.

The three major cranberry varieties grown in Wisconsin are the Searles, McFarlin and Natives. Searles and Natives are Wisconsin varieties, the McFarlin was imported from the eastern marshes.[1]

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[1] Wisconsin Crop Reporting Service. Cranberries of Wisconsin Special Bulletin No.70, Madison: Wisconsin State Department of Agriculture, December, 1957, p.8 .

Fig. 30. -- Hand harvesting, using the Wisconsin scoop. Once a common sight on all Wisconsin bogs, now very rare. These bogs are off level making the use of machines impractical. (Central region, Cranmoor).

Fig. 31. -- Harvested berries are placed in wooden boxes and loaded into boats. Boats are towed on the ditch to end of bed where they are stacked and taken to warehouse by truck. (Central Cranberry Company, Cranmoor).

Fig. 32. -- Harvesting by machine. Boat is pulled by machine, lifted on a truck when full. Water must be deep enough to float the boats.

Fig. 33. -- Unloading the boat into the hot air dryer at the warehouse. The entire process is mechanized.

Fig. 34. -- Cranberries are stored in boxes in the warehouse after they are dried. Dump truck is used for winter sanding.

Fig. 35. -- When berries are ready for packaging they are dumped into these conveyors. From here the berries are selected for quality by a machine and then by hand. Cranberries are now packaged mostly in cellophane bags.

All the varieties of cranberries grown in Wisconsin are the result of selection of the wild vine. The Searles is the most important, occupying more than 60 percent of the total acreage in the state. It is the highest yielding variety, averaging over 100 barrels per acre. However, its keeping qualities are not as good as the others.

Natives are the original wild cranberry and have not been selected, at least not significantly. At present the Natives comprise about 14 percent of the total acreage with an average yield of 63 barrels per acre. The amount of Natives raised in Wisconsin marshes is steadily declining as they are replaced with newer, higher yielding varieties. The Natives are of course the oldest of Wisconsin varieties, some beds being over seventy years old but still producing yields as high as 80 barrels per acre.

Regional Differences

Although each cranberry marsh in the state is different, there are some characteristics of each that remain constant on a regional level. The most dependable regional characteristic is the pattern of construction of the bogs. The outline of the producing area, and to some extent that pattern of the individual beds within, reflects the nature of the local topography and therefore serves as the chief distinguishing factor.

Another readily observable characteristic is the age of the producing area and associated structures. The present widespread use of machinery has outmoded many structures which were essential to cranberry growing twenty years ago, and has necessitated greater uniformity of construction within the producing area. For example, the presence of drying sheds, housing for seasonal laborers, or a horse barn at a marsh will indicate construction before various kinds of mechanization took place. Similarly, a dike within the producing area wide enough only for foot travel is an indication of an old bog.

A description of the three cranberry growing regions follows. This characterization is based principally on differences and similarities of the patterns and relative age of the marshes. Also included in the descriptions are the physical and cultural phenomena that provide a regional background for the cranberry marshes. Four individual cranberry growing establishments, two from the Central and one from each of the northern regions, complete the regional description of the Wisconsin cranberry industry.

The Berlin Region. -- Many years have passed since the marshland north of Berlin was the most important cranberry producing region of the state. Almost all of the producing area has either been converted to truck farming or has been

allowed to return to the wild state. One commercial cranberry growing establishment remains in the region at the present time. This farm is located several miles north of the town of Berlin on the Fox River. Thirty-five acres of producing vines give a profitable yield most years, but the owner does not depend upon the sale of cranberries for his entire income. The grower markets his produce independently, which includes apples and truck crops in addition to cranberries.

The Berlin cranberry marsh has a serious weed problem. The canal which runs from the Fox River to the marsh is virtually choked by cattails and other tall grasses. The ditches within the bog are similarly filled with grasses, some to the point where the water is no longervisible. The abundance of weeds on this marsh and its connecting ditches stand in mute evidence of the effect of the alkaline water of the Fox River upon this and other cranberry marshes of the Berlin region. Perhaps, with modern weed control techniques, many parts of the Berlin region could again be brought into commercial cranberry production. It is unlikely that this will happen, however, for there are many undeveloped marsh areas within the state that are more favorable for cranberry growing.

The Central Region. -- The Central region is the most extensive cranberry producing region of the state. It has

been the principal region in production since the 1890's and presently contains three-quarters of the state cranberry acreage.[2]

Several districts within this region are recognized by most people of the cranberry industry. The oldest and most important of these is the Cranmoor district, which includes Cranmoor township, in southcentral Wood County.[3] This district is entirely within the confines of the lacustrine plain and the pattern of the marshes is the most continuous of any in the state. The second district of this region is Mather-Warrens, named from the two small towns located here. The marshes of the Mather-Warrens district are much more scattered and discontinuous than in Cranmoor. The district is situated on the western margin of the lacustrine plain which shows some variation of topography because of sand dune formation. To the south, in Monroe and Juneau counties, another district extending from Camp McCoy to Wyeville is sometimes recognized. Hilly terrain and bogs of a riverine pattern is the usual situation here. There are some marshes located in the flood plain of the Wisconsin River to the east and south of Wisconsin Rapids. The pattern here is quite similar to that of the Cranmoor district with the exception that the major water source is from the Wisconsin River.

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[2] Wisconsin Crop Reporting Service, op. cit.,p.6.

[3] See Figure 2, p.2.

Most of the districts of the Central region are within the area once covered by Glacial Lake Wisconsin. Only on the western and southern portions of the lacustrine plain do breaks occur. Most of the irregularities are caused by vegetation covered sand dunes, but a few small sandstone outcrops were observed. In striking contrast to the lake bed, which is practically devoid of relief, the buttes of the driftless area form an interesting backdrop for the bogs of the Warrens area.[4]

Water sources in the Central region are not all of the same type but most growers obtain their flood water from seepage in the swamp or from a reservoir made by damming a small stream. In the Cranmoor and Mather-Warrens districts streams are the principal water source, although seepage water supplements the supply. Reservoirs in this area are sometimes difficult to identify on air photos and usually cannot be distinguished from the ground. They appear as undisturbed marshland, with trees and other vegetation covering the water from view. The only indication of the presence of a reservoir in such a situation is the widely spaced canals which eventually lead to a producing cranberry marsh.

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[4]The buttes are well known features of the driftless area. They are outliers of the Lower Magnesian questa, which has retreated to the west and south. Lawrence Martin describes these buttes in detail in his The Physical Geography of Wisconsin, Wisconsin Geological and Natural History Survey, Bulletin No. XXXVI, Educational Series No.4, (Madison: State Publication), 1916., p.300.

Fig. 36. -- Marginal housing in the Central Region. These people, both Indian and white, make their living by harvesting sphagnum moss, cranberries and pulpweed.

Fig. 37. -- Abandoned farmstead on sandy area near Warrens. Many such unsuccessful farms can be found in the Central Region.

The motorist acquainted with the usual curving and hilly character of Wisconsin highways would not feel at home here. There is an almost complete absence of variation in the roads for stretches of over twenty miles as they cross the swampy lake plain. Traffic is very light. There are only a few county and township roads on the lake bed, but all are black-topped and are in excellent repair.

The Central region contains the oldest producing marshes of the state as well as some of the newest. The newer marshes in this region are not significantly different in building types or bog construction from the more recently constructed cranberry establishment of the northern regions. It is the older marshes of the Central region, then, that form the basis of cultural differentiation between this and the northern regions.

The old cranberry establishments are usually easily identified, for most of them have special-purpose structures that are now abandoned or have been put to other uses. The most common of these structures are the cottages which formerly housed seasonal laborers. Others are the drying sheds, stores, dance halls and horse barns.

Before the widespread mechanization of the cranberry industry, growers had to furnish shelter, food, and sometimes entertainment for the many laborers needed in the cranberry

growing operation. This was particularly true at harvest time for the cranberry harvest was the major social event of the year in the area. People from nearby towns and farms came to work in the bogs during harvest as well as Indians who would set up tepee villages on the premises. In many respects the grower was host to his workers for he was expected to provide the evening entertainment for these people as well as basic needs. Consequently, dance halls and stores were common buildings at many of the larger marshes and some remain to the present.

The drying shed is another frequently occurring but outdated structure of the Central region cranberry marshes. The first of these were built shortly after the turn of the century when the flooding method of harvest was introduced, and the last were constructed in the 1940's when mechanical dryers were perfected. The sheds may be any length, are about twenty feet high and have open sides. Although these sheds are no longer used for cranberry drying, they make excellent equipment shelters and are generally maintained for this purpose.

