



THE CRANBERRY INDUSTRY AT A CROSSROADS:

**The State of the Cranberry Industry in 2022
(Project Funded by USDA-NIFA Grant No. 2017-
67023-26906)**

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Public Summary Report

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Summary Note

This report is a highly condensed summary of the full report and forthcoming book. For further details, please contact Andy Hira, ahira@sfu.ca

Dedication

Dedicated to the hard working and sometimes cantankerous cranberry growers of North America, whose dedication, enterprising spirit, and sense of mission are unmatched.

Disclaimer

All opinions expressed in this report are those of the authors and do not reflect the perspectives of our funders or employers. The reader should keep in mind that while a survey was carried out, the opinions expressed in this report are not purported to represent majority views. They are generally expressed here as reflecting multiple interviewees' opinions and/or offering an interesting perspective on the industry. Even if it makes some in industry uncomfortable, we believe that reporting differences of opinion is important for an independent report, and that it has the potential benefits of voicing concerns that might not otherwise be heard in a form where they might feed into developing industry consensus around strategy. While there is no way to "resolve" the truth of most of the perceptual claims noted here, they inform the behavior of key stakeholders and the ability to resolve fundamental governance issues.

Acknowledgements and Methods of Study

This work was supported by the U.S. Department of Agriculture, National Institute of Food and Agriculture under Grant No. 2017-67023-26906, received by the Principal Investigator, Dr. Paul Gottlieb of Rutgers University. This case study is part of a larger study of agricultural clusters in the U.S., including precise mapping and examination of them as well as a parallel case studies on hops and racehorses. We would like to thank the funders. We would like to thank my research assistants, partly funded through USDA and partly through SFU's Work-study program: Raphael Ochil, Leighton Kerr, Ester di Maio, Ronaldo Au-Yeung and Amélie Lauzon of University of Ottawa. Leighton deserves special acknowledgement, for his significant work on the Canadian statistics and helping to prepare the survey. We would also like to thank Patty and

Sarita Hira for additional research and editing assistance. Patty also helped to gather and organize the statistics around BC and Quebec cranberry production.

Research was conducted through historical and statistical analysis; interviews with stakeholders in each of the 7 main producing clusters; and surveys carried out through intermediaries in the same 7 areas, over the period 2018-22. Cranberry industry stakeholders were generally open and supportive once we could reach them. We made an early pitch about the research to Ocean Spray at the Cape Cod Cranberry Growers' Association in 2018, and they have been generally supportive of the effort to provide a strategic overview of the industry, while still respecting my need for independence as a researcher. The stakeholder interviews were approximately 1 hour in length, and consisted of both predetermined and open ended questions, with the promise of not ascribing statements to any individual. Cranberry growers and handlers were generally very open and friendly to the study, and we were able to attend the NACREW meeting of cranberry researchers and extension workers. We would like to particularly thank the cranberry growers' associations in each of the clusters; all were very helpful. We were fortunate to be invited to the Washington/Oregon and Wisconsin growers' associations annual meetings, which gave me additional insights into concerns and allowed me to introduce the study. Unfortunately, the COVID-19 pandemic put a stop to the research for about 2 years. As a result, we had to shift some of the B.C. research to on-line interviews over zoom once SFU allowed the research to resume in Spring 2022. Happily, we were able to conduct over a dozen in person interviews in Wisconsin in March 2022 to complete the study. The growers' association in Québec, the APCQ, and the Government of Québec were particularly helpful in piecing together the important story of the cluster formation there.

Particular thanks are owed to officials in the USDA and the CMC. In the USDA, Patty Bennett's Marketing Order and Agreement Division, who helped considerably to clarify issues around the marketing order, and to Greg Lemmons, of the National Agricultural Statistics Service, and Agnes Perez of the Economic Research Service, who went out of their way to help with guidance around how to find cranberry statistics. In CMC, Michelle Hogan's support for the survey was vital to this study. CMC also kindly permitted me to virtually attend their 2022 winter meeting, even though we had to get up at 5 am on consecutive days for it. The CMC, the

BCCMC, and the APCQ all were kind enough to disseminate my survey to their growers' lists in Winter 2021-22.

We wish to thank the following list of interviewees. In accordance with SFU's ethics policy, all interviews were done confidentially, through 1 hour in person interviews with some pre-set and some open questions. Expert interviewees were assured that their names would be listed in the report (with their consent), but no information or perspectives would be specifically ascribed to them. We do not list any names of the government officials we interviewed for the study to protect them. Cranberry growers' names are not listed to protect them, and while other stakeholders' names are listed in the interviewees list, no attribution connects information to names. Over the course of three years over 80 1 hour mostly in person interviews, were conducted with stakeholders in Massachusetts, New Jersey, Washington, Oregon, Wisconsin, Québec and British Columbia and with USDA officials in D.C. We found names of growers and handlers through web searches. We then sent e-mails and made phone calls to set up interviews; this usually required multiple efforts. We are thankful to the organizers of the 2019 NACREW and the 2019 Washington-Oregon growers' associations for allowing us to pitch the research to their members.

List of Interviewees (growers not listed)

Dawn Gates Allen and Brian Wick, Cape Cod Cranberry Growers' Association

Charles Armstrong, U. of Maine Extension

Amaya Atucha, University of Wisconsin Madison, Dept. of Horticulture

Steve Berlyn, Mariani Premium Dried Fruits

Coreen Rodger Berrisford, B.C. Cranberry Marketing Commission, General Manager

Marc Bieler, CEO, Bielers Canneberges, and founder of Atoka Products

Cassie Bouska, Extension Officer, Oregon State U.

Shawn Cutts, American Cranberry Growers' Assn. (NJ)

Bob Donaldson, Director, Oregon Growers' Assn.

Rosa Gallardo, Elizabeth Canales, and Xueying Ma (VaccCap consumer preferences researchers)

Michel Gardner, agronomist consultant, Québec cranberry industry

François Gervais, CETAQ, Québec

Vincent Godin, Pres. of APCQ and Emblème, Québec

Christelle Guédot, University of Wisconsin Madison, Entomology

Nicole Hansen and Bill Hatch, Cranberry Creek (Wisconsin) Cranberries

Rebecca Harbut, Kwantlen Polytechnic University

Michelle Hogan, Cranberry Marketing Committee

Kim Houdlette, Makepeace Cranberries

Terry Humfeld and John Wilson, The Cranberry Institute

Massimo Iorizzo, Horticultural Science, NC State (head of VaccCap Research Project)

Allison Jonjak, University of Wisconsin Madison, Cranberry Outreach Specialist, Division of Extension

Didier LaBarre, Research APCQ, Québec

Jordan Lamb, DeWitt LLP (Wisconsin)

Tom Lochner, Director, Wisconsin Cranberry Growers Association

Jim Luby, U. of Minnesota

Heidi Lundstrum, E.S. Cropconsult (B.C.)

Chip Matthews, Pappas Lasonde, Inc.

Mass. Agricultural Commissioner John Lebeaux

Mass. State Sen. Vincent DeMacedo

Ocean Spray Employees- Rod Serres; Jeff LaFleur, Samantha Tochen (Wash.); Don Kloft (Oregon); Jean Pierre Deland (Québec); Miranda Elsby (B.C.), Leroy Kummer (Wisc.)

Jean Olsthoorn, agronomist consultant, Québec cranberry industry

Jacques Painchaud, retired, former official of MAPAQ (Québec Govt.)

Dr. Kim Patten, Prof. Emeritus, Washington State University, former director of the Long Beach extension station

Mat Patterson, Director, Marketing Development, Government of British Columbia

Martin Plante, CEO, Citadelle, Québec

Susan Playfair, author of *America's Founding Fruit: The Cranberry in a New Environment*

Renée Prasad, Associate Professor, Agriculture Technology Dept., University of Fraser Valley, British Columbia

Rutgers Research Station: Nick Vorsa, Amy Howell, and Jennifer Johnson-Cicalese

Hilary Sandler, UMass Research Extension Station

David Brock Smith, Oregon State Representative
Kalpna Solanki, Chair, BC Cranberry Marketing Commission
Carolyn Teasdale, B.C. Government
Monique Thomas, APCQ Director, Québec
Alan Thompson, Badger State Fruit Processing Company
Université Laval: Richard Bélanger, Jean Caron, and Silvio José Gumiere
USDA, Economic Research Service
USDA, Marketing Order and Agreement Division
USDA, NASS (National Agricultural Statistics Service)
Mike Wallis, Executive Director, B.C. Cranberry Growers Association
Bob Wilson, The Cranberry Network LLC (Wisconsin)
Nodji Van Wychen, Wetherby Cranberries

Acronyms

APCQ = Association of Cranberry Producers of Québec
BCCMC = British Columbia Cranberry Marketing Commission
CI = Cranberry Institute
CMC = Cranberry Marketing Committee
ERS = Economic Research Service (part of USDA)
NASS = National Agricultural Statistics Service (part of USDA)
R&D = Research and Development
SDC = sweetened, dried cranberries
USDA = U.S. Department of Agriculture

Executive Summary

Abstract

This study summarizes the North American cranberry industry from the perspective of economic cluster theory and business strategy. The study includes an overview of the industry, statistical analysis, and stakeholder analysis based on a series of interviews across North America from 2019-20. It closes with a set of recommendations designed for industry stakeholders and policymakers. This report summarizes a full length book that examines the cranberry industry from the perspective of cluster and cooperative theory.

Analytical Framework of the Report- Cluster Theory as Applied to Agriculture

Clusters are geographically concentrated areas of activity around a certain industry. The central question for modern cluster theory from the perspective of industry dynamics is why firms co-locate in the same space. The classic example is Silicon Valley, where multiple IT companies compete side by side, amidst some of the highest costs in the world. The truth is that we have only partial answers. Some suggest that clusters are a result of historical accident, such as the automobile industry being centered in Detroit because some pioneers such as Henry Ford, were from there. Others say that industries are set up close to transportation hubs or large markets, such as Napa Valley's proximity to San Francisco. Meanwhile, some suggest that having flexible labor pools, specialized training institutes and universities, and a set of anchor firms with startups and subcontracts, help to explain the "stickiness" of industries in certain locations. Still others suggest, and many places are betting, that policy can make a difference, for example by improving infrastructure, setting up R&D facilities, training local personnel, and providing startup funds, among other things. The truth is we don't have any consensus around why clusters arise, and what gives them staying power.

One of the most obvious explanations is to look at natural conditions and use them to explain location. Steel mills are close to Pittsburgh because that's where the coal is, according to this thinking. The same is generally assumed in agriculture. We grow food where the conditions are optimal, which leads to lower cost and better quality food. But what if some of the other factors, such as proximity to large markets or infrastructure, or availability of agricultural extension agents, also figure in? Then growing conditions would only be part of the story. This

is the purpose of our research project, to examine why agricultural crops locate in certain places, whether they cluster, and, if so, why they do.

While we can not provide a definitive answer, we can say after 3 years of study that the answer is far more complicated than growing conditions. There are a mix of complex factors that determine agricultural growing location. Let's consider the wine industry. Wine grapes can be grown in a wide variety of places around the world from the country of Moldova to Australia to North Africa. So, why, when we think of the great wines of the world, do we think of Bordeaux and Napa? The answer at first glance would seem to be product differentiation. The winemakers in those areas have developed techniques and knowledge as well as a reputation for quality that helps them to sell at a higher price, allowing them to stick around in much higher cost regions. Most of the academic studies on agricultural clusters have focused on wine, for this reason, it's a product with some clear clusters, even though there is also a lot of bulk wine production.

Why We Chose to Study Cranberries and How We Did the Study

Our approach in this study was to do something completely different, to study an undifferentiated commodity-type agricultural product that was geographically-concentrated. The Gottlieb-Goetz-Dobis team were able, over the course of 2017-2018, to obtain anonymized farm level production data from USDA that allowed them for the first time to map out agricultural production by crop and location across the U.S. In a series of forthcoming publications, they map out patterns and theories about why some crops cluster and others do not. There were certain crops, such as coffee and papayas that clearly clustered for geographic reasons; they can only be grown in Hawaii. However, there were other crops, such as almonds, ginseng, and cranberries, where the reasons for clustering were not obvious. We chose cranberries because they are grown in 7 different clusters, concentrated growing regions within North America. Even in the states and provinces where they are grown, they tend to be concentrated. When we started the study, we thought this might just be because of growing conditions, but we found out quickly that they can be grown in a much wider swath of area, both within North America, and around the world. So, why does the industry cluster and why just in certain parts of North America?

Through Gottlieb's connections at Rutgers, we were able to make contacts with key industry stakeholders, including Ocean Spray. We made our pitch in 2019 and were able to get the industry to buy in to our premise, with the promise of delivering a strategic bird's eye view of the industry, the result of which is this report. We started with a deep dive in the history of the industry, which we omit here for the sake of brevity. There are few sources, but they do provide a rich portrait of the development of the cranberry industry over the course of the 20th century. This brought out the very unusual feature of the industry around the dominance of one large cooperative organization. Thus, we started to modify our approach to consider industry organization which we argue helps explain clustering. Then we did a statistical analysis of production and yields across the different regions. This analysis showed a long-term trend of supply growing faster than demand, which helped us to frame the study in terms of commodity cycles, or the boom-bust aspects common to agriculture. We thus started to consider whether industry organization helped to smooth out price cycles, and that helped to explain the longevity of a cooperative that covers all 7 regions, even while its dominance is slipping. As we noticed the arrival of Québec from nowhere to becoming the 2nd largest producer, that became another important line of inquiry.

The next part of the study was to set up as many stakeholder interviews as possible in each of the clusters. Using growers' associations, website, and "snowballing" contacts for new contacts, we were able to set up dozens of 1 hour in person interviews across the 7 clusters. We mostly talked to growers, but we also talked to handlers, researchers, and anyone else involved who was open to a visit. Visiting in person also gave us a sense for the way each cluster operated in terms of governance, how different stakeholders reached agreement both within their state or province and across them. We were able to start to gain some trust through attending the NACREW research conference and growers' association meetings in some cases. Finally, we set up and asked the CMC, BCCMC and the APCQ to send out a link for an on-line survey to their grower members.

What We Found

Even though there is a temporary spike in prices, we believe that there are reasons to think the cranberry industry is at a crossroads. The introduction of new, much higher-yielding varieties and from Québec's entry will continue to shake things up. While in previous decades,

Ocean Spray was the dominant actor, providing much of the value chain for its members, and collective industry R&D, product innovation, marketing and branding to spur new demand, its position will have to change in line with these industry shifts. As we detail below, there are many important adjustments that loom on the horizon for the industry. These range from an ageing population of growers and likely consolidation to the lack of “killer apps” or new products such as juice or SDCs that spurred growth to match supply increases in the past. Moreover, the inability to coordinate the marketing order with Québec raises significant doubts about whether the supply management system in place from the 1960s can continue. In line with the significant expansion of non-Ocean Spray supply, industry institutions such as the Cranberry Institute and Cranberry Marketing Committee are due for an evolution as well. The potential for increasing demand to match new supply lies most prominently in the potential to link cranberries to health benefits, responsible already for the present COVID-19 related spike in demand, and in developing overseas markets.

In terms of cluster theory, we believe the cranberry industry, even with all its idiosyncrasies, offers important lessons for the potential reorganization of some types of agricultural production. The concentration of production despite wider growing conditions *refutes* the dictum that agriculture takes place wherever crops are grown best. Growing conditions are a precondition, but only the starting point for understanding agricultural organization. Studying the growing regions of cranberries demonstrate the utility of cluster theory to explain where and how agricultural production takes place. Proximity to markets, processing facilities, infrastructure, knowledge, and path dependency (historical experience) all play roles, alongside governance issues. In that regard, the largest cooperative organization has not only provided collective industry goods and leadership, but also helped family farmers to capture some of the downstream value-added and smoothed out some of the commodity cycle through developing new demand. While it’s impossible to think of cranberry industry organization as either stagnant or easily replicated, there are many lessons that could have tangible payoffs for farmers of a wide variety of crops as part of a longer-term research agenda.

Chapter 1: Sources of Potential Long-term Oversupply Factors

1.1: Why Cranberries Are a Good Test of Cluster Theory

Why study cranberries? This study is part of a larger investigation into agricultural clusters across the U.S. led by Gottlieb of Rutgers University. Gottlieb's team developed a specialized dataset mapping out the geographic concentration of different agricultural products across the U.S. in 2017-18. From this new dataset, we found, surprisingly, that cranberries are one of the most concentrated crops. Since they are not limited to certain geographic spots (such as guava in Hawaii), they are of particular interest from the perspective of cluster theory. As one of the more concentrated crops in North America, we are able to use cranberries to examine the factors behind agricultural co-location, and thus to test out theories for geographic concentration of industry. In the rest of this book, we examine a number of both natural and human-based factors that might explain the concentration of cranberries in certain locations, and thereby provide a test of the validity of such variables, which we revisit in the conclusion.

A 2014 report by Alston, et al., reflects the importance of the cranberry industry in North America. On pp. 30, they give the following estimates of its economic impact from 2009-12:

- In the United States, \$3.55 billion in value-added output and 11,610 jobs annually.
- In Wisconsin, for \$936 million in total value added, and 3,977 jobs.
- In Massachusetts, over \$250 million in value added and 1,682 jobs.
- In New Jersey, over \$561 million in value added and 1,569 jobs
- In Oregon, over \$78 million in value added and 458 jobs
- In Washington, over \$122 million in value added and 488 jobs
- In Canada, \$411 million in value added and 2,708 jobs annually.
- In Québec, \$365 million in value added and 2,269 jobs.

According to the latest FAO (Food and Agriculture Organization) production statistics (see FAO table below), the U.S. is responsible for 60% of global production, Canada 25%, and Chile for another 13%. Cranberries are, in other words, dominated by U.S. and Canadian producers, allowing for this study to reach a fairly comprehensive sample of stakeholders.

In short, cranberries were selected because they are one of the most geographically-concentrated products *and* because they are an undifferentiated product, just the opposite of what

we would expect to see on the basis of economic and cluster theory. While there are constraints on growing conditions, as we describe below, the concentration into certain geographic clusters within the wide range of possible cultivation areas, is unmistakable. Most cranberries are grown in just 5 states and 2 Canadian provinces, and within the states/provinces, the farms are concentrated in certain closely-linked parts. From a theoretical perspective, therefore, this study seeks initially to understand better why cranberries cluster, what the implications of the clustering are for the industry, and what role policy has and can play to aid cluster and industry health.

1.2: Clusters as a Possible Way to Overcome Commodity Price Cycles

The general observations about the commodity nature of agriculture make cluster theory even more important. If agriculture can start to differentiate its production, then there is a chance to reduce the vagaries of the commodity cycle. The commodity cycle refers to the rollercoaster ride of prices based on swings of demand and supply as reflected in the volatility of commodity markets, including agriculture and minerals. Bad weather or a pest can wreck supply, sending prices skyrocketing. This spurs new competitors to start producing agricultural goods, but it usually takes a few years to get on-line; in the meantime, growing conditions have normalized or been adapted to by the incumbent farmers. The result is a sudden downswing reflecting oversupply. This perennial problem is one of the main foci of agricultural policymakers; the sector as a result is rife with interventions, from subsidies to import controls. Because food is so central to survival, and land part of the founding and enduring mythology of national and regional identity, such interventions are often justified among mostly market economies as necessary to preserve “food security” and a way of life for family farmers. The heavy costs of such interventions reflect the essential problem of market distortions. In fact, no policy has eliminated commodity price cycles or the volatility that accompanies them.