Fig. 38. -- Spreading sphagnum moss out to dry. Several cranberry growers in the Central region collect sphagnum moss as a sideline.

Fig. 39. -- Baling the moss. Sphagnum moss is valued by florists for its water-retaining ability. It is worth about seventy cents a bale.

The Northcentral Region. -- The Northcentral Region is the newest in the state. Most of the cranberry growing establishments in this region have been constructed since the Second World War. The high prices growers were receiving at that time were largely responsible for the expansion of the industry into this region. About one-seventh of the bearing acreage of the state, roughly 600 acres, is located here.

The marshes of the Northcentral Region are quite widely separated from each other. There are three major groupings of bearing acreage. One of them is in central Price County, another in northwestern Vilas County near Manitowish Waters, and the third is in northeastern Oneida County. Several small marshes in Oneida and Lincoln counties comprise the remaining acreage in this region. All of these marshes are located near small lakes occurring on the Cary moraine which entirely covers this region. The topography surrounding the marshes is hilly and densely forested in most instances. The marshes are located on flat, swampy areas bordering lakes, except for two marshes which are located near streams. There are no continuously flat areas of great extent such as in the Central Region.

Lakes are by far the most important water source in the Northcentral Region. Only two of the marshes here

depend on a stream water source. Generally speaking, lakes are a better water source than are streams or swamp seepage because the water supply and pH character are more constant. Some growers pump water from the lake into a secondary reservoir on the other side of the producing area so that gravity flow may be utilized for quick flooding.

The part of the state occupied by the Northcentral cranberry growing region is primarily noted for its resort industry. General farming conditions within the region are mostly of a marginal nature. The most prosperous agricultural activities here are dairy farming and the growing of specialized crops--particularly potatoes and cranberries.

There are few cultural features in the vicinity of the cranberry bogs. Much of the region is within state or national forests and consequently settlement is somewhat limited. The state and county roads traversing the region are blacktopped and are in excellent condition. Traffic is quite heavy during the tourist season.

The cranberry marshes of the Northcentral region exhibit characteristics of modern construction. Within the producing areas dikes are evenly spaced and can be driven upon by heavy machinery. The typical marsh in this region has fewer buildings than its counterpart in the Central region. Drying sheds and housing for seasonal laborers are almost non-existent. The usual complement of buildings

Fig. 40. -- Bog construction at Thunder Lake, North-central region. The peat soil is only partially decomposed.

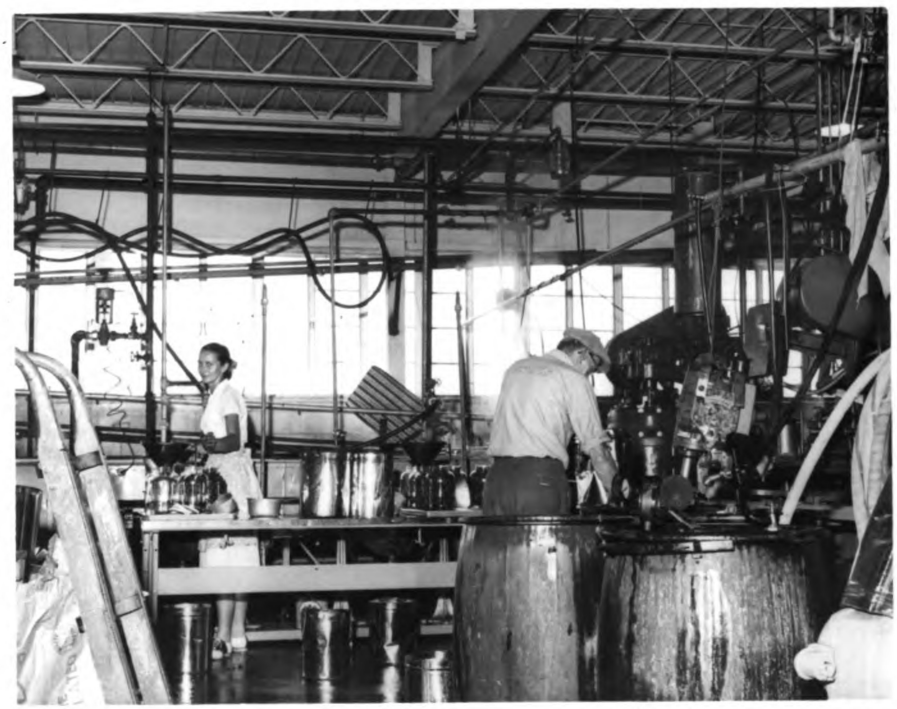

Fig. 41. -- Interior of cranberry processing plant. Cranberry Products, Incorporated, Eagle River. Production continues the year-round, using frozen cranberries.

consists of a residence, a warehouse, and sometimes a small shed or two. Seasonal labor in the Northcentral region is mostly supplied by Indians who earn their livelihood from forest occupations and various seasonal type labor.

The Northwestern Region. -- The first development of the cranberry industry in the Northwestern region took place after the First World War. Presently, about one-tenth of the state's bearing acreage is located here, primarily in Burnett, Washburn, and Sawyer counties.

The topographic setting of this region is entirely morainic. Recessional moraines of Cary age form parallel ridges and valleys with an east-west axis to the north of Spooner. There are no rock outcrops as the ground moraine covers the bedrock to a considerable depth over the entire region. The landscape is dotted with hundreds of small lakes and marshy areas. There are also numerous streams.

Most of the cranberry marshes in the Northwestern region are located in stream valleys, although there are several bogs that are constructed on the borders of lakes near Hayward and Minong. The northern-most marsh in the Northwestern region as well as in the state, is located on the flood plain of the St. Croix River, just north of Gordon. This bog is still under construction.

The principal source of income in this part of the state is the resort industry. The general economic level within the Northwestern region as reflected by the quality of roads, farms, and resorts, appears to be lower than that of the Northcentral region. The towns appear to be largely dependent upon tourism for their major income.

The riverine setting of most bogs in this region permits the growers to flood and drain the producing area without the aid of mechanical pumps. The flood water is stored in a reservoir at the high end of the marsh, and is released as needed.

The patterns of dikes and the outline of the producing area is quite irregular. The dikes must be placed to make the best use of the gradient of the valley floor, and the width of the producing area is limited by the sides of the valley. The depth of peat in the marshes also is quite irregular. Parts of the producing area over deep pockets of peat often sink below the surrounding area which makes it necessary to relevel and replant the affected bed.

The greatest problem to cranberry growers in this region is the alkalinity of the water and soil. The situation becomes progressively worse toward the west, especially in Burnett County. As the alkalinity increases, yields tend to drop off, and the weed population becomes such that profitable operation of a cranberry marsh is almost impossible.

Fig. 42. -- New bog construction in the Northwestern region. The peat here is more decomposed than in the North-central region.

Fig. 43. -- The sinking of beds is a serious problem. Note dip in the dike,which was once completely level. (Northwestern region.)

Representative Cranberry Growing Establishments

The Central Cranberry Company. -- The Central Cranberry Company is one of the oldest and largest cranberry growing establishments in the Cranmoor district. Some of the producing beds are over seventy years old. The company is owned by five individuals, all of whom have other sources of income and live elsewhere. The foreman and his assistant, together with their families, have permanent residences at the marsh.

The buildings at Central are well constructed and are in good condition. The warehouse is the largest structure here and contains facilities for drying, storing, and packaging cranberries. The main cluster of buildings includes the two residences, the warehouse already mentioned, a horse barn now used for storage, and a well equipped machine shop. To the north and south of the main group of buildings are six cottages for seasonal laborers, only two of which were occupied during the last harvest season.

In addition to the foreman and his assistant who are employed on a year-round basis, other help is hired during the growing season and especially during the harvest. Forty people are employed here at harvest, which is partly a hand operation at this marsh. Seasonal laborers come from several sources. Some are steady employees at the paper mills in

Fig. 44. -- Warehouse building at Central Cranberry Company, Cranmoor. The buildings here are very substantial and well cared for.

Fig. 45. -- A dike at Central, constructed about seventy years ago. It is too narrow for machinery, and will be replaced.

Wisconsin Rapids who take their vacation in the fall in order to earn extra money by harvesting cranberries. Others are general farmers from the vicinity. Many of the workers, both Indian and white, are a part of a subsistence level group which makes its living gathering sphagnum moss in the summer, harvesting cranberries in the fall, and cutting pulpwood during the winter. They live in shacks along roads throughout the Central region.[5]

Most of the beds at Central have been producing for a great many years, and this factor alone presents certain problems in their management. Some of the dikes are too narrow for the passage of machinery, as they were constructed when cranberry growing was entirely a hand operation. A few of the beds contain "Natives" which are still growing much as they did when this was a wild marsh. Ditching and weed control have maintained the Natives as excellent producers to this day, but the beds are not level and must be harvested with the hand scoop.[6] Central has about 120 acres of vines.

Central's floodwater comes from several sources. The water from Hemlock Creek, together with seepage water from the large swampy reservoir area, is the major source. When more water is needed it is obtained from the Wisconsin River via the twelve mile canal which runs from the river to the Cranmoor district.

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[5] See Fig. 36, p.68.

[6] See Fig. 30, p.60.

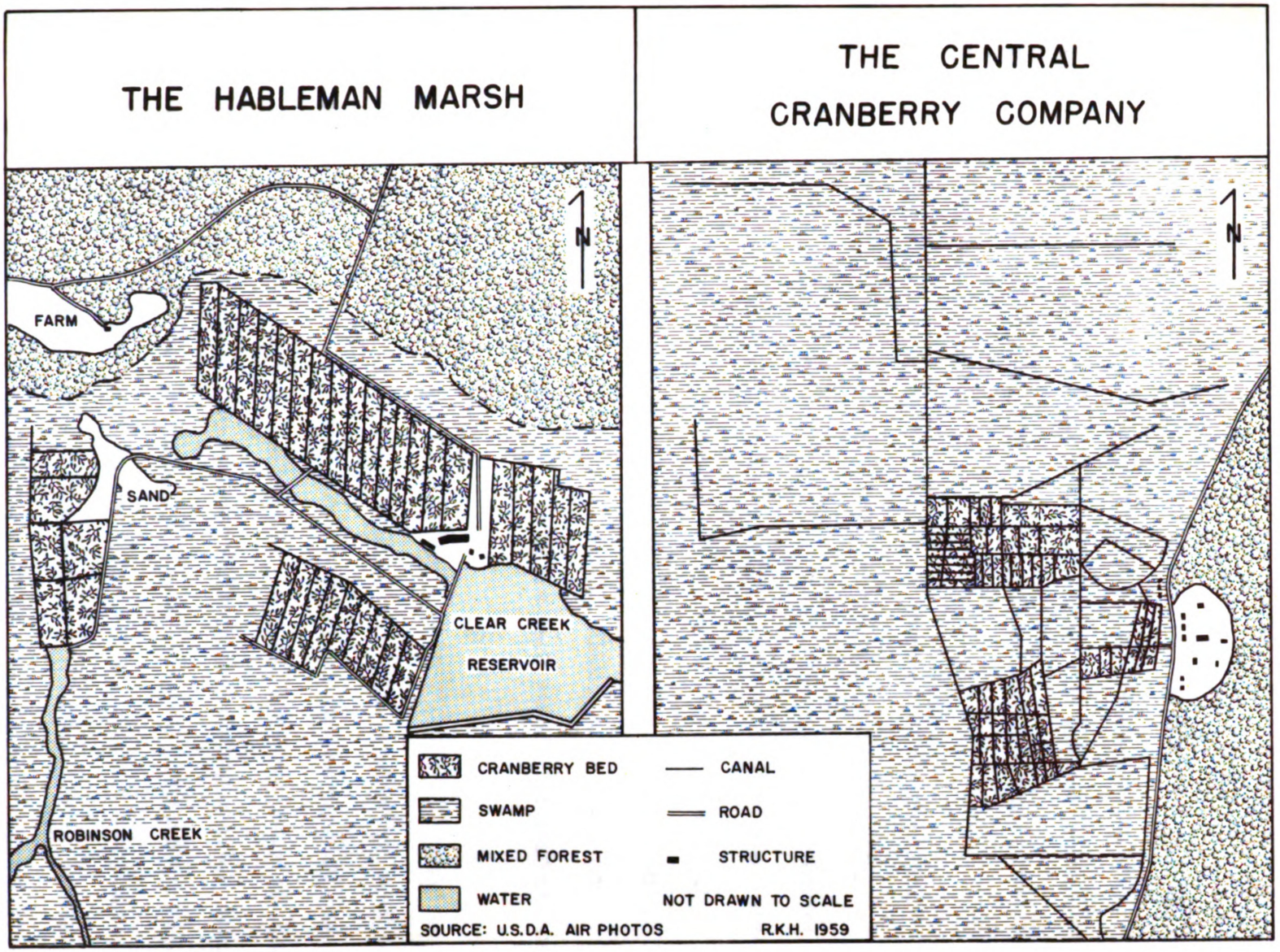

Fig. 46. The Hableman Marsh

Fig. 47. The Central Cranberry Company.

The Hableman Marsh. -- This marsh is located about five miles west of Millston, just off Highway 12 on the western edge of the Central region. It is one of three marshes owned and operated by the Hableman brothers, who do their own marketing.

The Hableman marsh is of more recent construction than most of the larger marshes in the Central region. There are only four major buildings at the marsh, a warehouse, a drying shed, and two residences--one for the owner and the other for the foreman. The warehouse is a long, one-story cement block structure of recent construction. It contains a dryer, packaging facilities, and storage space. The long open drying shed is now used for machinery storage.

The producing area is divided by a reservoir and swampy ground. The largest section of beds occupies a long stretch of level ground with a continuous pattern similar to that of the Cranmoor district. A smaller section of the producing area is constructed within the confines of a small stream valley, and consequently shows a more irregular pattern.

Two small streams furnish the water supply to this marsh, Clear Creek and Robinson Creek. Clear Creek comes in from the southeast, furnishes water for the bulk of the producing area. The stream is dammed to create a reservoir from which water is pumped into the producing area as needed.

Fig. 48. -- Residence at the Hableman marsh, near Millston. Note that the producing area is within a few feet of the house. (Central region).

Fig. 49. -- Warehouse at the Hableman marsh. Drying storage, sorting and packaging are all done in this new building.

Robinson Creek furnishes water to the smaller producing area built in its valley. The dammed water of Robinson Creek is fed into the producing area and is released from the producing area by gravity flow. No pump is needed for this section of the marsh.

The Hableman marsh is one of the few in the state constructed entirely on sand soil. There is no muck or peat present in any part of the producing area.[7] Although the sand is quite sterile the Hablemans have been able to produce some of the highest yields in the state through fertilization and other modern growing techniques.

The Cranberry Lake Development Company. -- The Cranberry Lake Development Company is located on Cranberry Lake just south of Phillips in central Price County. This marsh is on the Western edge of the Northcentral region.

Cranberry Lake is one of the older cranberry marshes in northern Wisconsin, being about 35 years old. It is owned by several individuals, none of whom live at the marsh . The Company is a member of the National Cranberry Association which handles all of its marketing.

The labor supply does not appear to be a problem at Cranberry Lake, for the marsh is completely mechanized. At one time over 200 workers were hired during harvest, but now only about forty are needed. A foreman and his family,

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[7] See Fig. 16, p. 28.

Fig. 50. -- The Cranberry Lake Development Company. This is one of the largest marshes in the state. It is completely mechanized. Structure in the foreground is an outhouse.

Fig. 51. -- Warehouse and other buildings at Cranberry Lake. Cement block warehouse was constructed using sand from the property. It is the largest in the state. Note weather instrument shelter.

including a son who also works at the marsh, are in permanent residence at Cranberry Lake.

The structures at Cranberry Lake include three small cottages for seasonal laborers, a large house where the foreman lives, a machine shop, an old horse barn, and a warehouse. The warehouse deserves special mention. It is a two story cement block structure, one of the largest and most modern in the state. Within the warehouse is storage space for machinery, vehicles and cranberries. Also in this warehouse is a dryer, packaging facilities and an office.

There are about 160 acres of vines at Cranberry Lake, making it one of the larger establishments in the state. The marsh is of modern construction, that is, the dikes are uniform distances from one another, and all have good roads. The harvesting is entirely mechanized.

Cranberry Lake is the sole water source here. Water is transferred from the lake into the marsh by means of two pumps of 70,000 gallonsper minute capacity. A 100 acre reservoir on the other side of the marsh services a detached group of beds. This also must be filled with water pumped from the lake. The water supply is somewhat of a problem here, largly because of an inadequate pump capacity. Two more pumps will be added in the near future.