This brings us back to some of the essential ideas behind cluster theory. If products can be differentiated by quality as well as by price, then farmers can start to create “branding” around the unique attributes of their produce, thus allowing for higher and more inelastic pricing, and in turn, more stable incomes, as we see with advanced name brand products, such as Apple’s phones. We see this in some categories of food already- the “farm to table” movement; the organic movement; and in gourmet niches such as prized high quality coffee, but by and large

most agriculture is still produced as a bulk commodity. In previous studies, Hira showed how some New World wine regions moved from low cost generic wine production to differentiated higher priced production through cluster theory and policy support for innovation (Hira 2013a/b, 2014, and 2015). Not many agriculture products are easy to differentiate, and economies of scale in production, processing, or distribution, may make it uneconomical to do so (most coffee is still bulk and price-sensitive). Studying how clusters function might either help to support product differentiation and/or provide farmers greater support from the commodity cycle seems to require collective action, if it is at all possible.

1.3: Environmental Regulations Constrain Cranberry Growth

Interviewees signal the fact that cranberries are usually grown in wetlands areas. Most states consider these to be areas requiring environmental protection, in order to protect biodiversity as well as water sheds. Awareness of the crucial role of wetlands in water storage, cleaning, and biodiversity has increased over time, thus there is a regulatory obstacle to expansion of new acres. Wetlands regulations clearly restrict the amount of area into which cranberry growers can expand. Some are pushing into “uplands” (in Wisconsin particularly) natural growing areas that are converted into suitable wetland-like conditions for cranberry growing, but growers universally agree that such conditions are disadvantageous.

Not surprisingly, most cranberry growers insist that cranberries are quite compatible with wetlands services, and, in fact, may enhance it because of the needs for pollination and preservation of water sources for their own long-term success. Thus, environmental regulations loom large in the industry in terms of both water and pesticide usage, indicating that policy also can play a crucial role in location decisions. The degree of protection can have a large effect on the operating environment for cranberry growers. In New Jersey, for example, growers in the protected Pine Barrens region note the lack of state promotion and, in fact, discouragement of expansion or renovation of farms is related to the state government’s concern around environmental issues related to wetlands. Existing farms are grandfathered in, but there is little evidence of active support for them. In Massachusetts, the state has a program for the purchase of cranberry land that owners want to sell, to reconvert it to conservation wetlands, but the funds are limited, there are restrictions on acceptable parameters, and there are many bureaucratic hurdles, all of which effectively limits this option. Wisconsin growers and those in B.C.

(Canada) also suggest that there are brakes on further expansion. These limits may have played a role in the expansion of the industry to Québec. State environmental regulations, in fact, vary quite widely and have a major effect on location decisions. Wisconsin growers suggest cranberry-friendly water regulations going back to the 19th century contrast sharply with Minnesota and Michigan, where the industry has never really taken off because of greater restrictions. However, experts there also note that concerns about rural water use and quality are growing, since most growers depend on surface water.

Interviewees in both Canada and the U.S. are also very concerned about federal/provincial regulations on pesticides, upon which most rely, and whether their options will be curtailed into the future. They express concerns about the costs of meeting regulations, the under-valuing of cranberry growing for environmental benefits, and whether such regulations will dampen the possibilities for future growth. These will only multiply as the industry seeks to expand in overseas markets, particularly the EU. So far, they do not yet have ready substitutes, natural or chemical, for many of the most widely used pesticides. Québec is not spared from such concerns. Even while it is the leading producer of organic cranberries, increasing concerns about environmental regulations are putting limits on growth and potentially moving production to less advantageous locations, as we discuss in section 3.4. There is considerable concern in the industry about new European Union (EU) regulations regarding the widely used rot pesticide Bravo. Current research includes, therefore, both the urgency of finding of new pesticide compounds and the challenges of organic growing.

1.4: The Cranberry Supply Chain- A Crucial Factor Behind Clustering and Stickiness

Explaining cluster location in the case of cranberries starts with noting that there are separate sub-markets for cranberries. The first is the smaller, fresh cranberry market, which sells its fruit primarily around Thanksgiving and Christmas. The fruit receives a premium for freshness and longevity, and it has to meet certain standards for fresh fruit sales (relating to size) set by USDA. A smaller section of this market is organic. Interviewees suggest that the upside of the fresh market is that the income stream from it is stable. However, the fresh fruit market is so small, and raises concerns about fruit rotting, that it hasn't attracted much industry attention. This could change if consumers begin to understand better the health benefits of cranberries. The second is the juice market, which is made in large processing centers combining berries

from the same region, as we describe below. This is the most commodified market, and was flooded by concentrates that are by-products of the third market until the recent post-Covid spike. The third market is the sweetened dried cranberries market (SDCs), which require fruit to be of a large size and color, and as the fruit dries, creates juice. Both the juice and SDC markets require Krugman-style economies of scale requiring millions of dollar investment in processing and plants and enjoy transportation advantages from proximity to large markets. There are other, much smaller markets, including pet foods, and supplements.

The supply chain for cranberries is similar in general terms to that of other agricultural products and can be seen graphically in the table below.

Table 2.1: Basic Supply Chain Inputs for Cranberries

<u>Growing Inputs</u>	<u>Processing Inputs</u>	<u>Sales Inputs</u>
Land purchase	Land	Transport to Markets
Farm Development	Building	Advertising/Marketing
Seeds	Specialized Equipment	Labor
Fertilizer	Labor	Taxes, regulatory compliance
Labor	Packaging	Export costs- shipping customs duties, etc.
Harvesting Equipment incl. fuel & maintenance	Storage	Further packaging for retail markets
Pesticides (Chemicals)	Freezers	
Taxes, regulatory compliance	Trucks	
Water equipment- irrigation, pumps, etc.	Taxes, regulatory compliance	
Royalties (if applicable) for new varieties		

Source: Authors

If we consider the above costs, it makes sense for larger producers to have higher yields through greater economies of scale and the ability pay down the fixed (capital) costs of production faster, though of course this also comes with higher risks. A 2015 (10, 12)

The significant costs of transportation, furthermore, mean that proximity to large retail markets is a factor in location decisions (Alston et al. 2014, 1&8). In fact, interviewees noted that the lack of nearby processing facilities put a damper on efforts to grow cranberries in Maine, Minnesota, and Michigan.

More interesting from the perspective of explaining location is the fact that interviewees emphasize the importance of transportation costs and the necessary **proximity of processing facilities** to support the clustering of the cranberry industry. These work hand-in-hand with the spread of tacit knowledge mentioned above. Research from the U.S. West Coast supports this contention. Washington State interviewees, for example, suggest that their proximity to West Coast markets, primarily in California, allows them to remain competitive with cheaper Wisconsin-based growers.

The industrial organization landscape varies considerably from one cluster to another, reflecting local supply conditions and path dependencies, varying in general patterns between Ocean Spray dominance and Ocean Spray rivalry with independent processors. Regardless, the location of processing is one of the keys to understanding where cranberries cluster, well beyond the prerequisite of suitable growing conditions. For example, there is much cheaper land in the area north of the St. Lawrence in Québec or New Brunswick, regions which have grown in recent years due to cheaper land, a colder climate (albeit a shorter growing season) with less pests, and more lax environmental regulations.

All of these factors, particularly the heavy long-term sunk costs and specialized knowledge and equipment in both growing and processing around key transportation hubs (the downstream supply chain), help to explain the “stickiness” of the cranberry industry around certain clusters, and in higher cost areas such as Mass. and New Jersey.

What creates these clusters of vertical supply chain activity? The fact is that, even outside of Ocean Spray, there are limited attempts by growers to handle their own fruit due to **economies of scale, which create effective oligopolies among the handlers** who process the fruit. These economies of scale help to define the industry, which over the last 3 decades has consisted of a very slow and, at times varying, decline in Ocean Spray’s dominance. This is challenging the ability of Ocean Spray to provide collective leadership for the industry, though it largely continues to do so, even amidst its own internal challenges, including financial challenges. The challenges come largely from the rise of new independent handlers in Québec and existing ones in Wisconsin, the two highest producers. Because the industry has been in periodic surplus situations, there has been little vertical integration, with few handlers buying their own land.

However, there are signs of this becoming a possible future trend, with some companies in Québec, for example, now buying acres of cranberry land.

There are other perceptual and cultural factors, beyond the operational and business ones described throughout this book, that reflect the refrain through the interviewee interviews that *growing cranberries “is a way of life,” thus most interviewees are reluctant to leave no matter how thin the margins.* They enjoy being their own boss, making their own hours, and are consummate problem solvers. With land and equipment paid off, they are able to hang on for the indefinite future, even as their children move onto other industries. Stickiness works both ways. While a positive along the lines of cluster theory, as we discuss throughout the book, it also reflects **barriers to exit, including shifting to potentially better locations or product diversification.** One interviewee in Wisconsin put it this way. If you have spent family generations on a plot of land, invested years in time and effort to develop your farm, have sunk investments that took years to pay off, and don't find other businesses provide a similar way of life, it would be very hard to leave the business. The pressures on smaller producers, however, are real. While many have succession plans and prospective business heirs, others are looking for an exit strategy.

1.5: Research and Innovation Activities Support Clustering

Caruso et al. (2019) state that the diseases related to cranberries are “unique” and include fungal pathogens that affect both the fruit and the leaf, but few issues related to nematodes, bacteria or viruses. False blossom disease, caused by a virus, is an exception and wiped out 9,000 acres in New Jersey and Mass. in the 1920s-30s. Fruit rot, created by a variety of fungi, is an ongoing concern. If left untreated, it could consume up to 50% of the crop on the East Coast. Interviewees across the board state the important value of their local extension stations and Ocean Spray representatives, who help them troubleshoot problems as they arise, and are generally available on a regular basis. They also note that the problems are very different in different growing areas, due to “microclimates” and unique conditions leading to different types of issues. Focused on local problems, there is resistance among clusters' state/provincial associations to collaborate on larger research issues. Thus, by default, Ocean Spray funds most long-term collective goods type research.

We could not find any formal (long-term) **training program** in any of the clusters. Most growers/managers appear to learn through the annual cranberry schools and the training offered by Ocean Spray, which includes financial management/analysis for growers.

Neither Québec nor B.C. have the equivalent of **agricultural extension** agents (scientists who act as bridges between growers and researchers and are generally located in stations nearer to farmers). Extension agents appear to be key “bridges” between growers and researchers in the United States, helping growers to see the value of contributing to industry research, and providing researchers with a ready source of funds. Thus, communication between growers and scientists depends instead on funding for specific research projects or personal networks (often through former students) between researchers and growers or growers’ associations. Canadian cranberry agronomists and growers state that they have very good relations with U.S. counterparts, and that there generally is a free flow of information, though a few expressed some reservations about the partial openness of Ocean Spray. In line with the “global pipelines” (alongside tacit local knowledge) concept of cluster theory, the flow of tacit knowledge from exchanges with Wisconsin growers was widely cited by Québec producers as behind their rapid learning curve. In general, cranberry growers and extension workers attend the “field schools” in different provinces and states which, along with NACREW, the annual researcher and extension workers’ conference, helps to spread knowledge.

Innovation has been vital to the cranberry industry’s fortunes. Long-time interviewees of the industry describe dramatic labor-saving improvements over long periods of time. They describe the many hours of even more back breaking work in which at least a dozen laborers were needed during harvest time to cull the cranberries. It is more typical now to see 3-4 additional workers. The original method was to use hand rakes to separate the berries. In the early 1950s, a mechanical raking machine was invented in Warrens, Wisconsin. Raking is still used by some to preserve the quality of the fresh fruit. Raking was replaced by the beater in the 1960s as juice products do not require the same care for the berries. A harrow, which is gentler on the vines and works faster and wider is now used. A large “cranboom” or flotation device is used to corral the floating berries. Whereas it required at least 2 people to bring in the net, growers now use an automated reel or tie it to a truck to bring in the net. Vacuum pumps suck in the berries, separating out water and residue.

Public funding has been vital to innovation. In 1929, the USDA, working with the New Jersey and Mass. Agricultural Experiment stations, began a cranberry hybridization program to produce cultivars that would be resistant to false blossom disease. However, it produced only 1 generation of improvements (Eck 1990, 57). In 1939, the Wisconsin Agricultural Experiment Station with the assistance of USDA, the state govt., and Wisconsin Cranberry Sales Co., began a new cranberry breeding program. Researchers there developed six new varieties, (Vorsa and Johnson-Cicalese 2012, 195-6). Interviewees note several innovations that have changed the industry over the last few decades. These include the development of integrated pest management (IPM), including precision agriculture (e.g., selecting the specific areas for pesticide and water application), and the replacement of the beater with the harrow, which is easier on vines; and improvement in various equipment, such as vacuum tubes.

The Cranberry Research Foundation, based in Massachusetts, conducts research on behalf of the local industry; according to interviewees it provides approximately \$25,000/year in funding, mostly to the local extension station. Research is also sponsored by the Cranberry Marketing Committee (CMC) and the Cranberry Institute (CI). The CMC provides a quarterly production report that is widely used in the industry. The CMC not only administers the marketing order (see section 4), but also promotes exports. It uses a Seattle-based consulting firm to help it prepare an overseas marketing plan for the industry and works with USDA to help growers and handlers to make contacts in overseas markets, with matching funding from USDA. The CMC has recently sponsored health research. The Cranberry Marketing Committee was set up by the acceptance of the industry of the USDA marketing order.

The Cranberry Institute (CI) was created to provide research with representation from the whole industry, though Ocean Spray still controls a majority of the seats. It is notable that the CI depends on voluntary contributions of industry handlers (not growers), with the lion's share coming from Ocean Spray. It combines funding for research projects, based on majority votes deciding an agenda, and then a vetting of submitted proposals. It also helps to monitor regulatory conditions, such as restrictions and guideline differences between the U.S. and overseas markets and helps to coordinate lobbying efforts (which are not permitted by the CMC). According to interviewees, the fact that a majority of the board of the Institute are growers has both good and bad sides. On the good side, funded research is responsive to the needs of

growers. On the flip side, handlers may lack the knowledge or motivation needed to consider long-term strategy around marketing or R&D. Many interviewees make the same point about Ocean Spray. A number of growers noted the potential importance of the C.I. in providing timely and breakthrough research. They also cited its value in synthesizing information, particularly around pesticide use, in easy to understand formats for growers.

The Washington State Cranberry Commission also funds research projects, funded by a 10 cent/100 lb. levy on growers. Interviewees suggest that the levy provides research funding of approximately \$13,000/year for research projects. A commission of elected grower representatives choose the projects for funding. Washington growers organized through the Pacific Coast Cranberry Research Foundation also fund the operating costs for an extension station in Long Beach, manned by recently retired Dr. Kim Patten from Washington State University, as the state stopped funding the station some years ago.¹ By contrast, Oregon has no mandatory levy, and seems relatively neglected by the state. The growers' association is voluntary and charges a modest \$150/year in dues, which amounts to a few thousand dollars per year that had been going to Dr. Kim Patten. While there used to be two agricultural extension agents in the Bandon area, that state has now reduced it to just one position, to cover livestock, dairies, and horticulture including cranberries.

The Wisconsin Cranberry Board is clearly the most significant state-level supporter of research with an annual budget of \$400,000-500,000. The mandatory state levy has helped to fund significant research that benefits the industry as we discuss below.² The levy is 10 cent/barrel levy based on a state marketing order that funds research through the Wisconsin Cranberry Board. Research priorities are decided by the Wisconsin Board (with 7 board members elected to 3 year terms), with inputs from the Growers Association and the Research Foundation and generally reflect grower interests in horticulture and improving yields. The growers have had some success in getting federal lawmakers to fund US government Agricultural Research Service (ARS) specialists who specialize in cranberries and have been instrumental in developing some of the new varieties. The Wisconsin Cranberry Board also

¹ <https://apps.leg.wa.gov/WAC/default.aspx?cite=16-565>, Accessed Dec. 19, 2020.

² <https://datcp.wi.gov/Pages/AgDevelopment/WisconsinCranberryBoard.aspx>, Accessed June 2, 2022.

funds research projects on an annual basis, and fund graduate students for University of Wisconsin Madison researchers specializing in cranberries. There appear to be at least 5 researchers working on cranberries in the state, as well as one extension specialist who is posted closer to the farms centered in Wisconsin Rapids. Interviewees note that a years' long effort to establish a research station with an experimental farm has finally come to fruition. As one Wisconsin researcher put it, "We work together closely with the Growers' Association and with our USDA counterparts, who also teach on campus....There is no doubt that there is a symbiosis between our presence and that of the cranberry industry. The two work hand-in-hand to explain cluster location."

In Québec, the main researchers are at the Université Laval. While there is no extension through the universities, Richard Bélanger is doing applied work on fungal rot and Jean Caron has contributed as a researcher and through a startup business to improvements in irrigation and with Silvio José Guíamaes on water management.

The most important innovation in recent years are the **new, more productive varieties** whose development was led by Nick Vorsa of the Rutgers Experimental Station, Juan Zalapa of USDA, stationed in Wisconsin, and the Grygleski family in Wisconsin. These were widely introduced from the early 2000s, in an ongoing process. These new hybrids are revolutionizing the industry. They are the most important innovation since the Stevens hybrid was developed by the USDA in 1929 through a breeding program to create resistance to false blossom disease. Seedlings were released in the 1940s and became widely disseminated in the 1970s, leading to major increases in yields.³ Beyond yields, each varietal has different harvest times, qualities, and optimal growing requirements. The varietal mix varies considerably from one region to another.⁴ While scientific research in cranberry cultivation is limited, it is making a significant difference in the industry. For example, new varieties developed by Rutgers University vastly increased productivity (perhaps 1.5-2X the yield), leading to major increases in supply, particularly in Wisconsin and Québec.

³ See <https://silvercreeknursery.ca/products/stevens-cranberry>, Accessed June 2, 2022.

⁴ See <https://reports.uscranberries.com/TheCranberryStory/Varieties/>, Accessed Mar. 10, 2022.

Experts in the industry caution that it will take years to really see how the new varieties play out. When asked about why the new varieties focused on yield, given the commodity price cycle, they reply that it takes 30 some years to really develop new varieties, and these ones were started in the 1980s, when there was a supply shortage (around the time that SDCs were developed). Given that beds were often completely renovated as they were put in, it takes years to reach consistency in fruit production and learning the tacit knowledge to manage each variety. Overall, growers are cautiously optimistic, noting that each new variety will have its own characteristics and requirements, and more time is needed to reach any clear conclusions.

In sum, while growing conditions are important, they are wholly inadequate to explain cranberry clusters. We see through cranberries that **a wide swath of concepts from cluster theory are applicable to agriculture**, particularly:

- the factor of path dependency, or historical lock-in
- the importance of economies of scale
- the role of both formal knowledge through R&D and local extension stations and tacit knowledge through sharing growing and harvesting techniques
- the vital role of location next to supply chain factors, processing facilities in this case, as well as large markets on the East and West Coasts
- the role of policy, both in engendering a new cluster, as is the case with Québec, and in its lack of effort in holding back the industry, as is the case in New Jersey

In the rest of this report, we explore further the human factors behind clustering, including both industry organization and policy decisions. One thing we shall see is how uneven and idiosyncratic each cluster is, and that it is a dynamic moving target. But first we begin with a review of the history, and then a statistical analysis of trends in the industry, in order to understand the dynamic forces that led to the formation and shape of the current cranberry clusters.

Chapter 3: Ocean Spray's Role in the Industry at a Crossroads? The Rise of Québec

3.1: Ocean Spray's Crucial Role in Developing New Products

Ocean Spray is a cooperative, in which growers purchase stock to become members (Playfair 2014, 122). Ocean Spray's research was crucial to expanding markets in juice and SDCs (sweetened dried cranberries) in the postwar period. Jesse and Rogers (2006) provide a detailed case study history of Ocean Spray in recent decades that will not be repeated here, save some highlights. In 1966, Ocean Spray began distributing cran-apple™ juice, and in 1967, cran-prune™ juice, the latter of which was subsequently dropped (Jesse and Rogers 2006, 27). Jesse and Rogers (2006, 27-8) give much credit to Ocean Spray CEO Harold Thorkilsen for rapid growth in the 1970s. Among other accomplishments, he expanded into grapefruit juice, further developed overseas markets, invested in improved processing and packaging, and conceived of the plan to present cranberry juice as a healthy and natural choice. In 1979, he successfully held off a potential anti-trust lawsuit from the Federal Trade Commission (Long et al. 2017, 316).

Dried cranberry raisins were developed as early as 1912, but only when Ocean Spray learned how to infuse sugar did the product really take off in the mid-1980s (Stang 2003, 292). Equally important was the introduction of cranberry juice boxes in 1981, allowing Ocean Spray to temporarily become the leading U.S. seller of canned and bottled juice drinks. During the 1980s, the company also introduced a host of new products, such as Mauna-La'i™, including a guava-lemon drink, Firehouse Jubilee™, offering tomato juice; Ocean Spray Liquid Concentrates™; and Cranberry Fruit Sauces™. In 1985, Ocean Spray purchased Milne Fruit Products, Inc. of Washington State, a large fruit provider to a variety of food companies. Milne tripled in size by the early 1990s and provided valuable revenue for Ocean Spray (Long et al. 2017, 317).⁵ Innovation occurred in the way of product diversification as well, such as Cranberry English Muffins™ with Thomas' English Muffins™ (1994). In 1994, a Harvard Medical School study suggesting cranberry juice could help ward off urinary tract infections was published, further boosting demand (Long et al. 2017, 318-9).

Juice products fundamentally changed the seasonal nature of the cranberry market, and by 1998 represented 70% of Ocean Spray's revenues. At that time, Ocean Spray cooperative

⁵ <https://www.naturalproductsinsider.com/archive/ocean-spray-sells-subsidiary>, Accessed June 2, 2022.

members also reflected approximately 10% of the grapefruit harvest (Marple and Harding 2002, 79, 81). Subsequently, SDCS took over as juice demand plateaued.

Under CEO Randy Papadellis, appointed in 2003, Ocean Spray continued to develop new products. In 2004, it introduced Juice & Tea, mixing juice with iced tea. Craisins™ were part of new trail mix lines. In 2006, it signed a new agreement with PepsiCo to market new single serve cranberry drinks and develop new juice-based products. In 2008, Ocean Spray introduced Cran*Energy, a cranberry, vitamin and green tea blend. In 2009, it expanded its lines to include pomegranate juice, and in 2010, blueberry juice. In 2013, it moved into “extracts,” or powder or gels that could be mixed with water, and the Pact brand, which sold the water and extract already mixed (Long et al. 2017, 320). None of these products have created new demand along the lines of juice or SDCs.

3.2: What Explains Ocean Spray’s Longevity?

What explains Ocean Spray’s staying power? Jones (2003) suggests that there are cultural components that go beyond market forces, using them to explain why at the height of the recent oversupply crisis in 2000, growers were unwilling to sell the company. As she states (345), “Since the 1950s, Ocean Spray cranberry growers have typically seen themselves in terms of their membership in the Ocean Spray cooperative rather than as cranberry growers. This association with the cooperative is so powerful that both members and independents alike believe that without Ocean Spray, the cranberry industry would not exist as it does today.” Jones explains some unusual aspects of the cranberry industry underlie the possibilities for cooperation: limited suitable growing areas; a general lack of need for government subsidies; the long-term nature of investments in the industry; the tendency to pass down growing to subsequent generations, including 7th or more generation families tending to the crop; and the vertical integration of supply chains that Ocean Spray captures (349). Interviewees across North America state that they stick with the industry because “it’s a way of life,” their families “have been doing this for generations,” and they “really enjoy it.” Many seem to have a deep sense of community with other growers. At the same time, a number of interviewees across the U.S. state that their children are generally uninterested in continuing in the business, and the average age of growers is likely to be over 50 (though no data are available). This suggests, along with the

market trends we discuss later, that a shakeout in the industry, particularly among smaller farms, is likely to come.

By contrast, interviewees who are independents are fiercely so. They tell a common narrative of resentment against Ocean Spray, based on its “market manipulation.” The prime example they give is the flooding of the market with SDC-derived concentrate that Ocean Spray had stored up for years, before finding a way to dispose it legally through the recent marketing order. They suggest that Ocean Spray pushes competitors out, citing Northland, and that it enters into emerging markets such as fresh fruit, sometimes lower prices designed to push out competitors. Some of these growers were at one point rejected for membership by Ocean Spray, thus their resentment is personal. Most seem to be strongly independent minded by both personality and philosophy, suggesting they prefer the risks/rewards of market competition to the security offered by Ocean Spray, and citing the deferred payment scheme of Ocean Spray (based on meeting firmness, color and preservation incentives) as problematic. (The payment system has now been changed to a continuous one). They suggest, furthermore, that Ocean Spray’s overreaction to price increases in the 1990s led to oversupply and that its reluctance to ease growers out of business perpetuates it. Ocean Spray does not seem to have a long-term supply plan, other than closing its doors and increasing its quality standards.

Regardless, Jones (2003) notes that Ocean Spray continues to provide collective goods to the industry, helping to spread best management practices such as testing for the use of pesticides, helping to control and manage supply; spreading new technology; and of course, its overall success in growing the market. It is also synonymous with cranberry products, and so a vital marketing vehicle (361). Moreover, as we noted, it has negotiated on behalf of the industry with government.

Ocean Spray is clearly at a crossroads, along with the industry as a whole. Some growers are still fiercely loyal, with one saying that the interests of the farm, the co-op, and the brand are clearly aligned. They point to the proven track record of the benefits of pooling investment to develop retail outlets. They see cautionary tales in other agricultural products who are less organized or sell out to other companies who then dismantle the co-op. Growers in Washington State relayed to me the benefits of loyalty. In comparison with approximately 50% of growers in Oregon, who became independent in the 1990s, when prices were higher, most Washington State

growers stuck with Ocean Spray. By the mid-2000s, they relay, Ocean Spray was paying better prices and provided (and continues to provide) them a sense of security. As one grower related, “I don’t have to worry about whether someone’s going to buy my fruit, or try to find a buyer.... They (extension help) are always there to help me if I need anything.”

As a “market maker” who is facing eroding control, Ocean Spray is in a tough position, one reflected in recent changes to management and the Board of Directors. Some are concerned that the previous battles with takeover artists will be relived, and the magic of the co-operative formula will be lost. At the same time, every independent agent we spoke with said that they still saw Ocean Spray as the leader of the industry, the one actor everyone “needs to do well.” Interviewees place some of the blame on ineffective management at the company, and some are cautiously hopeful the new management team will find avenues for product innovation that would increase demand. Early opinion of the new CEO, Tom Hayes, the former CEO of Tyson Foods, is positive among those interviewed in early 2022. He has brought in a new team. Other independent growers in Mass. and Washington relayed that they did not want to be part of a larger organization, revealing personality differences matter in business decisions as well. As several growers in Washington remarked to me, the tension is a good thing, as the independents keep Ocean Spray in check....The current spike in prices means that tensions have died down, but they are unlikely to disappear.

3.3: New Challenges to Industry Organization: The Emerging Giant from Québec

Cranberries are grown in several Atlantic provinces, Québec, and British Columbia. This section offers a brief overview and spotlight on Canadian market trends, which we put into global perspective in the following statistical analysis section. This sub-section focuses on Québec, because of its potential role in industry disruption.

The following table shows the remarkable increase in Canadian production over the last decade.

Table 3.2: Growth in B.C./Québec Production, 2011-2018

	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021
Growers				70	75	72	73	72	72	72	76	70	74	75	75	70
Acreage	5,846	5,870	5,916	6,129	6,508	6,505	6,539	6,566	6,541	6,483	6,483	6,411	6,382	6,297	6,556	6,374
Barrels	764,106	792,132	693,290	788,418	643,851	607,520	944,051	941,277	837,538	988,903	1,007,684	858,941	1,347,753	631,045	1,003,998	1,012,786
Yield	131	135	117	129	99	93	144	143	128	153	155	134	211	100	153	159
<i>Quebec Cranberry Statistics</i>																
Growers				66	74	76	80	81	84	82	82	80	78	78	81	80
Acreage				4,354	4,878	5,880	7,070	7,657	8,516	9,247	9,504	9,828	9,965	10,145	10,682	10,777
Barrels				963,617	918,896	1,193,306	1,854,680	1,621,764	2,410,472	2,085,387	2,758,937	1,602,672	2,513,928	2,558,094	2,306,906	2,201,382
Yield				221	188	203	262	212	283	226	290	163	252	252	216	204

Source: Patty Hira from BCCMC reports. Yield = barrels/acre; our calculations.

As seen in the table, the number of growers showed initial increases, but has gone back to the same number as in 2009. The number of growers in Québec increased until 2016, and has declined slightly to 80 since then. Acreage increased slightly (9%) over the period in BC, but monumentally (148%) in Québec. While the number of barrels increased by 1/3 in BC and 128% in Québec, the increase in yields seems to have peaked in 2018, but then gone down during the covid period, reflecting perhaps less crops harvested. The yields are considerably higher in Québec.

Despite the spectacular growth of cranberry production in Québec, there are few documentary sources to help us understand how, beyond the considerably lower prices of land, a new cranberry industry was largely created from scratch. The growth has been impressive. Poirier (2010, 5-6, 10-11) suggests that, though cranberries have been grown there since at least the 1930s, the more recent growth has its origins in the 1980s. She notes that the area cultivated with cranberries grew 22% between 1995-2006, while the volume produced increased by 26%. Meanwhile, the number of producers increased from 35 to 66 between 1999 to 2009. Québec has the additional advantage of colder weather, like Wisconsin, which means fewer pests (Poirier 2010, 23).

The APCQ (Association of Cranberry Producers of Québec), is located in the heart of the main growing region in central Québec, was founded in 1994. It operates based on member fees based proportionately on the overall size of each producer's harvest. New producers, processors, and producers from New Brunswick pay a flat \$350 annual fee. Interviewees note that it operates on a consensual basis, and helps by providing agronomist advice, representing the industry to government, and reporting on industry statistics. It holds a biannual meeting, alternated with a Congress where growing issues and new research and techniques are discussed. Speakers from outside the region are often invited to present.

About 77% of cranberries grown in Québec are processed there. There are three main growing areas, according to interviewees: the central areas around Victoriaville and Drummondville, south of Québec City and east of Montreal which is currently the dominant production region; the northern area around Lac St. Jean; and a third mini cluster to the northeast of Montreal, in the direction of Joliette, towards the Laurentian mountains (Lanaudière region).

As of 2008, approximately 38% of the crop went to concentrate, 59% to SDCs, and somewhere between 3% to fresh (Poirier and Painchaud 2010, 9 & 13). Painchaud (2017) estimated that 31% of the crop would be organic in 2018. Cranberries are now the number one fruit crop by value in Québec (Poirier and Painchaud 2010, 9). A 2021 (Ministère de l'Environnement, 18) government document cites 81 cranberry growers in the province, with an estimated growing area of 4,047 ha. The report states that the industry (a little more than) doubled from 2009-21 in terms of land for production. Between 2006-21, the area under cultivation increased by 7%/year on average. It currently employs approximately 1,000. Québec is the largest producer of organic cranberries.

Organic cranberries reportedly fetch up to double the conventional price, however, they are far more capital- and labor-intensive and risky to grow. The higher selling price for them means that there is a limit on the overall market size. Interviewees suggest that the amount of organics is probably at its ceiling given limitations to market demand at present. Indeed, several interviewees state the Ocean Spray and others recently agreed to switch organic back to conventional cranberries; one interviewee estimated that 1,200 acres were switched back in 2020-21 because they simply can't sell enough organic cranberries.

The leading independent handler is Fruit d'Or, which is the largest organic producer in North America (Alston et al. 2014, 6). The processing sector appears to be an effective oligopoly with Ocean Spray (through its purchase of Atoka), Fruit d'Or, Citadelle (another cooperative), Emblème and Canneberges Québec (which also sells conventional fruit to Ocean Spray) dominating. Emblème does not process, but sells frozen cranberries around the globe, with local sales only accounting for 5% of sales. Processors have been innovative in seeking out new markets and developing new products. For example, one features whole SDCs (vs. sliced). Citadelle has a juice contract with Coke. Several interviewees cite contracts with China and the E.U.

In a sense, Ocean Spray came late to the game, after Atoka had already established an independent culture in the cluster. Wisconsin served as a model for creating the large economies of scale and modern techniques (such as large square farms, automated irrigation, and the use of booms) present in Québec. Gardner worked with some Laval researchers early on to develop a new varietal, but it did not take off as expected, however, this shows the engagement of

researchers early on in the industry. Moreover, growers note the importance of having local equipment manufacturers who could custom make and help to maintain cranberry equipment. However, most of the standard equipment, such as tractors is still imported. Perhaps the most important shift was to promote organic growing, the high proportion of which distinguishes Québec's industry. Painchaud in MAPAQ also pushed for efforts to find organic fertilizers, which was funded in part by the Cranberry Institute.

Growers interviewed in late 2021 stated that with such comparative advantages, they are still able to make money, and thus see no real likelihood of anyone leaving the industry, though prospects for growth are limited to the Lac St. Jean area, both by price and natural lands available due to environmental regulations. They state that there is less concern for wetland preservation north of the St. Lawrence, so government policy is determining future growth of the cluster there. As in Oregon, there is fierce competition between growers who are members of Ocean Spray and the quickly growing independents. Pioneer Bieler created the Atoka processing plant in order to offer an alternative to selling to Ocean Spray. As prices increased in the 1990s, other local processors followed suit, particularly Fruit d'Or, Canneberges Québec, Emblème, and Citadelle, who have now become major players in the global cranberry market. The different cranberry companies offer an interesting contrast in business strategies. Canneberges Québec primarily sells conventional cranberries to Ocean Spray and has its own organic business on the side. Emblème sells frozen (fresh) cranberries on the wholesale level, across the world. Citadelle was a long-term maple syrup co-op, moved into honey, and more recently into cranberries. Like Ocean Spray, its growers own shares of the central processing and marketing business. Citadelle has an unusual structure of using one business platform for all three product lines. It sells its products at the retail level, under a variety of brand names (unlike Ocean Spray).

Fruit d'Or is by far the largest so far and has its own land as well as purchasing from independent growers. It offers a full line of retail products, but mostly occupies emerging niches, such as 100% cranberry juice and supplements. It is fairly innovative in its marketing, such as introducing sour (dried) cranberries. Several interviewees attribute its impressive growth to founder Martin LeMoine's entrepreneurial vision and management capacity. Fruit d'Or's website states that they were the initiators of the organic movement in Québec in 1993,

something backed up by other interviewees.⁶ In 2020, Fruit d'Or announced a C\$17.5 million investment in expanding its processing facilities in order to meet additional demand.⁷

The large independent Québec companies purchase from local independent growers but also create their own fruit. They seem quite innovative in entering into non-traditional markets, such as “sour” SDCs and 100% cranberry juice (for health-conscious consumers) as well as making inroads into European markets through their cultural ties. Interviewees in Québec state that they receive little real help from the provincial or federal governments in developing export markets. This is despite the fact that cranberries were Canada’s 3rd largest fresh fruit export in 2019, after blueberries and cherries (GoC 2019). Nonetheless, a press release from 2017 regarding the Canada-EU free trade agreement under negotiation stated that it would substantially reduce tariffs for cranberry imports to the E.U. Some mentioned success in penetrating Asian markets, and particularly the ability to sell in China.

Key Role of Government Policy

Once established as a viable sector, the Québec government made a conscious effort to support the cranberry industry, pouring resources through the government to attract technology transfer, such as inviting Mass. growers to buy land and establish businesses there through tax breaks. The Québec government provides project grants to farmers if they have obtained loan guarantees through its financing arm, Financière Agricole. Cranberries are an “emblematic crop,” for Québec, along with maple syrup and blueberries, and so favored for public funding. There are also specific programs aimed to support young farmers (Appui financier à la relève agricole), and an Agri-Stability program to help stabilize incomes. According to Poirier (2010, 25), from 1998-2008, the government invested C\$2,159,160 into university-based research, 83% oriented towards cranberry production, with another 13% towards health, and 4% towards processing. The Govt. of Québec estimates public investments of C\$4.9 million between 2007-15 (MAPAQ 2018a, 9).

⁶ <https://fruitdor.ca/en/who-we-are/>, Accessed Oct. 10, 2021

⁷ <https://www.lanouvelle.net/2020/09/02/fruit-dor-envoie-un-signal-fort-a-la-communaute-economique/>, Accessed Oct. 13, 2021.