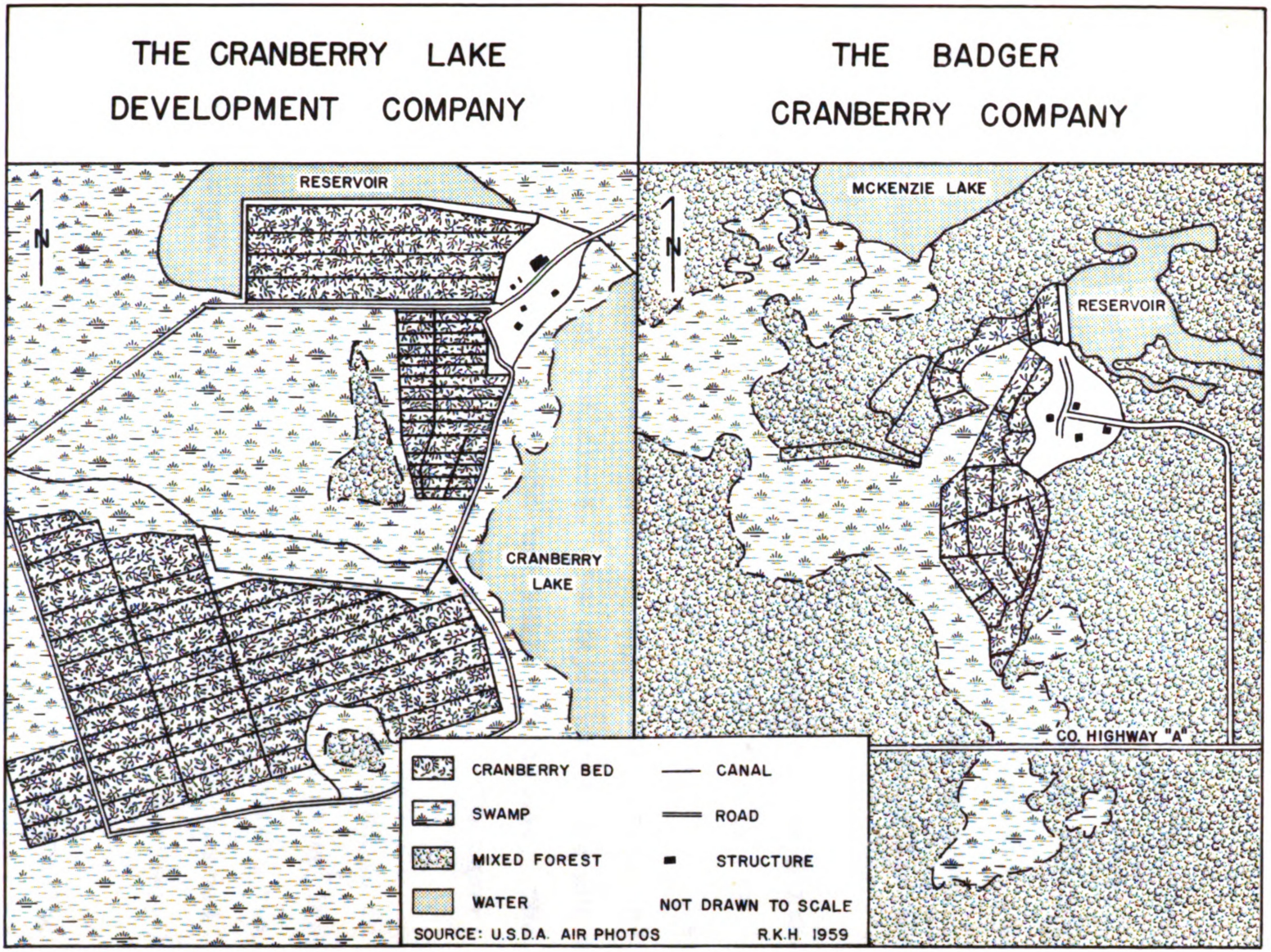

Fig. 52.--The Cranberry Lake Development Company

Fig. 53.--The Badger Cranberry Company

The Badger Cranberry Company. -- This marsh is located five miles northeast of Shell Lake, on the east central boundary of Burnett County. The Badger Cranberry Company is owned and operated by C. E. Lewis, who is also the mayor of Shell Lake. The company is a member of the National Cranberry Association, which handles the marketing for this establishment.

The Lewis marsh is probably the oldest in the Northwest region and all northern Wisconsin. The age is not reflected by the buildings at the marsh, however, for they are mostly of recent construction. Only a few shacks remain of the original buildings. The major buildings are a warehouse of moderate size and two small residences. The foreman is a permanent resident at the marsh. The owner lives in the town of Shell Lake.

There are forty acres producing and twenty acres in new vines. The producing area of this marsh shows an irregular pattern with beds of various sizes constructed within the confines of a small valley. The water source is the dammed Beaver Brook. Water flow from the reservoir is entirely by gravity.

There are two major problems at this marsh--sinking bogs and weeds. The depth of the peat base in the valley varies considerably--from twenty feet in some places to less than one foot in others. Sinking occurs in the deep

Fig. 54. -- Dryer and warehouse at the Shell Lake Marsh. This is an old marsh but these buildings are new. (Northwest region).

Fig. 55. -- Reservoir and marsh at Shell Lake. Warehouse is visible in the distance. The reservoir is a dammed portion of a stream; waterflow is entirely by gravity.

pockets of peat and the affected cranberry bed must be releveled and replanted, a costly and time consuming operation. The other problem is the superabundance of weeds. The westward increase in alkalinity of both water and soil in northern Wisconsin has already been noted. This marsh is one of the most western in the state, and the effects of alkalinity in the form of weeds has almost put this grower out of business.

The physical environment for cranberry growing at this marsh is certainly less than ideal, but with the aid of chemical weed sprays and much patience a profitable yield is produced in most years.

CHAPTER V

WISCONSIN CRANBERRY PRODUCTION: MARKETING AND NATIONAL IMPORTANCE

Marketing Wisconsin Cranberries

The marketing of cranberries is done on a very seasonal basis, as can well be imagined. At least 90% of the fresh berries are marketed during the months of October, November, and December. The marketing of processed, which usually involves about 30% of the crop, is somewhat more evenly distributed over the year. The emphasis is on early marketing in Wisconsin, for the majority of the berries are of the Searles variety, which are poor keepers. The later marketing involves mostly the McFarlin, Howes and Native varieties.

Wisconsin cranberries are marketed in most of the major cities from the east to the west coast of the United States. The cities receiving the largest shipments are in the Midwest, however. Chicago, Minneapolis-St. Paul, Kansas City and St. Louis receive the largest shipments of Wisconsin cranberries. Most of the berries are taken to market by truck, although shipments over very long distances often go by rail.

The northcentral states are the most important single regional market, according to the American Cranberry Exchange.[1] It is also reported that 53% of the total sales in the country

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[1] Department of Agricultural Economics, University of Wisconsin, "Economic Analysis of Cranberry Industry," (June, 1955). Dittoed.

were made in the northcentral states (twelve states) in 1951. This is further supported by a national survey taken by Booz, Allen, and Hamilton Business Surveys:[2]

> The survey revealed that despite wide national sales promotion in recent years, certain "historical opinions" are still current in the trade as to the location of the cranberry market; namely,
>
> 1. The market is felt to be concentrated in the northern states and particularly among people of northern European ancestry.
>
> 2. The middlewest is believed to be the best single regional market for two main reasons. First, a high percentage of home cooking is done in those states. Second, people of German and Scandinavian descent are numerous there, and considered to have an educated taste for cranberries due to the wide use in their native countries of lingenberries which are similarly flavored.

Growers Associations

Of the approximately 150 individual cranberry growers in Wisconsin, 104 belong to the National Cranberry Association. The Association handles the marketing for all its growers through its regional office in Wisconsin Rapids. The NCA is a cooperative type organization, handling supplies and consulting service for its growers besides the marketing function. The brand under which most of the Association's products are marketed is "Ocean Spray," although some are sold under the "Snoboy" brand. The processing plants are located in North Chicago.

The only other growers' association in Wisconsin is Indian Trail, Incorporated, which is not a co-op but a merchandising

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[2] Ibid.

and selling organization. Freezing and processing for Indian Trail is done at Ripon, while most of the fresh packaging is done at the Central Cranberry Company in the Cranmoor district. The main office is located in Wisconsin Rapids.

Independent Growers

There are only two independent growers of major importance within the state. One is The Hableman Brothers who have marshes near Millston and Camp McCoy, also on the western margin of the Central region. The other independent grower is Vernon Goldsworthy who is the major stockholder and president of Cranberry Products, Inc., at Eagle River. Goldsworthy's bogs are located at Thunder Lake, in the eastern corner of Oneida County in the Northcentral region.

The Hableman Brothers market their fresh berries in Minneapolis by means of several large trailer trucks. Their processing berries are sold to another of the Wisconsin associations, since they do not have their own processing facilities.

Vernon Goldsworthy of Eagle River markets both fresh and processed berries under the "Eagle River" brand. Cranberry Products, Inc., of Eagle River, is the larger of the two cranberry processing plants in the state. A variety of cranberry products are made there utilizing berries from the Thunder Lake marshes and various other marshes in the state.

Wisconsin's Place in National Cranberry Production

Cranberry production from year to year shows a considerable fluctuation, primarily due to weather conditions at crucial points during the growing season, but a steady increase in production has been the general trend in most growing areas. The United States production has increased quite steadily from 318,000 barrels in 1900, to over one million barrels in the last few years.[3] The only large area of commercial production that has shown a significant decline is New Jersey. Formerly New Jersey ranked second to Massachusetts in national production but was surpassed by Wisconsin in 1938 and has been in third position since then. Figure 55 indicates a general decline of bog acreage in New Jersey, beginning in the middle 1930's which has continued to the present although the production level has remained about the same during this period. Figure 56 indicates that all producing areas, including New Jersey, have greatly increased yields since the Second World War, a fact that accounts for the maintenance of prewar production levels in New Jersey despite decreasing total acreage.

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[3] The unit measure of cranberries is a standard barrel established by an act of Congress effective July 1, 1916. The dimensions of the barrel are fixed by law to a content of 5,826 cubic inches. This amounts to about 100 pounds of cranberries, which is the usual definition of "barrel" at the present. The actual barrels are no longer used in the industry, as they have been replaced by more efficient containers for drying and shipping. The unit measure, "barrel" as used in this paper means 100 pounds of cranberries. (Bulletin 1882, United Stated Department of Agriculture, 1942, p. 21).

CHAPTER VI

SUMMARY AND CONCLUSIONS

Wisconsin is second in importance in the national production of cranberries, producing about one-fourth of the total million barrels grown annually in the United States. Since 1945 the expansion of Wisconsin's cranberry industry has been greater than in any other cranberry growing state.

There are three producing regions within the state. First in importance is the Central region which is located mostly on the Lacustrine plain of Glacial Lake Wisconsin. Both the northern regions, Northwest and Northcentral, are situated on ground moraines of Cary age. Bogs are widely scattered in both regions, but reflect differences in the regional drainage patterns.

The climatic setting of Wisconsin's cranberry industry poses certain problems not as prevalent in other states. Frequency of frosts and the shortness of the growing season are the major problems. The more extreme coldness of the winter months, the greater number of hours of sunshine, and the larger amount of precipitation during the summer months than in other cranberry producing states are the chief climatic assets.

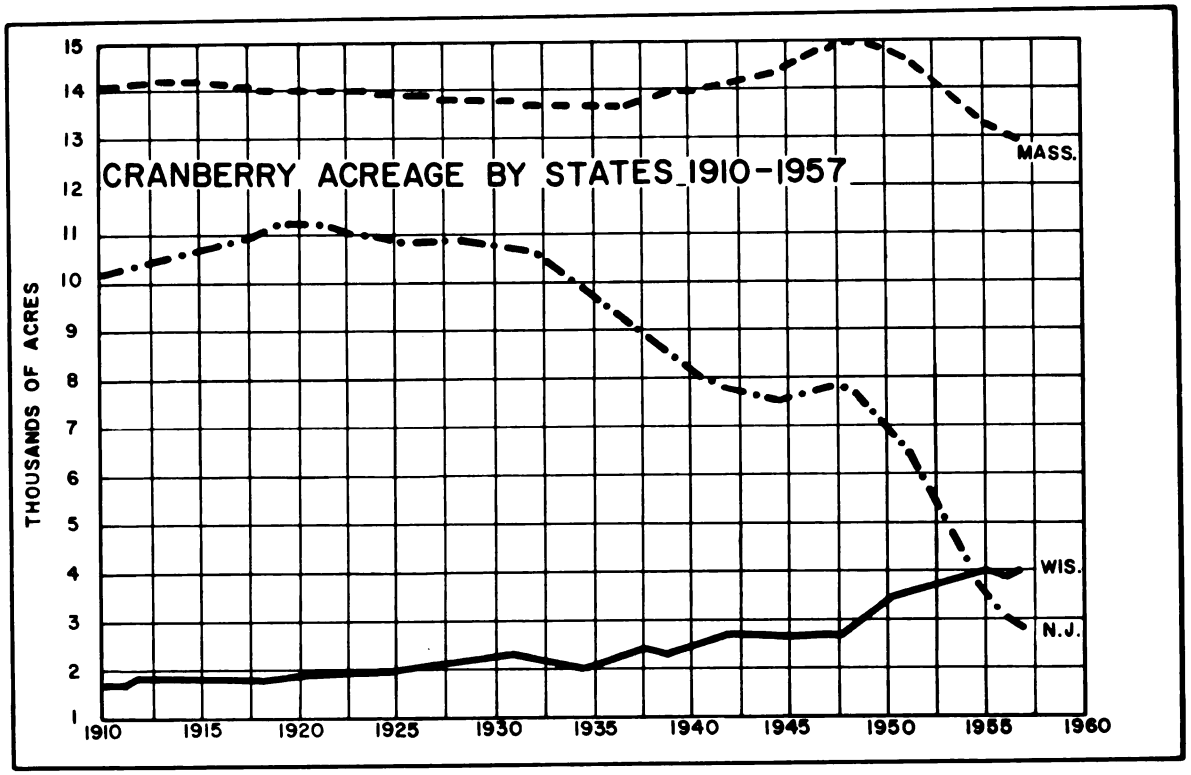

Fig. 56.--Cranberry Acreage by States 1910-1957

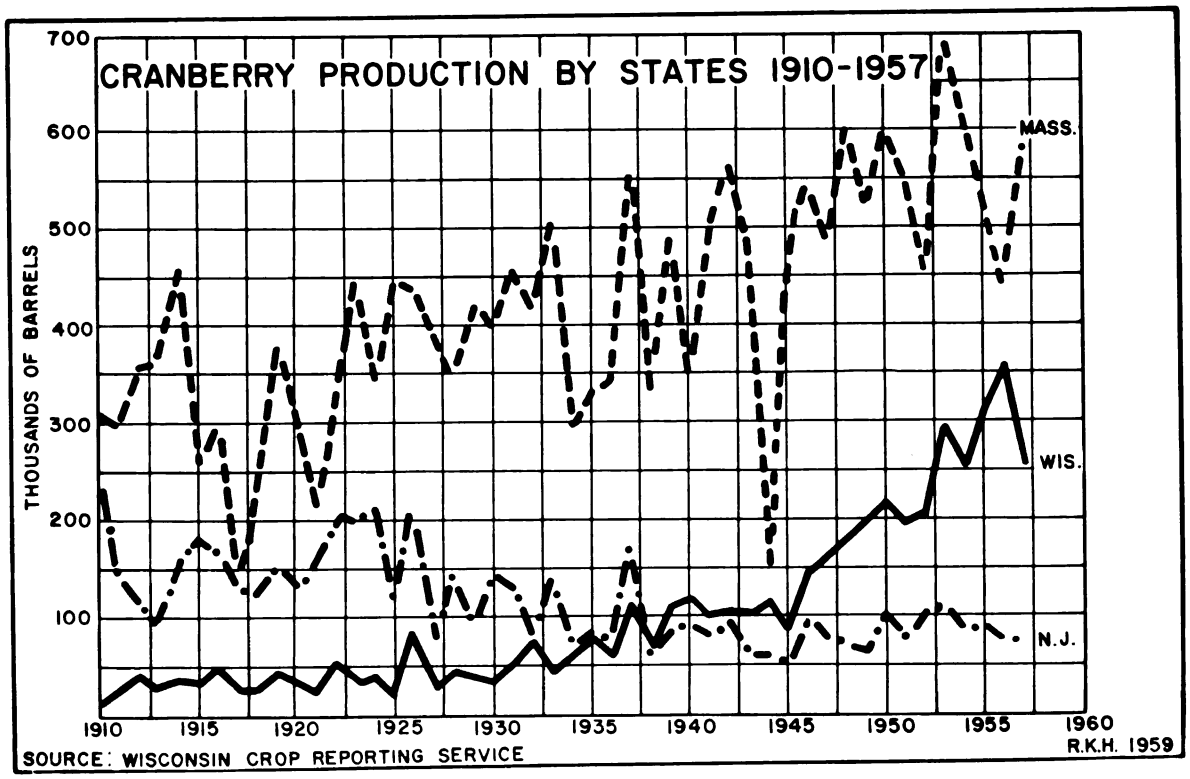

Fig. 57.--Cranberry Production by States 1910-1957

In the United States the general increase of yields in recent years is principally due to improved cultural methods. Since 1945 many important developments have taken place. New chemicals for weed killing, better fertilizers, more widepread mechanization of growing and harvesting operations, and in general, more scientific growing practices have all had their effect on increased bog production and the improvement of the product.