According to the Govt. of Québec (MAPAQ 2018a, 6), the industry had to change after prices declined in 2008. One response was to invest in freezing equipment, which was done by 3 independent processors between 2010-6, the start of continuing efforts to improve processing capacity and efficiency. This support appears ongoing, for example, in 2017, the Canadian government provided more than C\$9.3 million in funding to Fruit d'Or through its AgriInnovation Program to expand its facilities, including building a new plant. Furthermore, a 2019 news report stated that the provincial govt. was making C\$1,755,319 available, including a loan of \$621,550 to the company Emblème Canneberge to help improve equipment for the preparation, packing and freezing of cranberries.⁸

Besides provincial support for APCQ efforts, there is ongoing research at Laval and McGill universities, l'Institut national de la recherche scientifique (INRS), la Chaire de recherche industrielle CRSNG-Hortau in irrigation, le Club Environnemental et Technique Atocas Québec (CETAQ), l'Association des producteurs de canneberges du Québec (APCQ), the growers' association, and l'Institut de recherche et de développement en agroenvironnement (IRDA), all receiving at least partial public funding in a way one cannot find in the U.S. Research funding between 2012-6 totaled C\$4.6 million (MAPAQ 2018a, 12). There is also a project (to be completed in 2022) examining the effects of organic fertilizer on nitrogen levels and cranberry production by the IRDA.⁹ Interviewees also cite funding for improving local demand, such as the local cranberry festival. Overall, the Government of Québec views cranberries as a “growth vector,” and they are featured in the overall strategic plan it has for food industries. It particularly sees a specialization in organic cranberries as a comparative advantage (MAPAQ 2018b, 19). The strategic plan mentions a number of different avenues for the support of organic food generally, from insurance for farmers to subsidies for conversion from conventional production to subsidizing certification programs. There are also regional strategic plans for increasing agricultural production in certain areas, including projects that would benefit a variety of sectors and joint projects with growers' associations, including APCQ. There are even specific programs for reducing bee mortality.

⁸ <https://www.lanouvelle.net/2019/08/29/quebec-soutient-la-croissance-de-lentreprise-embleme-canneberge/>, and <https://fruitgrowersnews.com/news/canada-invests-quebec-cranberry-industry/> Accessed Sept. 14, 2019.\$

⁹ <https://www.irda.qc.ca/fr/projets-recherche/azote-canneberge-bio/>, Accessed Oct. 13, 2021.

In 2017, a report noted C\$9.3 million in federal funding from Agriculture and Agri-Food Canada for expansion and a new plant at the Québec handler Fruit d'Or, as well as C\$183,127 to be invested into pollination studies.¹⁰ Much of Québec production is independent of Ocean Spray, thus it presents a different profile from B.C., with Ocean Spray taking perhaps 25-30% of production, according to interviewees. Independent growers state that they fear being squeezed between Ocean Spray and the giants of local industry, who may continue further vertical integration by buying more land of their own, though the processor co-op Citadelle's model is based on 5 year contracts with independent growers. Non-grower interviewees also observe some degree of consolidation over time, with the number of growers declining while overall acreage has increased substantially.

The Future of Cranberries in Québec is Bright

Why would Ocean Spray promote cranberry growing in Canada, when it competes with U.S. producers, and most of the supply is exported out of Canada? Part of the reason, according to interviewees, is that production was ramped up there in the 1990s when there was a perceived long-term shortage of cranberry supply. The other part is that Québec has differentiated its production there by becoming a leader in organic growing, reflecting its deep investment in R&D which will benefit the whole sector. However, this may be reaching a saturation point, as Ocean Spray has frozen any further growth in organic, leading to some dissonance (as elsewhere) about independent growers would like to become members. Ocean Spray offers a premium price for its member growers, though it underpaid during the halcyon days of high prices in the 1990s when some members left. Moreover, Canada offers additional trade opportunities, stemming in part from Québec's long-standing ties and personal networks with Europe and from lower sugar prices due to U.S. protection for domestic high cost sugar growers. For example, the new Canada-EU free trade agreement reduces duties on SDCs and juice by 17.6%¹¹, with the same advantages maintained for the U.K. post-Brexit via a continuity agreement. It is being applied on a provisional basis while awaiting full ratification by the E.U.

¹⁰ <https://fruitgrowersnews.com/news/canada-invests-quebec-cranberry-industry/>, Accessed Sept. 4, 2019.

¹¹ <https://www.international.gc.ca/trade-commerce/trade-agreements-accords-commerciaux/agr-acc/ceta-aecg/business-entreprise/sectors-secteurs/agri.aspx?lang=eng#fnb2>, Accessed Oct. 13, 2021.

member states. Canadian growers were also shielded from U.S. Pres. Trump's trade spats with China and the E.U. which led to temporary tariffs.

From the perspective of cluster theory, Québec shows that active policy support can make a clear difference. U.S. policy at both the federal and state levels, largely limited to supply management, lacks severely in imagination to ad hoc and haphazard efforts. Even though policy didn't initiate the sector in Québec, it clearly financed and continues to support its growth. There is no question that the level of investment of the Québec and federal government of Canada into the sector have been far greater and better organized than in the U.S. Québec thus comes closest to the Triple Helix ideal of cooperation among researchers, government, and industry, though it lacks the element of extension and of export development. A partnership between Ocean Spray and the largest Québec producers could jointly support shared strategic initiatives for the industry with great benefits, as we discuss in the conclusion.

Chapter 4: Understanding the Roots of the Oversupply Problem and Its Implications for Cranberry Clusters

4.1 Introduction to Statistical Profile and Trend Analysis of the Oversupply Issue

This chapter examines basic market trends in the cranberry industry. We begin by providing an overview of demand market segments. We then turn to supply trends on the global level, and then do a deep dive into how supply in North America has changed over time, highlighting the sources and trajectory of the current oversupply crisis. As we demonstrate, the main factor in supply comes from new Canadian producers. This emerging fact ties into knots the main cooperative solutions we discussed in Chapter 2, namely Ocean Spray's efforts to manage supply and increase demand through product marketing and development, and, as a last resort, the intervention of the U.S.D.A. to restrict supply. A secondary factor is the lack of new killer products that have been developed to grow demand as in the past. These factors have merged together to create the current crisis. The third factor is the overall increase in productivity in the cranberry industry, which can largely be ascribed to the introduction of new varieties.

4.2: Consumption Increasing, but Not Fast Enough

Amanor-Boadu et al. (2003, 10) state that there are 6 basic markets for cranberries: fresh (unfrozen and frozen), juice (pure, blend, and concentrate), powdered, dried (sweetened and unsweetened), sliced, and sauce and jellies. Girard and Sinha (2012, 401) note that cranberry consumption for 2009 could be broken into 10% for fresh fruit; 15% for cranberry sauce products; 20% for dried fruit products; and 50% for juice products. The total US market was \$2 b.

In Table 4.1, we see an unsteady rise in cranberry consumption, particularly in processed cranberries (dried and juice). Fresh fruit sales appear to have a low growth rate of 1.4%/year, with an average of 264,802 lbs. per year, and represent just 3.9% of the total market. Processed sales are increasing at a reasonable 3.3% rate on average, but sales here as well as in fresh show great volatility from year to year, as reflected in the high standard deviation figures. The year 2017 shows considerable improvement, but in light of the longer term volatility, can not be taken as a sign of a long-term improvement yet. Still, per capital consumption in both categories are steadily increasing, reflecting a steady increase in demand.

Table 4.1: Global Cranberry Consumption

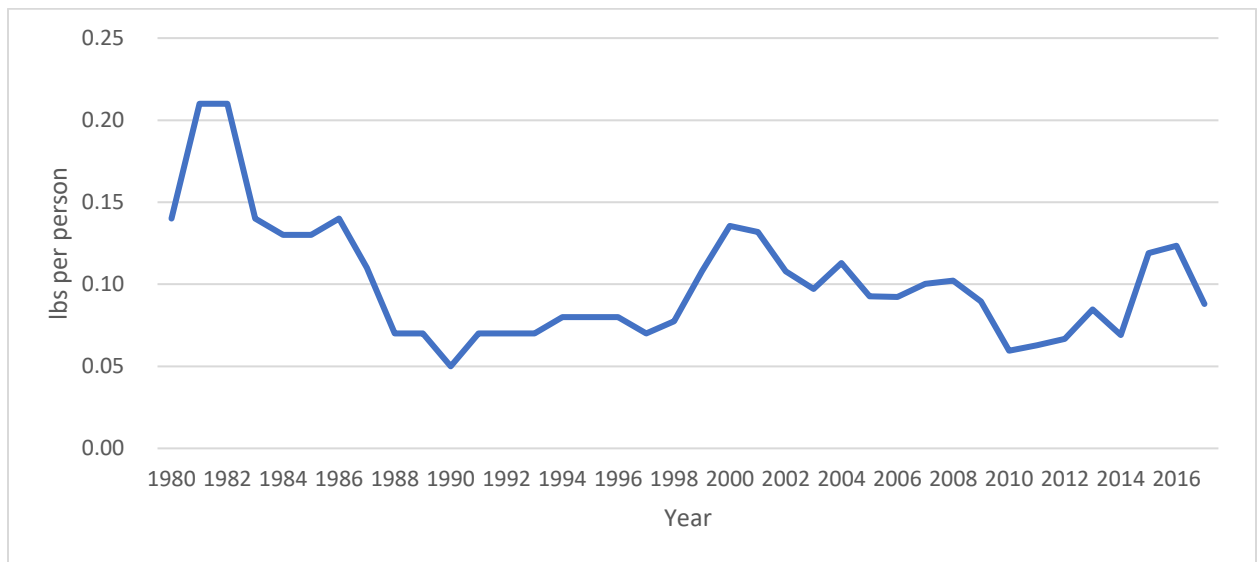
Crop Year	Processed Sales (lbs.)	Annual Growth Rate	Fresh Fruit Sales (lbs.)	Annual Growth Rate	Per Capita Consumption Fresh (lbs.)	Annual Growth Rate	Per Capita Consumption Processed (lbs.)	Annual Growth Rate
2008	5,328,003		252,694		0.08		1.75	
2009	5,535,668	3.9%	241,219	(-) 4.5%	0.08	0.0%	1.80	2.9%
2010	5,717,010	3.3%	257,012	6.5%	0.08	0.0%	1.83	1.7%
2011	5,315,314	(-) 7.0%	258,980	0.8%	0.08	0.0%	1.70	(-) 7.1%
2012	5,237,404	(-) 1.5%	265,364	2.5%	0.08	0.0%	1.67	(-) 1.8%
2013	5,555,709	6.1%	270,383	1.9%	0.09	12.5%	1.76	5.4%
2014	6,164,931	11.0%	258,767	(-) 4.3%	0.08	(-) 11.1%	1.92	9.1%
2015	6,203,247	0.6%	270,229	4.4%	0.08	0.0%	1.93	0.5%
2016	6,260,106	0.9%	288,697	6.8%	0.09	12.5%	1.94	0.5%
2017	7,053,075	12.7%	284,672	(-) 1.4%	0.09	0.0%	2.15	10.8%

Average	3.3%		1.4%		1.5%		2.4%
Standard Deviation	5.7		4.0		6.8		5.2

Source: Authors from Cranberry Marketing Committee, accessed June 2019

USDA also gives a longer per capita consumption timeline for the U.S., which we present in the following graph, and also show downward trends.

Figure 4.1: U.S. Per Capital Consumption of Cranberries, 1980-2016 (lbs./person)

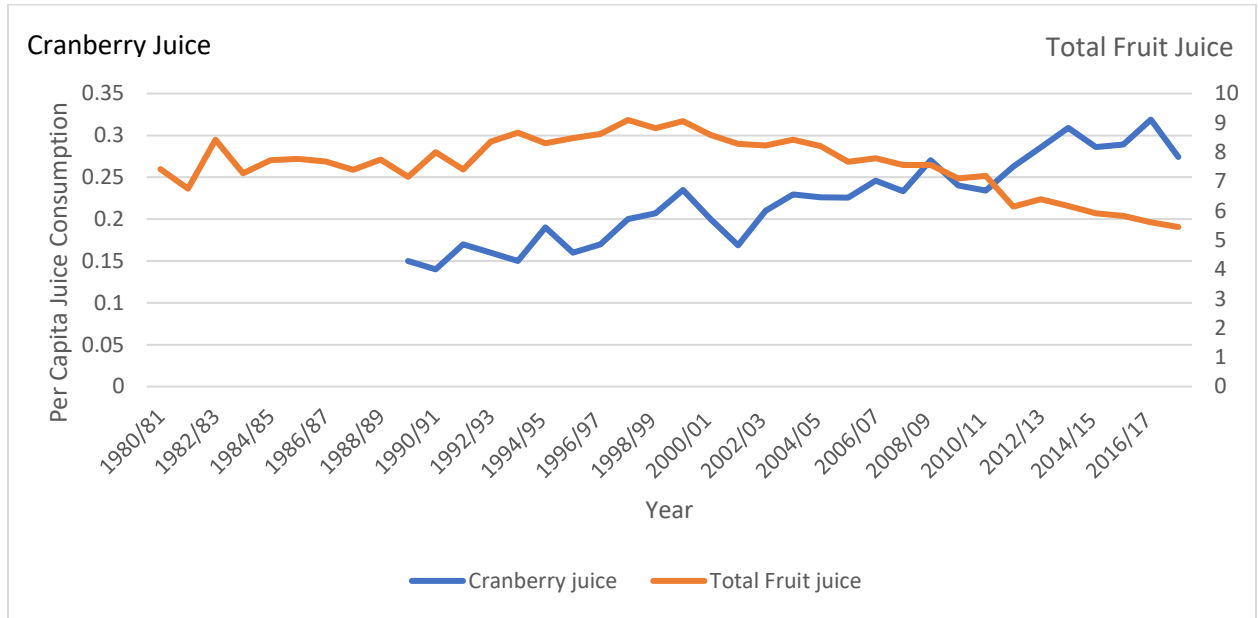


Source: author from USDA

What we see is that while overall sales are increasing by about 2%/year (calculations by author from cranberry marketing committee, found at: https://www.cranberryinstitute.org/about_cran/Cropstatistics_about.html, accessed May 1, 2019), per capita consumption has declined from previous decades, even after the introduction and takeoff of sweetened dried cranberries in the 1990s. Interviewees suggest that demand is declining due to generational change, as most still associate cranberries with holiday side dishes, and younger people are less apt to celebrate them and/or to consume cranberries with them. Fruit consumption varies over the period, but it is notable that blueberry and cherry consumption have increased at a steady rate.

Interviewees suggest that cranberry juice consumption in the U.S. has been flat or declining, while most growth is in sweetened dried cranberries (however surpassed by growth in supply). We can confirm the former through the following figure.

Figure 4.2: U.S. Per Capita Juice Consumption, 1980-2017



Source: Author from USDA ERS

Note: units = gallons, single strength equivalent; 2017 figures preliminary

We note that there is an overall decline in fruit juice across the board, and while cranberry juice consumption increased during the 1990s, it has been relatively flat in the past 7 years.

While overall demand is increasing at approximately 2%/year pace as reflected in overall sales, in what we presume is the sweet dried category, while juice sales have been in a slow, years-long-decline, though post-COVID-19, there has been a recent spike. Since there are no good publicly available statistics on SDCs, it is hard to evaluate the size and growth of the market, however, growers and handlers interviewed for this report suggest that it is currently the main market driver, but that demand growth was flat.

Emerging Chinese Cranberry Market

China is the most tantalizing market for cranberry growers as it is for a large variety of sectors, given its huge potential market. Chinese consumers reportedly perceive strong health benefits from cranberries and do not mind the tart taste of the fruit. Employing a research assistant who could read Mandarin, we were able to piece together the following basic facts.

The following table illustrates, from 2014/15 to 2016/2017, China’s increasing demand in cranberries has been juxtaposed with an active increase in imports by double-digit percentages for three consecutive fiscal years. While 2017/18 witnessed a slight decline in net import increase, China still remains one of the largest importers of the berry, receiving more than six percent of total global exports. However, as the US-China Trade War increased fifteen percent of tariffs on cranberries and other fruits in 2018, imports decreased by more than fifty-five percent was witnessed in 2018/2019, from 184,094 (2017/18) to 82,117 (2018/19).

Table 4.3: Total Chinese Cranberry Imports, 2014-2019

	2014/15	2015/16	2016/17	2017/18	2018/19
Imports into China (Barrels)	82,843	128,319	194,848	184,094	82,117
Net Increase in Import	N/A	54.89%	51.85%	-5.52%	-55.39% (U.S. trade war)

Source: “Overview of Export Data,” Translated from Xiangrong Chen, et al. “Research on the Development of Cranberry Industry in China” [“Manyuemei chanye zai zhongguo de fazhan yanjiu”], *Rural Economy and Technology* 20, no. 19 (Dec 2020): 221.

Recent data reveal that Beijing had become the second-largest importer of American cranberries in 2017 before the US-China Trade War, receiving approximately 8,000 tons of American exports.¹² It’s not clear how much imports went down as a result of Chinese tariffs imposed on cranberries, but producers interviewed for this book suggested that there were significant losses. Reflecting its general mercantilist approach to trade, China appears to be interested in import substitution policies for cranberries. China now has the largest and the only cranberry farm in Asia, the Honghai Manyuemei Production Base (translates directly to Red Sea

¹² Ibid.

Cranberry Production Base), located in the City of Fuyuan of Heilongjiang Province in northeast China. Production appears to have started with the introduction of North American cranberries and research on the cultivability of cranberries in Fuyuan in 2010 and large-scale cultivation of cranberries and production of its products in 2015. Approximately 4,200 acres have been planted, about 500 acres of which would be harvestable by the end of the year, according to 2019 figures.¹³ This seems to reflect clear challenges to ramping up production, though it's worth noting that several key experts interviewed for this report mentioned receiving consulting offers from China.

The City of Fuyuan is continental seasonal in climate, locating at a similar latitude to that of British Columbia and Québec (47°25'30" to 48°27'40"). It has one of the only three remaining black soil belts in the world (the other two being located in the Ukraine and Mississippi River region) and the largest wetland in the country—the Sanjiang Plain Wetland. The pH value of the Fuyuan City averages between 5.2 and 6.8, and the pH value in Honghai Production base is around 5.5.¹⁴ The water holding capacity of the land in the production base, in addition, is strong, and the temperature and humidity of Fuyuan are very suitable for the growth of cranberries.¹⁵ The plantable cranberry land in Fuyuan is about 3,000-6,000hm²,¹⁶ giving Honghai a great chance to expand its production base in future years, especially considering the growing demand of cranberry and its products in the Chinese market. In terms of transportation, Honghai Production Base is five kilometres away from Fuyuan Airport and eight kilometres away from the nearest the railway station. All these factors make Fuyuan a suitable base for the development of the cranberry in China and to a lesser extent in Asia.

At the municipal, provincial, and state levels, there seems to be few environmental regulations on the level of the U.S. or Canada. Peng Hai, a local production manager, revealed that the local (from my understanding both municipal and provincial) government(s) gave tremendous technical support to the production base in a later interview with the People's Daily

¹³ Bihua Ye and Yana Dai, "Global Reserve of Frozen Cranberry Reaches Historical Lows" ["Quanqiu manyuemei dongguo chubeiliang dadao lishi didian"], 21 Century Global Economic Report, Available at <https://m.21jingji.com/article/20190927/herald/b11e13077148e2d68af26B.C.28d3874e6.html>.

¹⁴ Ibid.

¹⁵ Ibid.

¹⁶ Ibid.

Online.¹⁷ He says, “the number of research institutes and experts on cranberries was historically limited; however, the Honghai was able to establish cooperation with the Heilongjiang Academy of Sciences, the Northeast Agricultural University, and the Heilongjiang Academy of Agricultural Sciences, among others to conduct research on breeding and other aspects of cranberry production.”¹⁸ While Hai also mentions preferential policies by the Fuyuan (municipal) government,¹⁹ the details of these policies are not available.