Table 2 indicates tremendously greater yields occurring in Wisconsin than in the other producing areas.[4] There are many factors that contribute to the high yield in Wisconsin. The two most apparent ones are the use of higher yielding varieties of cranberries, and improved methods of growing and harvesting. The Searles Jumbo is the leading variety grown in Wisconsin, comprising over 60% of the total acreage in 1956.[5] The average yield per acre of this variety in 1956 was 103 barrels per acre. The McFarlin variety, which is the second most important in the state with about 20% of the total acreage, yielded an average of 82.1 barrels per acre. The highest yielding variety in Massachusetts is the Early Black, averaging 42.5 barrels per acre in 1955. The Howes variety is the only

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[4] Washington and Oregon have produced yields similar to those in Wisconsin in recent years. Although discussion of these states is omitted here, the factors responsible for the high yields on the west coast are, generally speaking, the same ones covered by the discussion of Wisconsin yields.

[5] Wisconsin Crop Reporting Service, op.cit. p.8.

TABLE 2

CRANBERRY YIELDS PER ACRE BY STATES, 1910-1957
(IN BARRELS)

Year	Massachusetts	New Jersey	Wisconsin
1910	22.3	23.6	9.4
1911	21.1	14.1	17.6
1912	25.1	10.9	25.0
1913	25.8	9.6	16.7
1914	33.2	15.1	18.3
1915	18.1	17.2	19.4
1916	25.8	15.6	21.1
1917	9.7	11.8	15.0
1918	15.5	11.5	16.7
1919	28.2	13.8	22.2
1920	22.1	11.6	18.3
1921	14.9	14.7	12.6
1922	24.1	18.5	28.9
1923	32.2	18.2	17.5
1924	24.4	19.5	21.0
1925	32.2	10.6	12.5
1926	31.5	19.7	40.5
1927	27.7	6.9	11.9
1928	25.2	12.7	20.5
1929	30.5	8.3	19.1
1930	28.6	13.5	15.7
1931	33.3	12.3	20.0
1932	30.3	7.5	32.6
1933	36.9	13.7	19.1
1934	21.2	7.1	28.1
1935	24.2	8.7	36.7
1936	25.3	7.9	27.0
1937	40.9	19.0	47.9
1938	23.6	7.0	26.7
1939	35.3	10.4	45.0
1940	23.2	11.0	48.4
1941	35.7	10.0	38.1
1942	40.6	12.2	39.6
1943	34.6	8.1	37.8
1944	11.1	7.8	42.6
1945	33.0	6.4	30.4
1946	37.6	13.1	53.7
1947	32.9	10.5	59.6
1948	40.3	8.3	85.0
1949	34.7	8.9	64.5
1950	41.2	14.7	63.4
1951	38.4	11.7	54.4
1952	31.1	17.9	54.9
1953	49.6	28.4	77.6
1954	43.4	20.7	64.1
1955	40.7	25.0	78.8
1956	34.2	24.3	91.8
1957	45.0	27.5	65.0

[6] Ibid., excerpt from pp.18,19.

one grown to any great extent in both states. In Massachusetts this variety yielded 91.8 barrels per acre.

Although the different varieties used in each of the growing areas are mostly responsible for the greater yields in Wisconsin, there are many other factors to be considered. Mechanization, the flooding method of harvest, weed and insect control, and general bog management all have been touched upon in preceding chapters but are mentioned again here because of the important contribution they make to the production of any bog.

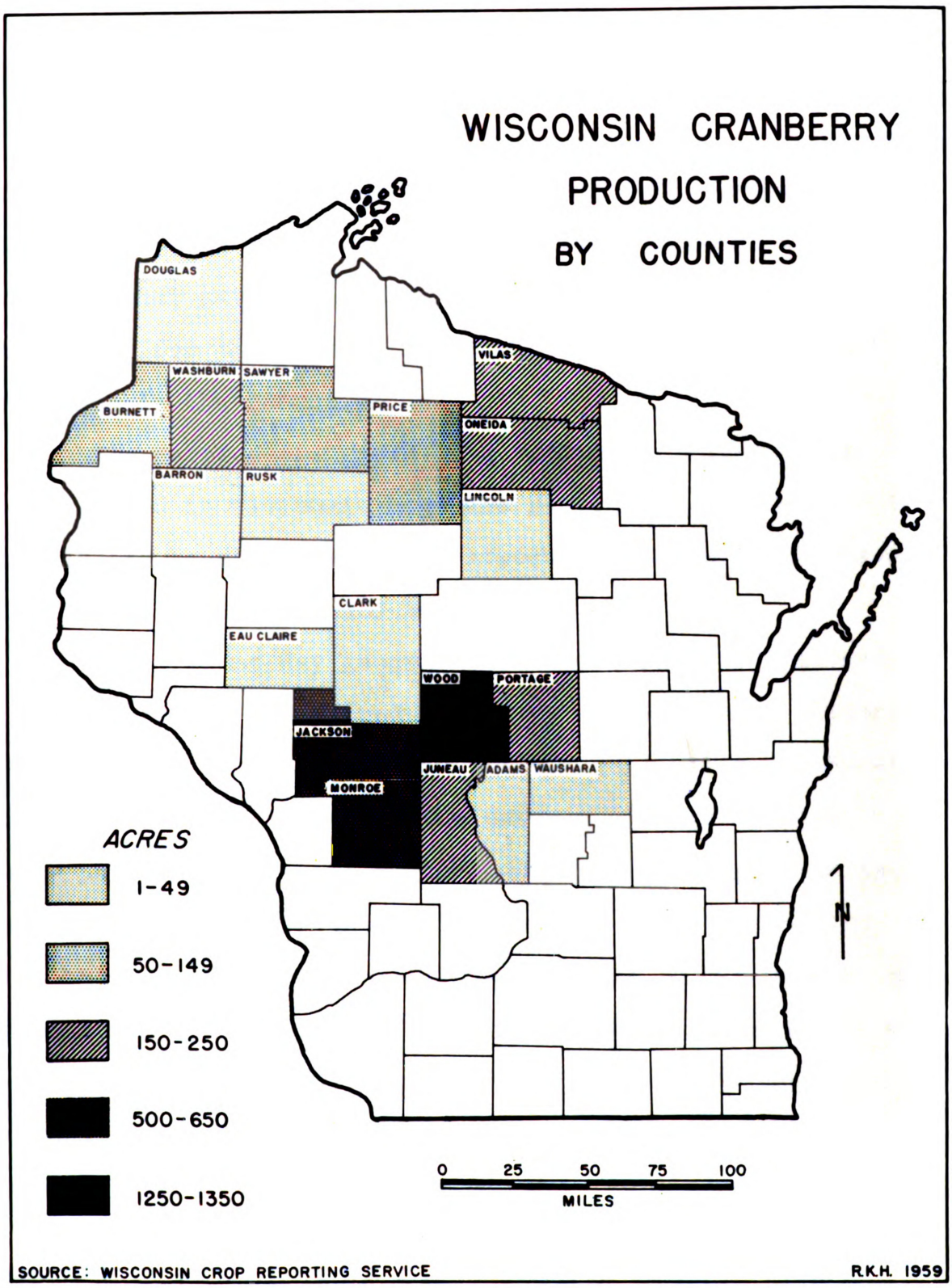

Fig. 58.--Wisconsin Cranberry Production by Counties

Most cranberry growing establishments are isolated within forested areas, consequently the vegetational pattern of the area becomes an important factor in areal differentiation. Vegetational patterns within the producing areas are equally important for the control of weeds is one of the greatest problems in the industry.