Fuyuan was historically a ‘national-level poor county’ (Fuyuan is a so-called ‘county-level city’). With the expansion of the scale of the cranberry industry in Fuyuan, however, farmers were able to lift themselves out of poverty in 2018, achieving an average annual income of “hundreds of thousands” yuan,²⁰ which significantly contributed to Xi Jinping’s ‘victory in ending extreme poverty’ in early 2021. The municipal government has a strong interest in turning Fuyuan into a ‘Eastern Capital of Cranberries’, while at the same time creating a “comprehensive cultural industry” of cranberries and building “China’s first cranberry-themed cultural festival” in the city of Fuyuan through business and tourism.²¹ Some scholars further suggest that the Chinese cranberry industry can create a cranberry economic development circle covering Europe and Asia with Fuyuan as an industrial centre and a nod for Sino-Russian border trade and with Shanghai as the marketing “bridgehead.”²²

Chinese demand for cranberries and its products, both preserved and fresh, are expected to grow significantly as the product is perceived to have health benefits and the tart natural taste is not a deterrent to the Chinese palate. Awareness of cranberries among Chinese people reached a historical high of seventy-one percent in 2021 as compared to sixty-six percent of the previous

¹⁷ “Interview with the Chairmen of Honghai: Let the Chinese Eat Cranberries Produced in Their Own Country” [“Zhuanfang honghai zhiye dongshizhang: Rang zhongguoren chishang ziji guojia shengchan de manyuemei”], reprinted by Xincainet, available at <http://www.xincainet.com/index.php/news/view?id=233275>. The original print by People’s Daily Online is “403 forbidden”..., which is available at <http://cnews.people.com.cn/n1/2019/1012/c354509-31396088.html>.

¹⁸ Ibid.

¹⁹ Ibid.

²⁰ Ibid. The exact number of annual incomes among Fuyuan cranberry farmers was not given.

²¹ 13th Five-Year Plan of Fuyuan, cited in Ibid.

²² Xiangrong Chen, et al.. “Research on the Development of Cranberry Industry in China” [“Manyuemei chanye zai zhongguo de fazhan yanjiu”], *Rural Economy and Technology* 20, no. 19 (Dec 2020).

year, in accordance with the latest statistics from Nielsen.²³ Among them, twenty percent had purchased snacks made with cranberries, and twenty-nine percent had reported consumptions of cranberry drinks, such as fruit tea.²⁴ More surprisingly, twenty-nine percent of Chinese cranberry consumers had reportedly used cranberries as side dishes for their everyday meals for not only breakfast but also lunch and dinner.²⁵ Data from the 2020 China Fruit and Vegetable Juice Industry Summit also demonstrated a great potential of the Chinese cranberry market. The number of new products made with cranberry juice as a raw material has witnessed a growth of forty-eight percent over the past five years, and the use of cranberry puree has increased roughly between thirty and forty percent annually over the same period.²⁶

Perhaps owing to the fervent allegiance of Chinese consumers to diet regimen/therapy, the health benefits, such as claims about prevention of unitary infections and anti-Helicobacter pylori, of consuming cranberries have also received wide coverage in Chinese private media. Nonetheless, it is important to note the state media of China hold an opposite view; in fact, in 2015, the People's Daily Online, published an article entitled "Cranberry Contains Similar Nutrients as Other Fruits: Health Benefits of Cranberries is Deified," stating that the health benefits for cranberries are unproven, and concluding that "In fact, cranberries, like strawberries and blueberries, are just a kind of fruit."²⁷

Chinese consumers nonetheless seem convinced about cranberries and prefer fresh ones which are deemed to have more health properties. The rise of e-commerce in recent years and fast logistic networks in China allow the preservation of freshness of cranberries when delivered to the hands of consumers. In fact, the Honghai production company has been cooperating with

²³ Cited in Andrew D., "Cranberries Hit Record Recognition and Popularity Among Chinese Consumers," Produce Report, 27 February 2021, Available at <https://www.producereport.com/article/cranberries-hit-record-recognition-popularity-among-chinese-consumers>. I was unable to find the original Nielsen report; however, these number is widely quoted in Chinese media. The above citation is one of the media coverages in English language.

²⁴ Ibid.

²⁵ Ibid.

²⁶ Cited in Andrew D., "Cranberries Hit Record Recognition and Popularity Among Chinese Consumers." Similarly, I was unable to find the original report from the 2020 China Fruit and Vegetable Juice Industry Summit, but these number is widely quoted in Chinese media. It seems to be a tricky problem. The Chinese media do not seem to always provide the links of the reports they are referring to.... Nor are these reports generally available to the public....

²⁷ "Cranberry Contains Similar Nutrients as Other Fruits: Health Benefits of Cranberries Being Deified" ["Manyuemei suohan chengfen qita guoshu douyou: Baojian gongneng beishenhua"], People's Daily Online, 26 October 2015, Available at <http://health.people.com.cn/n/2015/1026/c21471-27739856.html>.

Chinese e-commerce giants, such as Jingdong Shengxian (translates directly to Jingdong Fresh).²⁸ The companies guarantee speedy delivery to preserve freshness, thus local cranberries have ready logistical and freezer supply chains.

One Québec interviewee suggested that Chinese production should be viewed in a positive light, because the local industry will act to promote local consumption. This includes a cranberry festival that the emerging Chinese cluster holds. This is plausible, along with the fact that current production is unlikely to meet potential demand.

To be sure, North American cranberries still appear to have a comparative advantage over those produced in Honghai, an area in northeast China, in the Manchuria region. The following table reflects the unit price of Chinese-produced frozen and dried cranberry seats respectively at 20,000 and 45,000 yuan/tonne, roughly U\$3/kg for frozen ones and \$7/kg for dried ones (at the current exchange rate of 6.4), five and eleven times more expensive as compared to processed American cranberries, which average about \$0.6/kg or \$27.4/100lb in local American markets.²⁹ This comparative advantage is even larger when it comes to fresh cranberries. While Honghai-produced fresh cranberries seats at 180,000 yuan/tonne or U\$28/kg, American fresh cranberries average about U\$1.5/kg or \$66.80/100lb in 2019 in local American markets, according to USDA.³⁰

Table 4.4: Chinese Market Prices for Different Types of Cranberries (2018)

Type	Unit Price (10,000 Yuan/ Tonne)	Amounts Sold (10,000 Tonne)	Percentage of Total Sales	Total Sales (100 million Yuan)
Frozen Cranberry	2	1.8	30%	3.6
Fresh Cranberry	18	1.2	20%	21.6
Dried Cranberry (Juice Concentrates)	4.5 (15)	1.8 (2.4)	40%	8.1 (27)

²⁸ Ibid.

²⁹ Cited in Agricultural Marketing Resource Center, “Cranberries,” September 2021. Available at <https://www.agmrc.org/commodities-products/fruits/cranberries>.

³⁰ Ibid.

Anthocyanin Extract	50	0.12 (0.6)	10%	6
Seeding, Technology Transfer, Equipment rental				10
Derivatives³¹				3.2
Total				79.5

Source: “The Estimated Production Value of the Chinese Cranberry Industry,” Translated from Xiangrong Chen, et al. “Research on the Development of Cranberry Industry in China” [“Manyuemei chanye zai zhongguo de fazhan yanjiu”], *Rural Economy and Technology* 20, no. 19 (Dec 2020): 222.

Superficially, the barriers for North American cranberry producers and exporters to utilize their comparative advantage in price in the Chinese market are tariffs and transportation. While it is yet known how much tariffs China will impose on the import of cranberries as the Biden administration plans to review the phase one trade agreement that President Trump forged with China two years ago, North American cranberry producers and exporters should explore the Chinese market for fresh cranberries in addition to the market for processed ones because of the huge price difference (\$1.5/kg in US vis-a-vis U\$28/kg in China), which may account for the increased tariffs and additional transportation costs (think about fresh Malaysian durian).

More serious still are the deep trenches to understanding and facilitating export to the Chinese market, including finding suitable local partners. Existing efforts are haphazard at best. For example, one Oregon grower mentioned some support from the Oregon state government in meeting phytosanitary requirements in China, but most said there was no support from anywhere for learning how to export. State representatives headed by Rep. Smith were able to get the U.S. Obama Administration to change phytosanitary requirements by USDA for frozen cranberries and other berries, extending their expiration date from 14 days, standard for berries, to an indefinite period. There is an Oregon-China Business Council that organizes annual trade

³¹ Includes cranberry honey, cranberry tea, cranberry-themed tourism, and cranberry souvenir.

missions,³² but, alongside CMC programs to provide basic market intelligence, these efforts serve to underscore the lack of a harmonized industry approach to developing overseas markets.

CMC Global Supply Statistics

The US Cranberry Marketing Committee (https://www.cranberryinstitute.org/about_cran/Cropstatistics_about.html, accessed May 1, 2019) gives statistics in a different format, emphasizing just three countries. We should note first that these numbers don't jive with the previous sales numbers. The marketing committee should try to reconcile the supply and consumption numbers. Thus, we cannot directly compare supply with consumption. Putting that aside, if we focus on these supply figures for the moment, we see the steady increase in supply that precipitated a volume control regulation in 2017-18, as we discuss below.

Table 4.5. Global Cranberry Production- Major Increases in the United States, Canada, and Chile, 2011-2018

Year	United States	Canada	Chile	Total
2011	775,500	191,080	35,400	1,001,980
2012	793,700	295,400	35,480	1,124,580
2013	881,860	276,600	46,500	1,204,960
2014	805,780	337,300	40,800	1,183,880
2015	805,340	327,200	43,200	1,175,740
2016	925,070	395,890	48,800	1,369,760
2017	808,520	265,270	48,000	1,121,790
2018	861,516*	406,393	44,000	1,311,909

Notes: *approx. 110,000,000 pounds restricted and will not enter the market; Units are: pounds x 1,000)

Source: U.S. Cranberry Marketing Committee

³² The 14 day expiration date for fresh cranberries holds, despite the fact that they preserve longer than other berries.

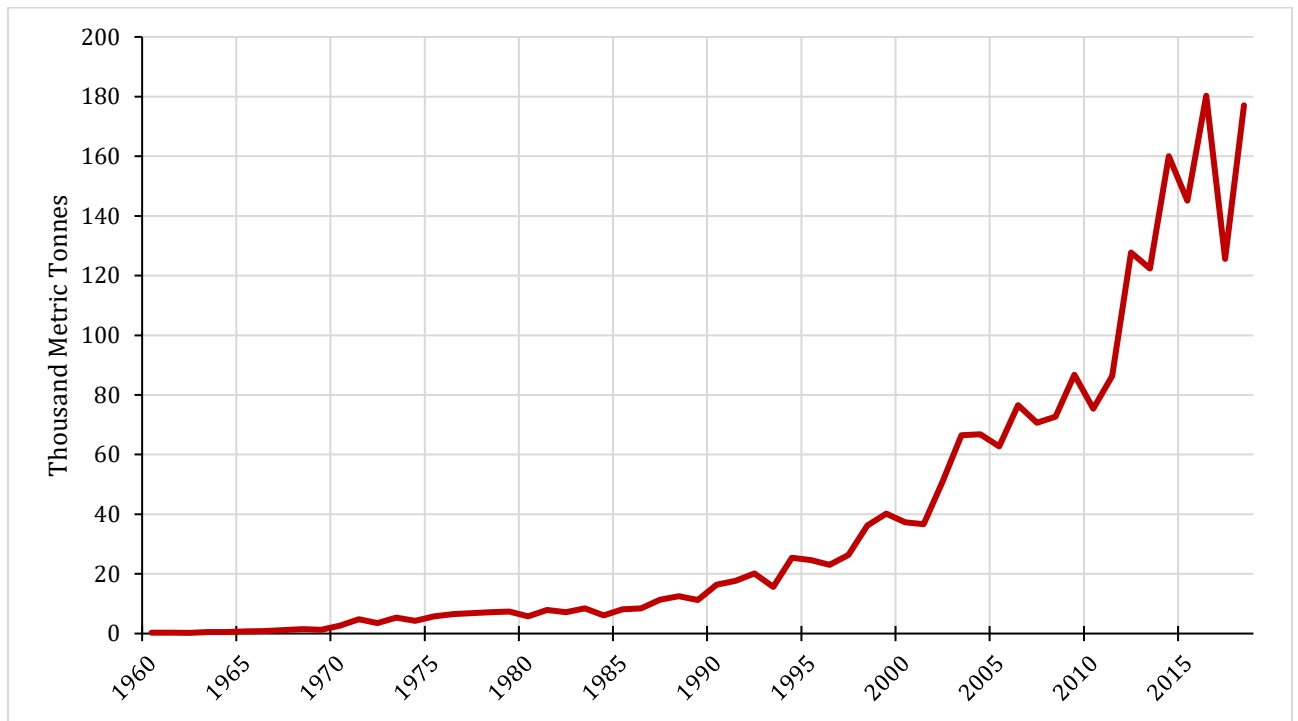
Considering the three main producers, the U.S. produced approximately 66% of the crop in 2018, Canada, 31% and Chile 3.4%. While the U.S. therefore maintains a dominant supply position, this is down considerably from the 77% production share it commanded in 2011, with Canada having only 19% and Chile steady at 3.5% at that point. Clearly, the major increase in supply is coming mostly from growth in Canadian production. Indeed from 2011-18, Canadian production grew 113%, as compared to 11% in the U.S. and 24% in Chile!

Canadian Production

We turn now to a more in depth analysis of Canadian production, relying on Canstats, the government agency. We note first that historical statistics are more limited than in the U.S. We do not have detailed statistics on domestic demand of cranberries. Most have traditionally come from B.C., with the Atlantic provinces playing a lesser role.

The Figure below gives overall Canadian cranberry production, demonstrating the overall long-term increase in production, accelerating significantly with the entry of Québec over the last two decades.

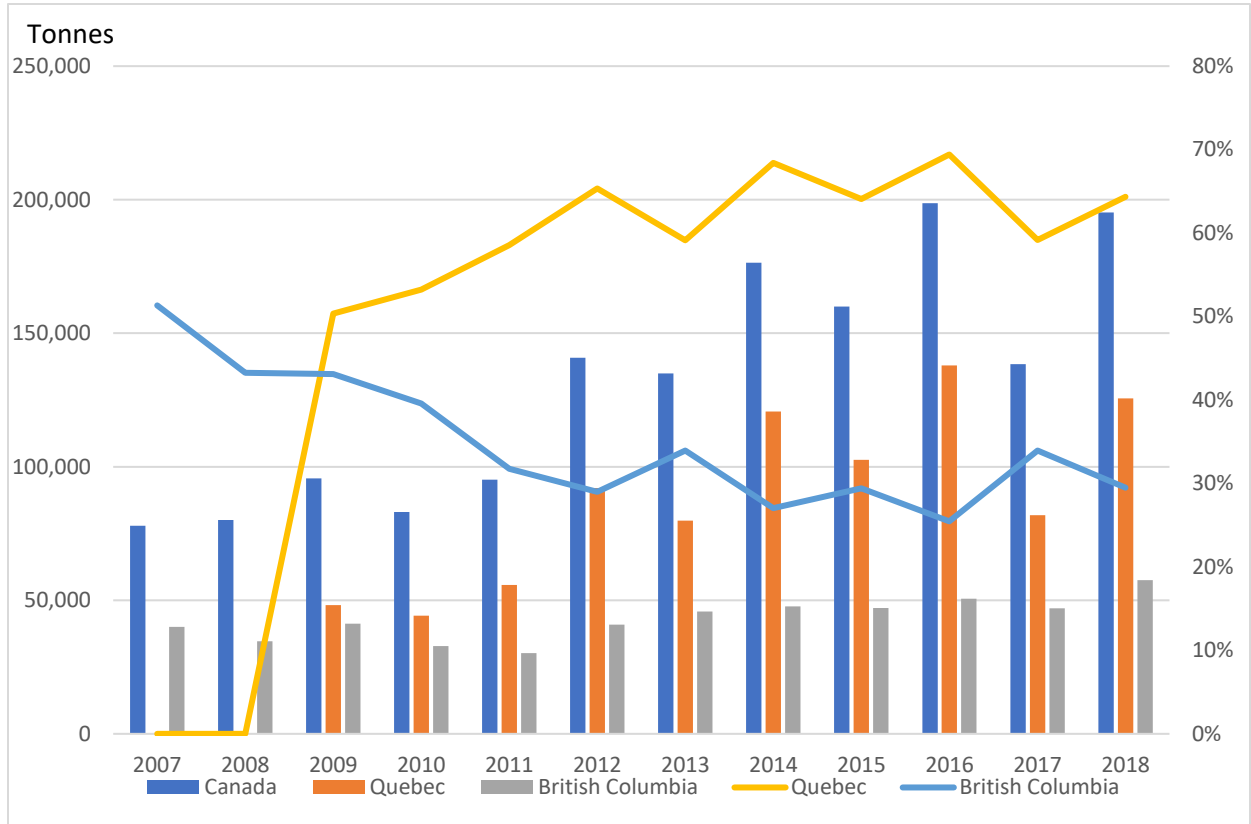
Fig. 4.3: Canadian Cranberry Production, 1960 - 2018



Source: Leighton Kerr from Stats Canada

In Fig. 3.6 below, we illustrate the dominance of the two major producing provinces. The rocket ascension of cranberry production in Québec from 2009 is impressionable. The lines give the relative percentages of Canadian production, while the bar charts give total tons.

Fig. 4.4: Impressive Growth of Québec Production



Source: Andy Hira and Leighton Kerr from Stats Canada

We were able to obtain a snapshot of export destinations by province for B.C. and Québec for 2018. The differences in export destinations are remarkable. We found 98% of B.C. exports go to the U.S. (as most B.C. growers belong to Ocean Spray, they are sent across the border to Washington State and California for processing). For Québec, 51.2% of exports go to the U.S., while 40% go to the E.U. The following figures break down export destinations, separating US states, to show the geographic orientation of the different markets.