Cranberries are grown on a variety of soils. The three types found in Wisconsin bogs are peat, sand, and muck. There appears to be no correlation between the degree of success of the growing operation and the soil type.

The present day geography of the Wisconsin cranberry industry can be better understood by reviewing its historical development. There are four distinct stagesof areal development. The first stage was the harvest of wild berries in many parts of the state by the Indians and early white settlers. The rise and fall of the Berlin area as a major producing region was the second stage of development. The center of the industry then moved to the lacustrine plain of Glacial Lake Wisconsin which has remained the most important region of the state. The latest area of development is in the northwest and northcentral part of the state. This expansion has taken place since the First World War.

The most important factors affecting the patterns and appearance of cranberry growing establishments in the three

regions are age and the physical setting. In the Central region many of the marshes are quite old and are constructed on continuously level land. The type of buildings and the uninterrupted gridiron pattern of the bogs reflect these facts. The Northwestern region is intermediate in age and the building types are not distinctive. The scattered pattern of the bogs reflects the undulating morainic topography. Individual marshes in this region are usually constructed in narrow stream valleys and have an irregular pattern. The Northcentral region is the newest of the three cranberry producing areas. Buildings and marshes are of modern construction, and reflect the mechanization of the industry in several ways. Most of the cranberry growing establishments in this region are constructed on level swampy ground bordering a lake. Marshes are widely scattered, but generally show a uniform rectangular pattern in the producing area.

The rate of expansion or the amount of expansion that can take place in the Wisconsin cranberry industry does not appear to depend to any great extent upon physical limitations or advantages. Some areas of the state are more favorable to the commercial production of cranberries than others, but usually the commercial cranberry marsh is based on an

environment that approximates the conditions of a wild cranberry marsh. It has been shown, however, that within the state of Wisconsin there are a variety of environmental circumstances in which cranberries can be and are profitably grown.

The amount of future growth of the Wisconsin cranberry industry will not be determined by limitations of the physical environment. Most of the growers in the state could double their existing bearing acreage on property they now own if the demand for cranberries would justify this. The principal governing factor in the growth of the industry has been and will continue to be the market for cranberries.

The condition of the market for cranberries is based upon many factors, most of which are outside the scope of this thesis. Product quality, distribution to markets, and consumer demand are the most apparent of these factors.

The Wisconsin cranberry industry will continue to expand more rapidly than other producing areas. The physical and cultural conditions which have made higher and more profitable yields possible, and the proximity to the greatest market--the Midwest, are Wisconsin's principal cranberry growing assets.

APPENDIX I

COVERING LETTER, QUESTIONNAIRE, AND SUMMARY OF DATA

(COPY OF)
(COVERING LETTER)

Department of Geography
Michigan State University
East Lansing, Michigan
14 February 1959

Although this letter is mimeographed for reasons of economy, I hope you will regard it as a personal appeal for information. Last summer I visited about forty different cranberry marshes, perhaps yours was one of them. The enclosed questionnaire is my only way of contacting those of you who I didn't get a chance to interview, and also to ask a few more questions of those I did talk to last summer. The results of the enclosed questionnaire are to be used in the preparation of a Master's Degree Thesis in Geography at Michigan State University. It is my purpose to describe the Wisconsin cranberry industry and particularly to point out special problems connected with cranberry growing in different parts of the state. I hope that this study will prove to be a valuable addition to information available on the Wisconsin cranberry industry.

Please return the questionnaire in the enclosed self-addressed and stamped envelop by March 1, if at all possible. All replies will be regarded as strictly confidential. Any published material resulting from this study will concern areas, not individual producers unless I have contacted you personally regarding this. I received your address from the grower's association to which you belong or by visiting your marsh. Thank you for your cooperation.

Sincerely,

Richard K. Haugen

1. Describe the location of your marsh (distance and direction from the nearest town and name of road).

2. How many acres of producing vines do you have? _____.

   Acres of vines not yet in production? _____.

   Acres of abandoned vines? _____.

3. What is the total acreage of your cranberry operation, including reservoir area, etc.?

   _____.

4. What is the source of your flood water? ( ) Lake _____ name
   ( ) Stream _____ name
   ( ) Other _____

5. What kind of soils do you have?

   ( ) Muck ( ) Peat ( ) Sand Combination_____

6. What is the acidity of your soil (expressed in pH, if possible)?

   _____

7. Is there a residence at the marsh? ( )Yes ( )No
   If ys, who lives there? ( ) Owner
   ( ) Foreman
   ( ) Other _____

8. Is cranberry production your main source of income? ( )Yes ( )No
   If not, is your main income ( )farm or ( ) non-farm?

9. How many years have you been raising cranberries? _____
   Are or were other members of your family in the cranberry business?

   _____

10. What special problems do you have connected with the particular location of your marsh? (for example, water supply, acidity of soil and water, sinking bogs, weeds, etc.)

Any additional comments are welcome. Thanks again for your time and effort.

TABLE 1

SUMMARY OF QUESTIONNAIRE DATA FROM THE NORTHWEST REGION

Location of marsh (nearest) (town)	Acres of Vines				Total acreage	Source of Flood Water	Soils	Residence*	Main Income
	Producing	New	Abandoned	Total					
Hawkins	5	0	0	5	35	stream	muck	xo	yes
Hayward	21	7	0	28	120	lake	peat	xo	yes
Hayward	32	0	0	32	100	lake	peat sand	xf	yes
Hayward	7	0	0	7	128	stream	peat	xo	yes
Minong	28	0	0	28	468	lake	peat sand	xf	no
Shell Lake	40	20	5	60	671	stream	peat	xf	yes
Shell Lake	60	8	5	68	700	stream	peat muck	xf	yes
Totals	193	35	10	228	2,222				

* x - There is a residence at the marsh
o - Owner is in residence
f - Foreman is in residence

TABLE 2

SUMMARY OF QUESTIONNAIRE DATA FROM THE NORTHCENTRAL REGION

Location of marsh (nearest town)	Acres of Vines				Total acreage	Source of flood water	Soils	Residence *	Main income
	Producing	New	Abandoned	Total					
Lanitowish Waters	30	0	0	30	120	lake	peat	xof	yes
Lanitowish Waters	15	5	0	20	200	lake	peat	xo	yes
Lanitowish Wat...	23	7	0	30	80	lake	peat sand	xo	yes
Merrill	55	0	0	55	2000	stream	peat	xf	no
Phillips	153	10	0	163	2400	lake	peat	xf	yes
Tomahawk	11	16	0	27	1800	stream	peat	xo	yes
Totals	287	38	0	325	6600				

* x - There is a residence at the marsh
o - Owner is in residence
f - Foreman is in residence

TABLE 3

SUMMARY OF QUESTIONNAIRE DATA FROM THE CENTRAL REGION

Location of marsh (nearest town)	Acres of Vines				Total Acreage	Source of flood water	Soils	Residence	Main income
	Producing	New	Abandoned	Total					
Babcock	27	5	0	32	1460	seepage	muck peat sand	xo	yes
Babcock	40	5	0	45	920	stream	muck sand sandy-loam	xo	yes
Black River Falls	14	0	0	14	560	stream	sand	xo	½ of inc.
City Point	25	1.5	0	27	2620	seepage	--	xo	yes
Cranmoor	99	12	15	111	2096	stream seepage	muck peat sand	x	yes
Cranmoor	18	0	0	18	100	stream	comb.	xo	no
Cranmoor	25	0	12	25	635	stream	sand	xo	yes
Cranmoor	22	0	0	22	682	stream	peat	xof	yes
Cranmoor	5	0	0	5	14	stream	peat	xo	no
Cranmoor	100	18	38	118	5280	stream	muck over sand	xf	yes
Cranmoor	50	0	0	50	120	stream	muck	xf	no

TABLE 3 (continued)