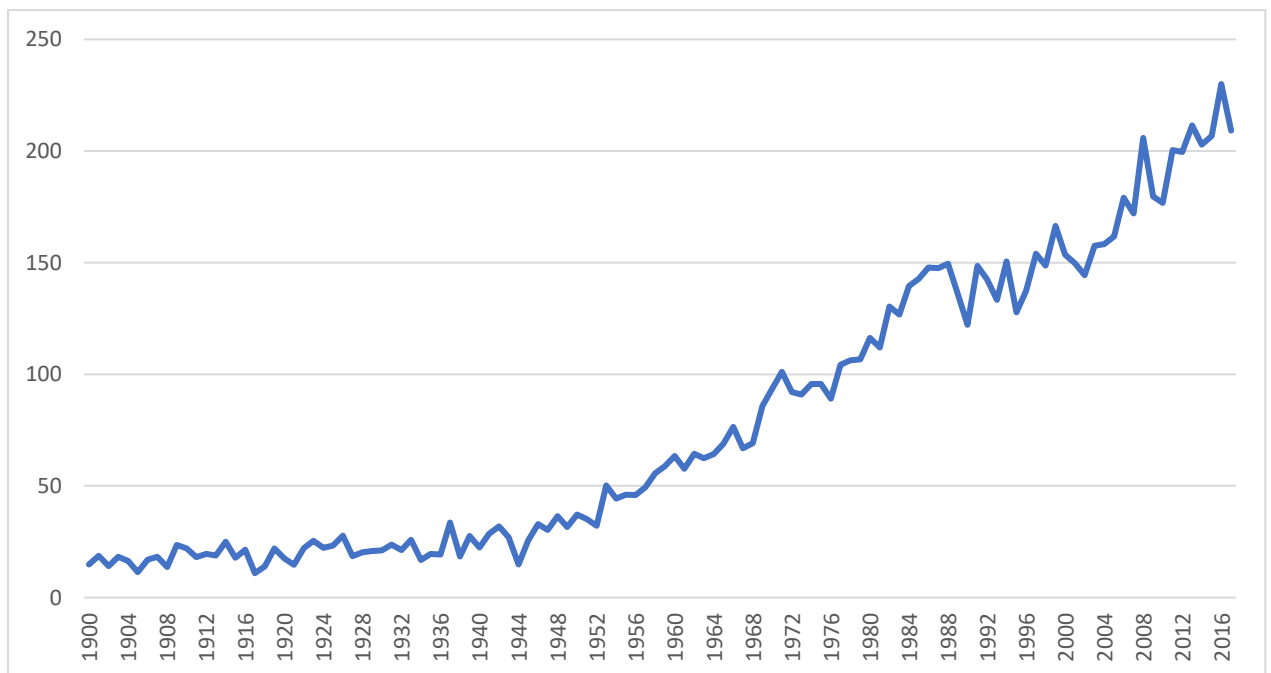
4.4: The Rise of Wisconsin and Québec to Industry Leadership

US Historical Production Trends

From the USDA (NASS and ERS) and Eck (1990), we have been able to compile a fairly long time series on cranberry production in the US, summarized in the following tables. In our first graph, we see a gradual increase, with the exception of 1929, the onset of the Great Depression. Cranberries plateau until the late 1950s, when they decrease, related to the “cranberry scare” as we discussed above, then acreage really takes off in the 1970s. We can see a smoothing out of growth in the last decade, reflecting an oversupply condition in the present market. With the exception of the crash in 1999/2000 and some volatility over the last decade, overall production has experienced a steady increase. The closing gap between acres harvested and increasing production reflects higher yields over time, inevitably adding to the tendency for supply to increase and prices to flatten or decline.

As seen in the next figure, productivity in the industry has clearly increased, with yields per acre really taking off in the postwar period.

Fig. 4.5: Yield per Acre, U.S., 1900-2015

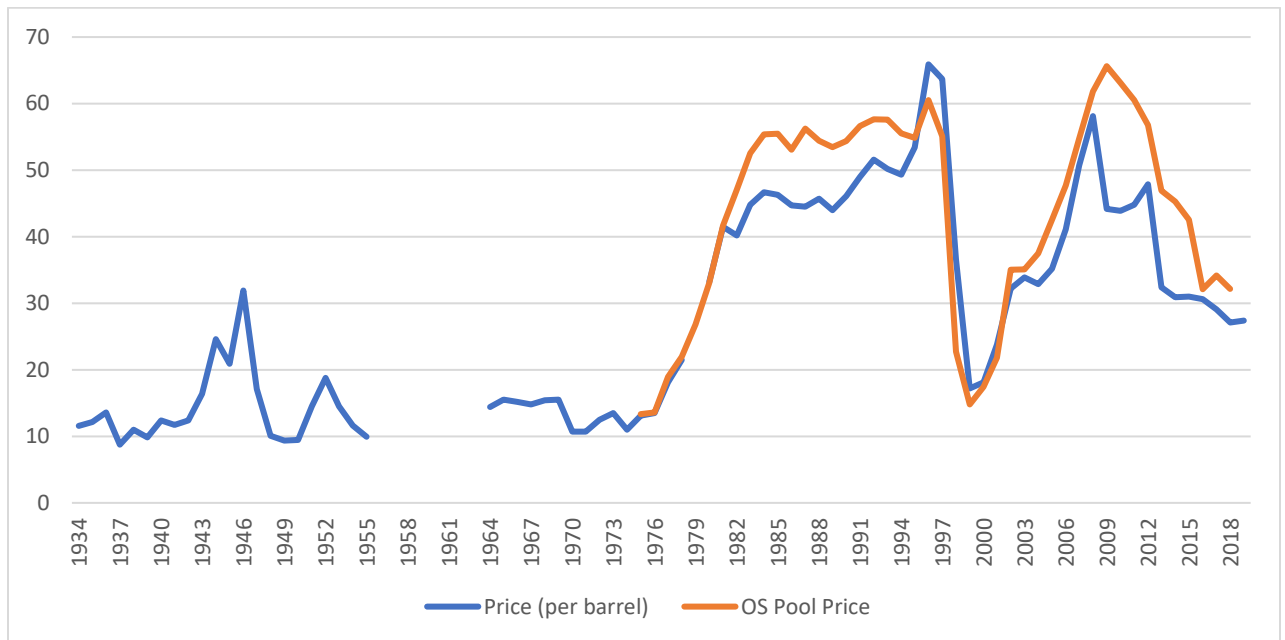


Source: author from USDA

The “market correction” of the last few decades reflecting our above analysis can be clearly seen in the value of the production (\$1000s), with the 1997 and 2008 spikes clearly seen.

The important point revealed by the figure below is that cranberries suffer from the same commodity price swings as do all agricultural products. This creates serious challenges for the industry to deal with significant volatility and uncertainty; the principal response that largely distinguishes the cranberry from other agricultural industries is the movement towards cooperation as a response, as we discuss in the next section.

Fig. 4.6: U.S. Processed Cranberry Price Per Barrel, 1934-2017 vs. Ocean Spray Pool Price from 1975-2018



Source: author from USDA and anonymous source; Processed price
 Note: Blanks indicate missing data

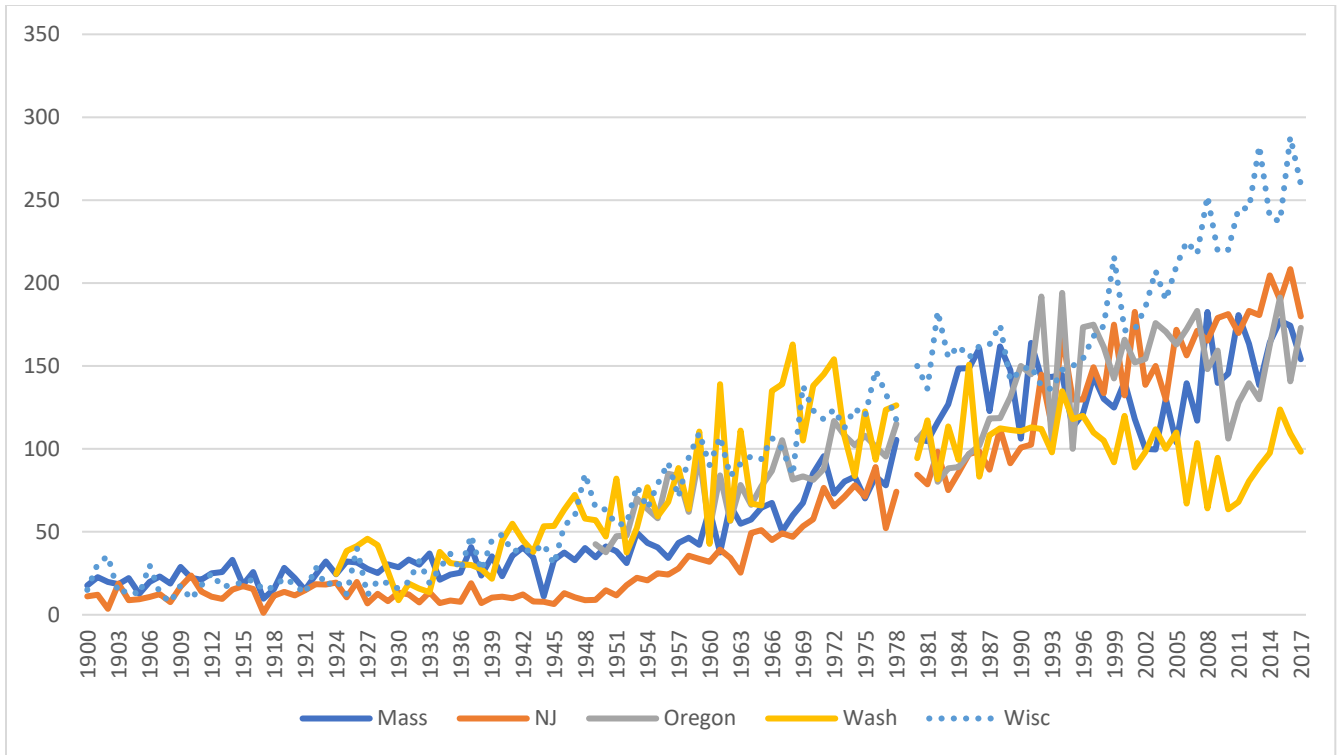
It is impossible to find data on the breakeven point for production, as that varies over time and space, and depends on a wide spectrum of supply and demand and sales figures which depend on the individual transaction. However, the current slump to the low \$30 price range is quite alarming. The graph illustrates a substantial overall price premium from Ocean Spray. This makes one wonder how sustainable such prices are, though reports in 2021 were that prices were back up to approximately \$37/barrel, which some growers attributed to health consumption

shifts during the pandemic of 2020-2. However, the same growers noted increasing costs for everything from petrol for transport to plastic for packaging. There is no way to tell whether the premiums make sense over the long-run without a review of internal data from Ocean Spray which are not available to this researcher, however, they substantiate the long-term attraction of growers to the co-op. A Farm Credit East report (2012-4) on Mass. cranberry growers reveals that the cost of producing cranberries per barrel for the period averaged \$32.39/barrel but was on a gradually declining trend; meanwhile the average price received in the state for 2014 was \$37.08, up from \$31.60 in 2013.

State Level Data

While Massachusetts is most often thought of in regard to cranberries due to its pioneering status, Wisconsin is the largest producer. Note in particular the difference in the trajectory of Wisconsin production from that of Massachusetts, with the inflection point taking place in the early 1990s. The decline in production in New Jersey from the late 1950s is also notable. Interviewees note the cheaper land and larger farms in Wisconsin. Wisconsin's takeoff in production can be reinforced by the graph below, showing its leadership in total production from the 1990s.

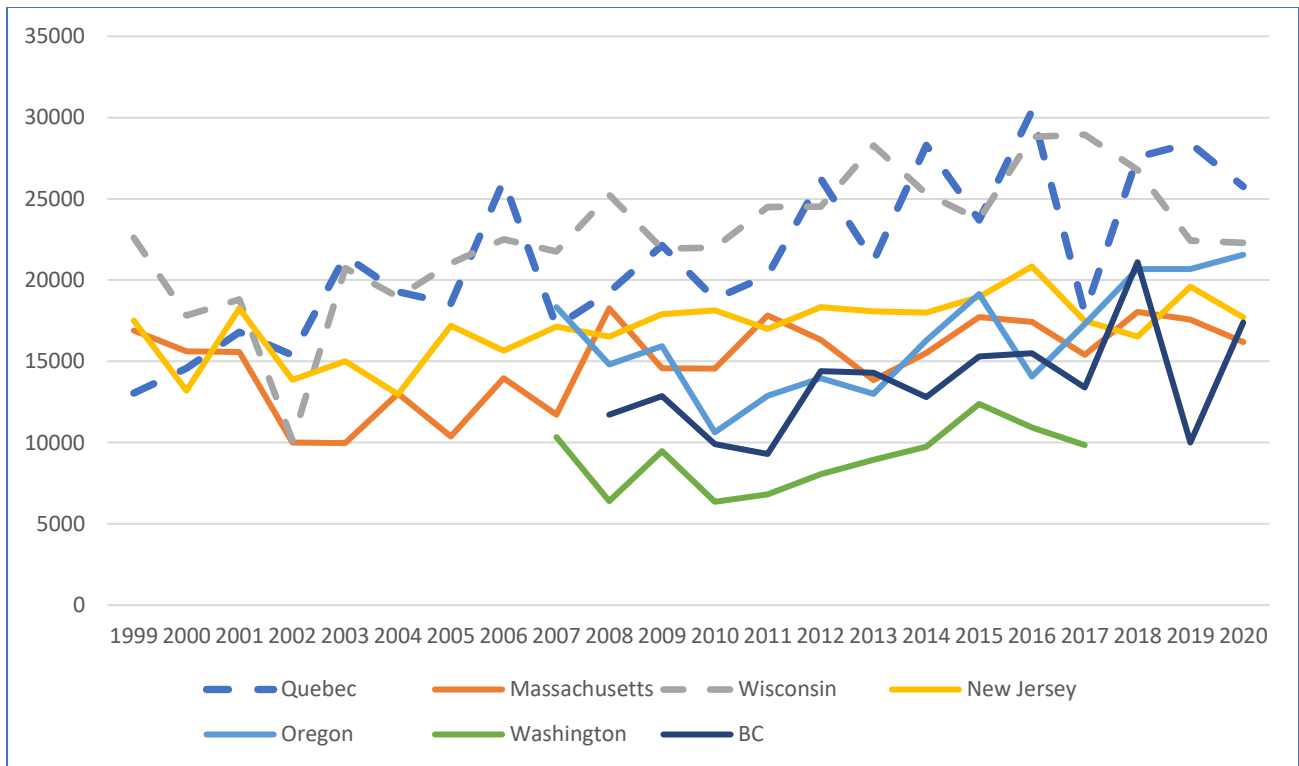
Fig. 4.7: Yield Per Acre (barrels/acre) by state, 1900-2015



Source: author from USDA

Caron et al. (2017) provide a more updated binational picture of yield per acre, as reflected in the following graph, which Caron designed to demonstrate the importance of water management in Wisconsin and Québec:

Figure 4.8: Yield Per Acre (lbs./acre), 1990-2020, Québec and Wisconsin vs. Other U.S. States and B.C.



Source: Author from Jean Caron, Université Laval

Caron ascribes the higher curves in Wisconsin and Québec to better irrigation/water management, noting that recent dips in both places are linked to “a compaction of beds” in both.

Clearly there is a national clearing market for cranberries, with not much differentiation by price and location, though the price spike in 2008 in Oregon deserves further investigation.³³ Through the NASS county level production statistics as reflected in the agricultural census, we were also able to find the number of farms and acreage by state for 1997-2017, for selected years. In regard to the number of farms, there clearly is a major decline in both Massachusetts, which lost 347, or an astonishing 49%, during the period, New Jersey, which lost 20 or 43.5%, and Washington state, which lost 26%! The industry in these states is in difficult straits for the long-term. As one Mass. grower relayed to me, he needs to work a full time job and then work in any free time on his farms, just to keep up with bills. He states, “But I’ll tell you honestly, it’s really tough. We don’t go to coffee shops or hang out like we used to. We have to do everything ourselves. We can’t afford to hire anyone anyway.” We heard the same stories in Washington

³³ My guess is that this may be a data entry error by USDA.

state and Oregon, with numerous interviewees telling me that they had other full-time jobs, or in Oregon, was combined with timber and livestock, so that cranberry growing was their second job, “by necessity.” This reflects the smaller size of many of the operations. This indicates that the USDA statistics (which don’t give the # of farmers) underestimate the extent of the problem. Indeed, based on internet searches of cranberry growers and discussions with interviewees, around 10/32, or 31% of listed Washington growers are no longer in business, while 1/9, or 11% of listed Oregon cranberry growers/handlers are out of the business. Interviewees suggest, for example, that the number of farmers in Long Beach, Washington state went from approximately 35 in 2000 to just around 20 now. Interviewees in Oregon suggested that at least 30% of growers had left the business, either selling or simply leaving their land fallow, and they believed that the numbers were worse in Washington.

By USDA statistics, Wisconsin lost approximately 6%, while Oregon had no change. In terms of acres harvested, there is some considerable movement towards economies of scale in Mass. and NJ, with the total acres increasing by 12% and 12.5% respectively. By contrast, the total number of acres declined elsewhere, by 2.4% in Washington, 33% in Oregon, and 25% in Wisconsin. We do not have access to acreage size, but if we divide the total acres/number of farms, we see the following breakdown by state, giving us the rough average size of each operation:

Table 4.5: Total Acres/Farm by State, 1997-2017

	1997	2002	2007	2012	2017
Massachusetts	21.70	30.51	28.50	33.90	37.34
New Jersey	84.87	75.73	86.59	118.38	131.35
Oregon	17.39	18.37	20.19	20.97	23.13
Washington	13.29	15.27	14.61	16.21	18.45
Wisconsin	63.92	73.81	71.09	85.65	91.94

Source: Author from NASS, accessed Aug. 19, 2019

This calculated table reinforces the fact that cranberry production areas are consolidating, through some exiting, and others trying to become more competitive through larger farms, something that was repeatedly suggested during the interviewee interviews.

According to interviewees, the entry of Québec as a major supplier, projected to be the 2nd largest in coming years, only after Wisconsin, was unanticipated by much of the industry. They state that aggressive provincial policies for technology transfer and investment from abroad (the U.S.) to establish the industry during the high prices of the 1990s paid off. Québec followed the Wisconsin model of large rectangular farms and high yielding varieties, achieving a high level of productivity in a short time. Mass. and N.J. growers report being “wooed” to Québec by promises of subsidies and cheap land, thus helping to transfer the tacit knowledge necessary to establish the industry there, whereas inadequate policy support in Maine led to a failure to establish a viable “critical mass.” Canada also has cheaper access to sugar, in contrast with U.S. protectionism of higher cost local producers. Québec’s maturity is marked by the recent acquisition by Ocean Spray of an independent handler there, Atoka, which it reportedly sees as a way to establish a strong presence in the organic market. Québec’s francophone roots are seen by some industry insiders as an advantage to accessing European markets. Québec also has a strong innovation program, with researchers from Laval, Montréal, and McGill offering both assistance and R&D for the industry. Québec, while offering serious benefits, also creates tensions and challenges for the industry beyond its increase in supply. The vast majority of growers there are independent of Ocean Spray, and many more are focused on the organic supply. Interviewees suggest a major climatic advantage for Québec and Wisconsin will grow over time, as they suffer from fewer pests due to having longer freezing periods. These tendencies are already happening as we show in our statistical analysis of US production trends.

4.5: Key Takeaways from the Statistical Analysis

What we have seen from this statistical overview are two compelling facts: a) a likely chronic oversupply situation in the cranberry industry, as productivity increases and cultivation in new regions outpace growth in demand, and b) growing disparities in productivity separate the financial viability of cranberry growing in different regions, leading to a shakeout of some producers exiting and others consolidating into larger farms. This is already reflected in the economies of scale advantages that add to natural growing and land price advantages in Wisconsin and Québec. As cluster theory predicts, both horizontal and vertical integration trends are occurring in the cranberry industry to smooth out lumpiness in the supply chain, reduce or better manage commodity cycle volatility, and create market power to improve

margins. This will further concentrate industry ownership and separate out large entities from smaller independent ones more likely to struggle. Significant high cost producers in higher cost clusters, such as Massachusetts and New Jersey, will likely exit if such trends continue. This suggests a more pro-active policy approach in the U.S. is direly needed, a point we turn to in the next chapter.