SUMMARY OF QUESTIONNAIRE DATA FROM THE CENTRAL REGION

Location of marsh (nearest town)	Acres of Vines				Total acreage	Source flood water	Soils	Residence	Main income
	Producing	New	Abandoned	Total					
Dancy	94	6	0	100	900	½ lake ½ stream	peat	xf	yes
Marshfield	20	4	0	24	640	seepage	peat	xo	no
Mather	12	0	0	12	1300	seepage	muck peat	xo[a]	no
Mather	47	2.5	0	50	4900	seepage	peat	xof	yes
Mather	11	0	0	11	263	--[b]	muck sand	xo	yes
Mather	5	15	2	20	1500	seepage	peat sand	xo	yes
Mather	16	0	0	16	1882	lake	peat sand	xf	no
Mather	30	2	8	32	1000	seepage	peat	xo	yes
Millston	35	0	0	35	1260	stream	sand	xof	yes
Millston	5	0	0	5	25	stream	sand	xo	yes
Millston	4.5	0	0	4.5	550	stream	peat sand	xo	no
Neilsville	21	0	0	21	1120	stream	sand peat	xf	no

[a] the owner is present part-time at the bog

TABLE 3 (continued)

SUMMARY OF QUESTIONNAIRE DATA FROM THE CENTRAL REGION

Location of marsh (nearest town)	Acres of Vines				Total acreage	Source flood water	Soils	Residence	Main income
	Producing	New	Abandoned	Total					
Pittsville	4	0	0	4	1300	seepage	muck	xo	no
Tomah	3	0	20	3	33	stream	sand	xo	no
Tomah	156	0	0	156	3500	stream	peat	xof	yes
Tomah	5	0	0	5	75	stream	sand	xo	no
Tomah	50	10	0	60	2000	stream	sand muck	xof	yes
Tomah	70	0	2	70	2300	stream seepage	peat	xof	yes
Tomah	4	0	1	4	40	stream	sand	x	no
Tomah	3	0	0	3	80	stream	sand	x	no
Warrens	4	0	0	4	40	stream	peat	xo	yes
Warrens	13	0	0	13	400	stream	peat muck	xo	yes
Warrens	5	0	0	5	256	stream	comb.	xo	no
Warrens	22	13	0	35	1320	seepage	muck sand	xo	yes
Warrens	3.5	0	0	3.5	10	seepage	peat sand	xo	no
Warrens	60	10	0	70	912	stream	sand peat	xo	yes

TABLE 3 (continued)

SUMMARY OF QUESTIONNAIRE DATA FROM THE CENTRAL REGION

Location of marsh (nearest town)	Acres of Vines				Total acreage	Source of flood water	Soils	Residence	Main income
	Producing	New	Abandoned	Total					
Warrens	17	0	0	17	90	stream	muck	xo	yes
Warrens	42	3	0	45	590	stream	muck sand	xo	yes
Warrens	12	0	0	12	580	stream seepage	sand muck peat	xo	yes
Warrens	20	0	0	20	360	stream	peat sand	xf	yes
Warrens	40	2	0	42	640	seepage	peat	xf	yes
Warrens	7.5	0	0	7.5	210	stream	sand	xo	no
Warrens	3	2	0	5	240	seepage	peat	xo	no
Warrens	9	1	0	10	360	stream	sand	--[a]	yes
Warrens	35	0	0	35	800	stream	muck over sand	xf	no
Wisconsin Rapids	84	14	0	98	700	stream	muck peat	xf	yes
Wisconsin Rapids	26	0	0	26	374	stream	sand	xo	yes
Wisconsin Rapids	33	3	0	36	800	stream	muck sand	xof	yes

[a] No response given

TABLE 3 (continued)

SUMMARY OF QUESTIONNAIRE DATA FROM THE CENTRAL REGION

Location of marsh (nearest town)	Acres of Vines				Total acreage	Source of flood water	Soils	Residence	Main income
	Producing	New	Abandoned	Total					
Wisconsin Rapids	49	11	0	60	1680	stream	peat over clay	xf	yes
Wisconsin Rapids	33	0	0	33	1000	stream	peat	xf	no
Wisconsin Rapids	30	2	0	32	--[a]	stream	muck	xf	no
Wisconsin Rapids	30	0	1	30	42	stream	peat sand	xof	no
Wisconsin Rapids	12	0	0	12	25	stream	sand	--[a]	--[a]
Totals	2,091	167	109	2,305	59,406				

[a] No response given

APPENDIX II

REGIONAL SUMMARY OF SOIL AND WATER ACIDITY, WEED POPULATION

TABLE 4

TABLE 4

REGIONAL SUMMARY OF SOIL AND WATER ACIDITY, WEED POPULATION*

Region	Central	Northcentral	Northwest
No. of samples	22	10	6
Water pH	6.38	6.60	7.35
Soil pH	5.11	4.63	4.88
Weeds**	3.30	2.60	3.00

** Weed population based on a scale of 5. 1 indicates no weeds, 5 indicates serious weed problem.

*Based on unpublished research paper by Malcolm N. Dana, "Small Fruits, Their Improvement Culture and Handling," Department of Horticulture, University of Wisconsin, Madison (December 1953).

BIBLIOGRAPHY

Books

Dansereau, Pierre. Biogeography: An Ecological Perspective. New York: The Ronald Press Company, 1957.

Bulletins

Franklin, Henry J. and Stevens, Neil E. Weather and Water as Factors in Cranberry Production. Massachusetts Agricultural Station, Bulletin No.433. Amherst: Massachusetts State College, June, 1946.

Hole, Francis D. and Lee, Gerhard B. Introduction to the Soils of Wisconsin. Wisconsin Geological and Natural History Survey, Soil Survey Division, Bulletin No.79, Educational Series No. 10, Madison: University of Wisconsin, 1955.

Malde, O. F. Cranberry Bog Construction for Wisconsin. The University of Wisconsin Agricultural Experiment Station Bulletin No. 213, Madison: published by the State, June, 1911.

Martin, Lawrence. The Physical Geography of Wisconsin. The Wisconsin Geological and Natural History Survey, Bulletin No. XXXVI, Educational Series No.4, Madison: published by the State, 1916.

Stevens, C. D., Cross, C.E., and Piper, W.E., The Cranberry Industry in Massachusetts. Massachusetts Department of Agriculture, Bulletin No. 157. Boston: Massachusetts Department of Agriculture, May, 1957.

United States Department of Agriculture, Harvesting and Handling Cultivated Cranberries. Farmers' Bulletin No.1882 Washington, D.C.: United States Department of Agriculture, January, 1942.

Whitson, A. R., et al. A Report on Cranberry Investigations. The University of Wisconsin Agricultural Experiment Station, Bulletin No. 119. Madison: published by the State, February, 1905.

Bulletins

Wisconsin Crop Reporting Service. Cranberries of Wisconsin, Special Bulletin No.70, Madison: Wisconsin State Department of Agriculture, December, 1957.

Wisconsin Crop Reporting Service. Wisconsin Cranberries. Bulletin No.322, Madison: Wisconsin State Department of Agriculture, November-December, 1953.

_____. Cranberry Bog Management for Wisconsin. The University of Wisconsin Agricultural Experiment Station, Bulletin No. 219, Madison: published by the State, April, 1912.

Reports

The Natural Resources Committee of State Agencies. The Natural Resources of Wisconsin. An Inventory by the Natural Resources Committee of State Agencies. Madison: published by the State, December, 1956.

Articles in Periodicals

Peltier, George L. "Factors Affecting Cranberry Yield in Wisconsin," Cranberries: the National Cranberry Magazine, Vol. XXII, No.8 (December, 1957).

Hall, Clarence J. "Wisconsin--An Increasing Production Challenge to East," Part I, Cranberries: The National Cranberry Magazine, Vol. XXIII, No.3 (July, 1957).

Hall, Clarence J. "Wisconsin--Grasses Growing on Many Marshes Being Reduced," Part II, Cranberries--the National Cranberry Magazine, Vol. XXII, No. 5 (September, 1957).

_____. "Wisconsin Production to be Matching Massachusetts in Ten Years," Cranberries: the National Cranberry Magazine, Vol. XXII, No. 6 (October,1957).

Articles in Periodicals

Durand, Loyal Jr. "Wisconsin Cranberry Industry," Economic Geography, Vol. XVIII, 1942.

Stevens, George L. and Joan Nash, "The History of the Wisconsin Cranberry Industry," Wisconsin Historical Magazine, Wisconsin State Historical Society, Vol. XVI, March 1943.

Aerial Photography

United States Department of Agriculture Commodity Stabilization Service, Photography of Jackson, Oneida, Price, Vilas and Wood Counties at a scale of 1:20,000. 1950.

Maps

United States Geological Survey, Mertel Quadrangle, Wisconsin, 15 Minute Series (Planimetric), 1:48,000. Washington 25, D.C. 1949.

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