What we have seen from our analysis so far is that the remarkable historical collective cooperation of the cranberry industry to try to address agricultural oversupply, through creating club goods, including retail marketing and product innovation, through Ocean Spray, is in peril. There is great hope that Ocean Spray will develop a new “killer app” to increase demand, but this magic bullet approach is clearly insufficient to form an industry strategy for the future. The oversupply situation has led to the invocation of volume regulations under USDA marketing orders, now superseded by the recovery of prices post-Covid-19.

4.6: The Federal Cranberry Marketing Order as a Decreasingly Efficacious Policy Instrument

The Cranberry Marketing Orders are governed by Federal regulation Title 7.B.IX/Part 929 governing agriculture.³⁴ The statute creates a Cranberry Marketing Committee (CMC) of 13 growers, with 9 alternates, along with 1 public member (and an alternate), who interviewees suggest is generally a U. Mass or U. of Wisconsin expert. The geographic allocations give the Mass. and Wisc. regions 5 members each, and New Jersey/Long Island and Washington/Oregon 3 members. Members are nominated by “major cooperatives” and “non-major cooperative” growers. Major cooperatives get 6 members by district, while non-cooperative growers get 6 members. A 7th at large member is given to cooperatives when they have 50% or more of market share, but to non-major cooperative growers when it is less. All actions require 10 concurring votes (11 if the public member votes) not a simple majority. No compensation is paid to members but expenses incurred are reimbursed. Meetings are open to all growers and handlers. Funding comes from assessments of handlers based on their percentage of sales. Expenses can

³⁴Found at: https://www.ecfr.gov/cgi-bin/text-idx?SID=58c55106641f13f4a2f3144681008c24&mc=true&node=pt7.8.929&rgn=div5#se7.8.929_120, Accessed: July 26, 2019.

include the costs of holding the meeting as well as R&D and marketing as determined by the committee. Interviewees note that the CMC tracks inventories, even in non-volume regulation years, so that it has a database of production by grower and handler. Where inventory needs to be destroyed by volume regulation, the CMC sends out a representative and otherwise audits reported numbers from handlers. Some interviewees are concerned about the accuracy and thoroughness of the CMC's numbers.

When a volume regulation is initiated, as was the case from 2000-1, 2001-2, 2017-18 and again from 2018-19, when it was set at 7.275 m. barrels,³⁵ it restricts the total amount of cranberries that can be sold through normal outlets. Each grower is given a % of the total volume based upon their previous sales history. This is the amount each can sell. Excess cranberries can be sold overseas (except to Canada), given to charitable institutions, used as feedstock for animals, or for research and development. The most recent order exempts organically grown fruit, small handlers who resold less than 125,000 barrels during 2017-18 and allows handlers to put up to 50% of "excess" cranberries into dried fruit or "other processed products." Interviewees note that in the latest marketing orders, exceptions were given to handlers who could demonstrate that they had previously sold 100% of their product; this was the case for the independent handlers.

It is unlikely that volume regulations will be as effective if put forward in the future for at least two reasons. First, interviewees say that due to exemptions, Ocean Spray alone had to dispose of much of its inventory, mostly in the form of juice concentrate left over from making sweetened dried cranberries. Independent handlers and growers, working off lower and more accurate market prices, state in interviews that they are "in balance" as they do not accumulate inventories, and the problem lies with Ocean Spray's previous overpayment to its members (which some claim led to increasing corporate debt) and stockpiling of concentrate inventories. Thus, it would be more likely Ocean Spray will make its own adjustments. Second, Canada and Chile cannot be subject to volume regulations. Interviewees say while the Cranberry Marketing Committee (CMC) was able to develop agreements with Canadian producers on a recent volume regulation, the Dept. of Justice made it clear any collusion with foreign producers was strictly

³⁵ A barrel is equivalent to 100 lbs., according to the Act.

prohibited. Some growers are experimenting with creating their own branded products, such as fresh/frozen cranberries of higher quality, jams, and honey, but even if there is individual success, such efforts won't solve the larger problems of oversupply.

4.7: Mounting Concerns About Persistent Oversupply Conditions

Our analysis brings us to two compelling issues that deserve attention. First, why don't other states simply copy Wisconsin's approach and increase their productivity? To answer that question, we can see that transformation of regions from low to high productivity is no easy task, as illustrated by the efforts in Massachusetts. What we see is that path dependency in the cluster looms large in terms of the concentration of handling and processing facilities in the state, as well as the surplus of talent, however, historic advantage is eroding over time.

In our interviews, we found signs of alarm in both Mass. and N.J.- long-standing families in the cranberry business had and were about to go out of business. In recognition, in 2016, the Mass. state legislature created the Cranberry Revitalization Task Force to examine methods to improve innovation in the industry; there is no equivalent response in NJ. This was in response to a severe economic collapse in 1999-2000, which led to seeking federal assistance through direct cash payments, USDA purchases of surplus cranberry products for federal food aid programs and mandatory production restrictions by USDA. Interviewees say that a virtual cranberry innovation center was set up to help farmers adopt new practices around the 2006-8 period. The task force sought to improve productivity of each farm and increase the use of technology in the state (MDAR 2016, 10-13). The task force concluded that despite its efforts, some Mass. growers would likely exit the industry (MDAR 2016, 26).

There are also attempts to monetize the environmental services given by the wetlands functions of cranberry farms, which also prevents the conversion to other uses, in turn reducing the ability to exit from the industry, a common refrain throughout the industry, that prevents exit from it (as the land cannot be re-sold for other purposes). However, interviewees state that the ability to convert farms to wetlands for families who want to exit the business is limited and "extremely slow" in terms of Mass. and NJ state regulations. Renovation includes reshaping the landscape, such as creating a smoother farm surface, and one lower to the ground, to reduce water pump and usage costs; and potentially introducing new significantly higher-yield and

larger varieties developed by Rutgers U. and used elsewhere, such as Québec and Wisconsin. Tax breaks are suggested for renovation efforts. The report also recommends funding the creation of an economic development coordinator and new extension courses. There are also efforts to fund health and pest management research through the U. of Mass. Finally, there is a suggestion for funding alternative energy sources on cranberry farms.

The bottom line is that land in Mass. is more valuable and limited, thus acting as a factor to push up production prices. Nonetheless, interviewees suggest that cranberry farmers are family-oriented businesses in place for multiple generations, and reluctant to exit the business, so most favor renovation. In fact, interviewees say that the formula for a \$1 m. state bond for cranberry farm renovation, currently under discussion, would likely attempt to favor smaller growers, in order to help them survive the downturn. However, some growers estimate a farm renovation cost of at least \$20,000/acre, thus the amounts dedicated by the state are likely to be inadequate. In fact, many stakeholders suggest that most farms in the state are now too small to be independently viable, requiring owners to diversify their crops or take on additional economic activities (second jobs). Only one of those interviewed indicated that they have been able to take advantage of Mass. state support for renovation. One large East Coast grower offers a range of tourism activities, from participating in harvests to cranberry festivals. It also has diversified into other businesses, including custom soils and real estate, both of which have helped it to thrive in a period of low prices. Overall, there is a real concern in Mass. that the higher costs of land will challenge competitiveness and lead to new generations unable to succeed in some of the family businesses. Interviewees state that the importance of the industry goes well beyond economic contributions. The fierce loyalty of multi-generational family businesses and the historical place of the industry in southeastern Mass. are intangible but valued attributes. This is reflected in a strong unity of diverse growers around the Cape Cod Growers Association, who interviewees say is the main source of industry ideas. Even with the limits of Mass. state support, the Mass. Growers Assn. seems to have gained more policy support; no other state supports farm renovation or easing growers out of the business. In New Jersey, some growers suggest that the state would like them to exit on their own so that they can reconvert the land to wetlands but offer no support. (This implies that the Department of Environmental Protection carries more political weight than the Department of Agriculture.) Interviewees on the West

Coast suggest a situation of general neglect from the states, though Oregon growers did get some help with irrigation from NRCS. The growers in these other states, when pressed, state that in a reeling industry, no one has time or resources to support lobbying, even if in coordination with other agricultural industries. Perhaps not coincidental is the fact that most states, unlike Mass., have a voluntary levy for their state growers' association. The Oregon association, for example, includes just 30% of the grower population. Its options are further limited by the \$150 annual fee for membership. Also notable is the legacy value of Mass. cranberries, where a deep history creates a cultural value (incl. the Thanksgiving mythology) unlike other locations.

The state level stakeholders report that they do *not* coordinate directly with the USDA or other states around policy. The former cranberry caucus in the U.S. Congress no longer seems active, thus it is not surprising that USDA is not pro-active on cranberries. Moreover, there are no signs of coordination with other agricultural industries. These are missed opportunities for the cranberry industry to push for more federal and state help, both in term of reducing barriers to exit and farm renovation and in promoting exports. For example, one logical answer for oversupply would be for states/the federal government to pay cranberry farmers to convert their land back to wetlands for environmental preservation, but outside of the limited Mass. program, there is nothing available along these lines.

Interviewees in New Jersey reveal similarly daunting obstacles. While New Jersey farms are larger than those in Massachusetts, they are largely concentrated in the Pine Barrens region of the state, due in part to growing conditions, where they are native, and in part to exceptions in state regulations allowing for the use of protected land in that region for cranberry cultivation. However, the area is warmer and more humid and thus subject to pestilence. Interviewees suggest little legislative support from the state outside of the highly valued services of the Rutgers extension station. One grower goes further and suggests that the state's regulations impede their ability to properly operate or expand the farm to achieve economies of scale. All the factors taken together suggest a likely consolidation of the cranberry industry in both states, as well as the West Coast, a fact supported by the observations of such by numerous interviewees in all three locations.

This leads us to our second question. Why, given the differences in productivity over time, do we have less productive regions still in the game? Interviewees give a variety of reasons for

the persistence of cranberry growing in states outside of Wisconsin. The growers in Massachusetts and New Jersey are fiercely proud, multi-generational cultivators of cranberries, with very strong social ties. Cranberries help to define their way of life. Even if they face setbacks, they bask in the optimism that prices will eventually rebound. Moreover, interviews with large handlers suggest that the productivity gap does not have to be completely closed. Because of the supply chain situation described in Chapter 2, transport costs give Mass. and N.J. some advantages in terms of proximity to markets and the location of cleaning and processing facilities. In theory the Mass. and NJ growers could move farther north, to Québec or Wisconsin, but in practice, families are wedded to their local regions. When asked the question in Washington, Grayland growers pointed to the fresh fruit market as a niche that allowed them to remain competitive as it requires a different set of knowledge and techniques and greater labor intensity. Oregon and Washington growers also cited the high reputation value of West Coast fruit with a darker color due to growing conditions. Some noted, however, that such advantages were eroding with the new varieties, and that growers were simply making do with smaller margins. As the market shifts from concentrate, where West Coast fruit was used to darken the juice, to SDCs, where a more neutral color is favored, this differentiation advantage has diminished. Oregon growers seem to be in a sweet spot- some are small enough to enter into niche markets, such as pure concentrate for local health consumers or IQF (industrial frozen food ingredients), but large enough to have created their own processing facilities (mostly cleaning), that allows for some aggregation in order to sell to larger retailers, such as juices competing with Ocean Spray nationally.

Chapter 5: Conclusion, Recommendations, and Implications for Agricultural Industry Organization³⁶

5.1: Survey Presentation and Analysis

From December 2021-February 2022, we opened up a survey for growers and handlers. The survey was anonymized, though participation was encouraged by offering random draws of 16 \$50 Amazon gift cards. The CMC, APCQ, the BCCMC, and the Wisconsin Board all sent

³⁶ Opinions expressed are those of the authors alone, on the basis of the previous analysis, and do not express any factual claims.

out an e-mail with the link for the survey to their members. The survey was translated into French for Québec growers. Unfortunately, only 46 responses were received, therefore it's not possible to reach any clear conclusions about growers' perceptions, or to do cross-tabulations to tease out possible explanations in differences in opinion. Nonetheless, we present some highlights from the survey which overall reinforce the points made through the rest of this analysis.

- Approximately 80% of the responses were from individual business owners (growers), rather than individuals working for companies. The average acreage size was 1145, and average annual barrels was 74,230. About 70% of respondents said that they belonged to Ocean Spray, however 43% said that they also sold independently, indicating a significant percentage sell to both Ocean Spray and independently.
- The average number of years in the business for individuals was 29 and for their families 52 years, **reinforcing the inter-generational nature** of most growers as family enterprises.
- Just **20%** of the respondents **sell directly to customers**, reinforcing the importance of supply chain partners made in Chapter 2.
- In terms of profitability, 35% said that their businesses were always profitable, while 54% said sometimes; another 11% said not yet. The “always” proportion is larger than one would expect, given the commodity cycles of cranberries, and perhaps reflects a stronger staying power in the industry than indicated by the more pessimistic patterns in the interviews. The relatively high number may also reflect the high proportion of Ocean Spray respondents.
- Respondents' opinions on **whether there is an oversupply situation were almost evenly split**, with 49% agreeing with this premise. One person commented, “The industry needs to be regulated by the CMC or entity that can have a forward-looking view of supply and demand the new varieties of vines are being planted at an incredible pace in Wisconsin which in approximately 3 to 5 years will result in catastrophic over supply situation's yet the planting is not regulated.”

- Participants were asked what are the most important factors for success in the industry, ranking a set of factors on a 0-10 scale, with 10 being the most important. The highest ranked factors (with average scores) were: **growing conditions (9.1); marketing and branding (8.3); product price (8.2)** and access to new knowledge and technologies, access to national and global markets (both 8.1).
- When asked about what should be the remedies to deal with oversupply, respondents rated a series of choices along the same 10 point scale. Very few are in favor of taking acreage out (3.5), while in line with our recommendations, the most favored solutions are to **expand overseas markets (9) and to work on new cranberry-based products (8.5)**.
- In terms of R&D priorities, the highest ranked priorities are pest (9) and bed management (8.7) which could be concerning regarding the ability of the industry to invest in activities that would resolve the previous point. As discussed in the conclusion, it underscores the tension that Ocean Spray management faces in short-term priorities of growers vs. long-term industry interests.
- When asked from where they receive support, respondents were again asked to rank different actors on a 0-10 scale, with 0 being unimportant and 10 being vital. The actors receiving the highest recognition for support were local fellow growers (8.1) and university extension agents (8). Ocean Spray received a favorable but weaker score at 7.6, while the CI received a rating of just 6.7, the CMC 5.8, and the USDA or AAFC (the Canadian counterpart) just 5.5. Another question asked about the importance of meetings with various actors. Here again the most highly ranked were **other individual growers (8.5) and extension agents (8)**. When asked to rate the importance of geographical location, the average score was 7.4. This reinforces cluster theory's premise about the advantages of co-location, access to and sharing of locally-tailored and tacit knowledge.
- Question 21 asked about how the industry should be organized, there was no real consensus, with 43.5% suggesting no mandatory industry association, and just 11% favoring one national or global industry association.
- When asked about how knowledge spreads across the industry, the highest rated items on the 0-10 scale were industry conferences (8.3), agricultural extension (8.2),

and industry journals or newsletter (8.1). The lowest ranking items were public sector outreach (5.2), equipment suppliers and contacts with other industries (both at 5.8).

- Finally, respondents were asked about climate change. It is paradoxical to note that 74% said they saw evidence of climate change, but the average rating of its importance was only 4.1. This is in line with other large surveys of general public opinion about climate change.

While we can not take it for granted that the responses of the survey as representative of the industry as a whole, it is important to note that they **largely reinforce the conclusions** of the rest of our analysis and of the **value of cluster theory** to explain the advantages of co-location beyond growing conditions.

5.2: Ocean Spray's Role Needs Adjustment

The ethos of cooperation in the cranberry industry, built up through historical experience, and with major payoffs in terms of product and market innovation, is under threat. The basis of cooperation continues for now. Knowledge is widely and freely shared, though there are some obstacles to cross-border Canada-U.S. cooperation; growers help each other on a regular basis; and most stakeholders work hard to build consensus in the industry for common aims. As discussed in Chapter 2, the requirements around processing conditions, as much as the growing conditions and culture of cooperation, help to explain geographical clustering. The unique value proposition of Ocean Spray to take all the fruit grown by members and find ways to brand, market and sell has helped to smooth out normal agricultural cyclicalities, mainly through demand innovation, something that cannot be planned but requires steady investment and effort. As discussed, there are signs of consolidation of land in all of the clusters, which signals increasing economies of scale are likely to reduce the number of small family growers. Such transformations would likely have happened sooner were it not for Ocean Spray. Economies of scale clearly abound in both juice and SDCs, the two main markets, and limit the possibilities for individual growers to become large players in downstream markets. Competitors such as Pappas Lassonde, Refresco (previously Cott), and until recently J.M. Smuckers (through its R.W. Knudsen label) have competed with Ocean Spray for many years without affecting its dominance. The same is true in SDCs up to now, with Mariani among others creating a small

enough market share that it did not threaten Ocean Spray's dominance. That was, until Québec entered the market, providing new and potentially serious competition in both segments. As discussed in that section, Québec provides the evidence of how policy helped to fuel crucial financial support to stimulate industry growth. One can also see the possibility of a large SDC buyer such as Nature's Valley or Kellogg's considering backwards integration by buying up farms or making competitive offers alongside Ocean Sprays, as began to temporarily happen under Northland in the 1990s before its efforts fell apart. It is also possible that an overseas competitor could eventually begin to compete in the cranberry market, as has been the case with apples. Regardless of these long-term possibilities, the current situation warrants a serious rethinking of industry organization.

Most member interviewees suggest that Ocean Spray has historically built up a great track record as a cooperative. The cooperation is most closely reflected at the local level, particularly in Mass. and New Jersey, where Ocean Spray started and the culture of cooperation and knowledge sharing abounds. As in New Jersey and Washington State, several B.C. growers express a fierce loyalty to Ocean Spray. They compare their situation with that of blueberry farmers, who are "at the mercy" of independent processors. They feel like the company represents their interests well, and express optimism for its future direction. They suggest complaints are from growers not looking at the long-run picture. As one said, "cranberries are a crop that you have to be in it for multiple generations....You won't get the same returns as other investment vehicles, but they are consistent over the long-run." The grower noted that even while they didn't make the "big returns" as independents do during boom periods, Ocean Spray helped to stabilize prices for them. Moreover, the grower was happy to "see the trucks loaded" after every harvest and not have to worry about it afterwards, allowing them to do what they are passionate about- farming. The person, like other Ocean Spray loyalists, suggested that they found the spirit of cooperation unique in agriculture, so "we're not competing with each other" like other farmers and "we're in it together". This means they are open to sharing information and feel a sense of community as part of a larger operation.

At the same time, our conclusion is that it is good to have some share of independents, to keep Ocean Spray honest, and to react more flexibly and innovatively to market opportunities. In fact, many interviewees point out that even as Ocean Spray is challenged by independents, it

is still the dominant force in the market. They point out that the oversupply conditions come from decisions during the high prices of the 1990s. The result happened in good part because Ocean Spray sought to expand production by some 5,000 acres, underestimating the yields of the new varieties and of independents' equal response to expand acreage. Beyond their dominance in marketing, R&D, and industry institutions, this means that Ocean Spray's lack of a clear plan for managing supply actually contributes to the rollercoaster conditions. Part of this may be its challenges with holding back its own growers who want to expand during high prices, even though they are happy to be part of the organization's stability when prices are low. This is another paradox of a grower-run management team.

It's not clear at what point; however, the growth of independents supersedes the ability of Ocean Spray to continue to provide industry leadership as it has so far. More pointedly, there are concerns about the future in regard to its ability "to find the next killer app" (new product and/or market) for cranberry demand growth in order to resolve the oversupply issue. Given the post-COVID-19 cranberry supply issues and spike in health-related demand for cranberries, many growers in the industry are basking in the high prices of 2021-22, forgetting about the long history of rollercoaster prices. Even as prices have spiked, so have prices for inputs, so the industry is not making more money. Similarly, "short crops" over these 2 years have reduced supply, meaning even while prices are higher, there are less cranberries to sell. In fact, the temporary supply constraints are likely to induce faster consolidation of growing areas. So, the central question for our analysis is how to evolve industry organization to deal with the need for Ocean Spray to co-exist with emerging large independent growers and handlers.

Most independent growers and handlers acknowledge the central importance of Ocean Spray for the industry, even as they cherish their freedom to work as individuals. It has been the provider of public goods for cranberry processing, demand growth, and lobbying efforts. It is the central figure in marketing cranberries and expanding overseas markets. Ocean Spray provides its own R&D and extension support, in addition to being a crucial funder to state-level efforts. It also helps to stabilize the incomes of cranberry grower-members, sometimes to its own long-term detriment, as we have discussed. One Mass. grower, similar to what we heard in all of the clusters, relayed how he had tried for many years to get into Ocean Spray, and felt a sense of relief at "finally getting in," because it provided price premiums and a greater sense of stability.

Tensions seem to arise principally from independent growers not being able to “get in” Ocean Spray, as well as some resentment at its market power. The flip side of having a very large industry cooperative, one that has undergone a number of management shifts, is that it is difficult to reach consensus, making decision-making and innovation challenging. Smaller niches, such as fresh cranberries, may be neglected. Overall, we should see the current interplay of Ocean Spray as a generally healthy industrial eco-system, one that allows for collective goods and innovation through competition, the best of both worlds. But this balance is very fragile, and the likely further diminution of Ocean Spray’s position means that new institutions are needed to create collective action, particularly ones that improve joint efforts between the large Québec producers and Ocean Spray. One can see, for example, coordinated research and marketing efforts, as well as lobbying to mollify the barriers to cross-border supply management which is an accepted agricultural principle in both countries.

Let us now review issues that arguably require industry adjustment. Some independents interviewed point to the fact that Ocean Spray’s SDC process creates excess juice, whereas they use the whole berry. According to them, Ocean Spray’s derived concentrate therefore not only floods the juice market, but it also undermines the health claims as the derived concentrate and SDCs, according to interviews with health scientists, do not have the same medicinal properties. This opinion is not shared by everyone in the industry. Ocean Spray’s reluctance to change its SDC process, according to interviewees, is best explained by growers’ myopia, their unwillingness to forego short-term gains. Simply put, Ocean Spray should consider changing its SDC process to avoid the costs (reputational and financial) of SDC-derived juice. In a sense, this issue highlights the contradictory overall strategies of the industry, on the one hand claiming cranberries are healthy and on the other selling concentrate for high sugar content juices and SDCs. The contradiction comes from the fact that the blended juice market is still significant, but it reinforces the fact that the historical evolution of cranberries as a product only for Thanksgiving and Christmas into juice required serious imagination and investment in rebranding and repurposing the product.

As discussed throughout the report, Ocean Spray does the bulk of cranberry marketing, but its very size means it has limitations. It has been slower than independents to develop niche products such as 100% juice and supplements; to develop overseas markets; and to find a

coherent strategy regarding the health benefits of cranberries. As of this writing, independents seem to be distinguishing themselves from Ocean Spray in a number of innovative niche products, such as developing unsweetened dried cranberries. One low-hanging fruit opportunity is to consider how to better promote cranberry consumption in North America. Wisconsin, Québec, B.C. and Massachusetts all have fledgling local marketing programs, but they are underfunded and do not seem tied to any coherent strategy. There is, moreover, a lack of hard data or studies on how to market cranberries in other areas of lower consumption, such as the Southeast. The CMC could in theory play a leading role, but some claim has not had the resources or capability to step up to the task. Others suggest it is the internal organization of the CMC that is the problem. Several growers express doubt about reform of the CMC. Ocean Spray still dominates in resources, and so it will tend to focus them on its own internal strategy, according to them.

Perhaps more important still is both the complication and opportunities that the rise of the mostly independent Québec cluster presents Ocean Spray. Supply management via USDA marketing orders is no longer possible, unless some way to work around the trade regulation restrictions. Given that such coordination is entirely sensible, what is missing is the policy push to develop a workaround, which, after all, is in the best interests of both countries. Beyond this immediate challenge is the need to rethink the cranberry support institutions beyond Ocean Spray so that they can more effectively reflect industry interests across borders. This includes the Cranberry Marketing Committee (CMC), the Wisconsin Cranberry Board, and the Cranberry Institute (C.I.), as well as all the cluster-based support institutions including growers associations. Multiple interviewees state flatly that the CMC is dysfunctional, unable to reach agreement on a strategy and under-funded. The rivalry between independents and Ocean Spray appears to have hamstrung the CMC. As one interviewee stated, “The people on that board (of the CMC) are not collaborative. They are fighting over things that happened 20 years ago. They can’t take their hats off at the door and say what’s best for the industry.” On the other side, some claim Ocean Spray (understandably) does not fully commit to CMC and CI because they have their own significant marketing and research arms. Regardless of the ultimate cause, the CMC has not been able to really develop overseas markets beyond consulting reports that begin to explore them.

5.3: Updating Industry Institutions

There are more positive reviews of recent activities of the CI, which include participation of handlers in Québec. Interviewees could not explain why the CI functions more smoothly than CMC, other than being a function of personalities and handlers “checking their hat at the door.” It is, of course, much easier to manage a smaller group of handlers than the larger group of growers and handlers who are part of the CMC. Even so, the Cranberry Institute (CI) and Cranberry Research Foundation come nowhere near the needs of the industry at present. Informal coordination does already occur in horticulture and agricultural research, however, a more formal and concerted effort in new products and marketing is needed that may be beyond Ocean Spray’s capability to tackle industry issues at this point, such as expanding overseas markets and defining health benefits. At present, most of the research has focused on improving growing techniques and new varieties, reflecting the grower-heavy management of the CI and CMC, and behind them, of Ocean Spray. It is understandable that growers would like to bet on sure things, and they know improved productivity will pay off for them right away. Ocean Spray growers’ focus on investments that will benefit them as individual farmers is understandable, but it reflects a fundamental contradiction at the heart of Ocean Spray, which simultaneously seeks to maximize prices for growers and minimize prices for processing. This explains the debt Ocean Spray found themselves in during the early 2000s, by paying prices above those of the market. More fundamentally do growers, who run the board, really understand product development and marketing, or can they see long-term potential in product development, marketing, and research that might require a decade or more of funding? Most industry observers say no and imply that a grower-run organization is inhibited from thinking of long-term strategy or providing the space for marketing and production innovation, which inherently require risk. They point to the dissension and underfunding within cranberry industry institutions which results in underinvestment in long-term industry collective goods. However, a few interviewees noted that even in spite of the inherent contradiction of a cooperative management team running Ocean Spray, the growers had been quite capable of finding enough smart representatives among themselves to manage the company. The recent volatility of management changes at Ocean Spray as well as the longevity of, and fierce loyalty to, the company reflect such contradictions.

To realize efforts on the marketing side and to raise sufficient funding to develop new markets would require coordination with independents in Québec and elsewhere, which in turn would likely imply abandoning the USDA marketing order. It is worth considering this step, as supply management cannot be coordinated across the countries and thus, if put in place in the US, only incentivizes further production in Québec. This requires both the independents and Ocean Spray to recognize that there are benefits to partnering on generic marketing of cranberries, especially to develop new demand in overseas markets. While laudable, the CMC's efforts along these lines are limited to market intelligence reports, which only touches the surface on what is needed to develop new consumers. According to interviewees, the culture and governance of the CMC would need to be reformed to develop the levies and deeper investments to do the job properly. More importantly, serious reforms in the contribution system would be needed to raise an adequate budget for serious global marketing efforts. This, in turn, has been stymied thus far by Ocean Spray's priority to market its own products. Here is where marketing to develop new demand and new products needs to be distinguished from marketing existing products. One interviewee notes that the raisin and prune industry spend ten times more on marketing, and several mentioned the almond industry as a potential example of how industry came together to provide more collective funding. Several Wisconsin interviewees suggest that the state could serve as an example of how to create harmony between Ocean Spray and the independents. A note of caution is in order, still, before abandoning the CMC, which does bring together U.S.-based independents and Ocean Spray under a common umbrella to discuss supply issues, and, perhaps more importantly, is the main data source of industry trends. Such functions need to be in place.

Research coordination, on the other hand, is not inhibited, but it requires a much more agile and well-funded CI that can spur cranberry researchers to coordinate across borders, and perhaps some concerted lobbying to get large funding agencies and universities' attention. They could seek grants in the U.S. that build upon and coordinate with the more generous support systems in Québec. One can imagine National Science Foundation grants, for example, providing a lot of public funds alongside private sector ones on health issues; if matched with Canadian funding sources, a lot more could be accomplished. There are obstacles in the sense that Canadian and U.S. funding agencies generally discourage funding of international (non-domestic) teams.

Some efforts to create cross-border funding agencies/grants would go a long way, as would potential pooling of industry funding, such as a joint APCQ-Québec-Cranberry Institute research ground might help to bridge such gaps. The industry clearly does *not* take advantage of all the opportunities offered to it at the national levels in Canada and the U.S., including NSERC and NSF, respectively, sources which would vastly multiply research possibilities. The same is true for joint marketing efforts between Ocean Spray and the independents, which are non-existent. Arguably, the time is right for a slow shift from Ocean Spray providing collective leadership towards a more institutional framework. The process will be evolutionary and still require Ocean Spray leadership, but it shouldn't have sole responsibility for industry R&D, marketing, and innovation.

More generally, while overall industry cooperation is holding for the moment, there does not seem to be a long-term strategic vision for the industry, as reflected in the turnover in Ocean Spray management, and the unclear plans around the persistent oversupply situation in the 2000s. As shown in the statistical section of this report, there are growing production and productivity differences across the North American clusters; these are bound to increase the strain on Ocean Spray as an actor who can combine interests. Moreover, perhaps because of Ocean Spray's past success, policy support at both the state and federal levels is weak. As discussed above, Massachusetts has not enacted most of the supports requested by the revitalization task force. New Jersey interviewees laud their close relationship with Rutgers and directly support its activities but report a distance and even negative impacts from state policymakers. USDA supports the industry through the marketing order, but its export promotion assistance seems haphazard, and CMC is too poorly funded to make enough headway in an efficient manner to develop overseas markets. At the 2021 CMC Winter meeting, the welcome news of the elimination of EU tariffs and duty suspensions was announced, however, along with continuing tariffs and additional labeling requirements for China. Overall, the CMC seems to rely on a handful of consultants, who are providing valuable information services and some efforts at marketing. However, without a clear strategy, these efforts appear disjointed and spread across many different markets. Consultants are not able to provide the deep relationships needed to develop strong consumer awareness and the distribution and marketing relationships to develop entirely new markets. The success of Québec in developing exports highlights the

deficiencies of US efforts, but also speaks to the potential for joint efforts to do much more than deliver consulting reports. Most concerning is the low level and disconcerted efforts to fund R&D in the industry, with no significant ongoing industry support from federal agencies whose mission is to fund research, such as NIH. A joint effort with the Québec producers could completely reform both CMC and CI; this would require abandoning the marketing order. Such efforts could lay the groundwork for truly developing new markets beyond consulting, including finding local partners, developing widespread knowledge, locating potential wholesale and retail distribution channels, linking up to local supply chains, etc. Like health research, such efforts would require far more resources than are presently available in the CMC and CI.

The current industry institutions reflect a situation that no longer exists. As noted, overseas suppliers in Canada and Chile have now become serious competitors, ones not subject to USDA volume regulations. In this sense, Ocean Spray is caught in a paradoxical position- if it ignores overseas markets, it will lose its influence and ability to profit from them, such as the additional trade opportunities Québec and Chile offer. Yet, by investing in these regions, it creates more supply and competition for its majority U.S. members. As noted in the statistical analysis, Canadian producers are competing strongly in the U.S. domestic market. There are discussions of the Chinese investing large sums into entering into cranberry production. Given the oversupply issues, clearly more economic analysis is needed for the industry, adding to the agricultural research capacity. The foundation for further analysis would involve addressing statistical gaps as noted above, including a breakout of sweetened dried cranberries and addressing the huge gap on the consumption side (demographics and geography of consumption by market segments, both domestically and abroad). Despite the admirable optimism ingrained in industry culture, there are reasons to wonder whether demand can be increased fast enough to reckon with the likely spread of Wisconsin production techniques to other growing areas over time. Interviewees suggest the fast-growing segment of dried fruit and overseas markets are the best bets for growing demand. However, as reflected in this report, the level of coordination across the states and with USDA is limited, with Ocean Spray spearheading such efforts and leading the way in terms of developing new product innovation. It seems likely that the old model of depending on Ocean Spray to solve industry issues is going to be inadequate to solve current issues.

5.4: New Ways to Manage Commodity Cycles including Long-term Oversupply

The oversupply is related in good part to fast productivity increases in Wisconsin and, more particularly, to the massive increases in Québec. Most growers in Québec are independent, thus Ocean Spray has limited ability to influence the fastest growing source of supply, with the province moving towards becoming the 2nd largest cranberry producer. Thus, future marketing orders and the influence of Ocean Spray on supply is increasingly circumscribed. One observer states, “Ocean Spray was the big gorilla that you needed approval from, to do anything. These guys (in Québec) said, we don’t need it.” Another long-term industry insider put it, “The industry has shifted and will (continue to) shift (in location).” In their opinion, locational supply chain advantages related to processing and transport costs will not be enough to revive the fortunes in Mass. and N.J., though growing will continue there, in consolidated form. Moreover, Québec has its own independent handlers as well as an Ocean Spray facility, so processing is not an impediment.

Several experts were convinced that if the same water and fertilizer management and farm renovation techniques were applied to Mass. and Wisconsin, their yields would start to approach those of Québec, thus positing that it is technology and adoption, and not natural comparative advantage that is responsible for success. Some experts are skeptical about long-term prospects for New Jersey, Mass., Washington, and Oregon, because the temperatures are too warm and will increase due to climate change. Problems are even worse in NJ and Mass. due to higher humidity levels. Indeed, interviewees report increasing pest and rot issues winters in New Jersey and Mass., though other experts suggest they have been problematic for some time, and that there is no clear evidence that climate change has affected growing conditions up to now. Nonetheless, interviewees from all regions report increased volatility of weather and extreme weather events. In Wisconsin, for example, interviewees report an alternation of cold snaps and earlier warm temperatures and intense bursts of precipitation that bring plants out of dormancy too early over the past few years. A few mentioned the possibility of climate change also affecting pollination; this jives with general concerns in agriculture around pollination, including the costs and activities of using bees. Many growers suggest that weather volatility is linked to the “short” (lower) production crops of 2021-2. Some researchers suggested that colony collapse reflected long-term issues around declines in bee populations, but others express skepticism.

Some growers are experimenting with bumblebees which might provide a supplement to the traditional honeybees, whose population have been more susceptible.

Overuse of water, according to these experts, damages fruit and makes it more susceptible to pests, while overuse of fertilizer or pesticides simply wastes money. One can visually see the differences in size and squareness of the farms between older states and Wisconsin and Québec. Not only do economies of scale help in regard to paying off land and equipment, but interviewees state that booms and other equipment are easier to use if the farms are squared off. This jives with the economies of scale, equipment and farm design as well as the new hybrids used in Wisconsin. Several interviewees were more skeptical about B.C. because it does not have the right sandy soil conditions and the prohibitively high cost of land reduces the possibilities for economies of scale. Expansion is also unlikely in Massachusetts and New Jersey where both high land costs and environmental regulations prevent larger farms, though as elsewhere cranberry growers could buy out other growers or farmers. Regardless, such transformation would require a concerted support push by both the US and Québec industries, with Ocean Spray as the principal, and public policy. The interviewee suggested that Ocean Spray has not yet done a proper study of Québec's techniques, and that it has a hard time convincing U.S. growers to change their techniques.

The newer varieties are sure to increase the overall supply even if acreage remains largely stagnant. One study suggests that Ocean Spray's volume will likely increase from 7.1 million to 8 million barrels soon (FERENCE & COMPANY 2020, 109), though variations are normal. On the other side, several growers in these lagging regions see the new, higher yielding varieties as a saving grace that will allow them to stay in the black on the financial side. Moreover, as discussed previously, for most of them, land is paid off and its sale for other uses is restricted by agricultural preservation and wetlands regulations. Thus, it is understandable that families who have been growing cranberries the same basic ways for generations would be harder to convince. Yet, demonstration effect within the cluster through expanding use of the test farms in each of the clusters could go a long way to improving productivity in the U.S. (outside of Wisconsin). So far, policy support in the lagging states is lacking. Such support could include policies for exit and consolidation to make larger and more economical farms.

Most growers outside of New England and New Jersey express concerns about their inability to understand how Ocean Spray determines its prices, which many find arbitrary and detrimental to planning. Similarly, there are concerns about perceived arbitrary changes. In the early 2000s, for example, there was a “Pool A” and “Pool B” system of pricing, with Ocean Spray offering a premium in Pool A (Ocean Spray regular members); needless to say, this caused resentment for Pool B (Ocean Spray recent arrival or independent/mixed) producers. The original idea was for Ocean Spray to compete with independents who were paying higher prices. Independent interviewees allege this was a form of price fixing to drive them out of markets, which failed when Ocean Spray underestimated their ability to withstand long prices, in part due to income diversification beyond cranberries. One grower in Canada noted that color requirements were in place for a while in the last decade and then rescinded without proper explanation. Similar concerns were expressed about volatile policies around white cranberries. While prices increased dramatically during 2021, with most attributing this to bad harvests in recent years, costs also increased due to the supply chain and fuel price increases related to COVID-19. Some growers now suggest that Ocean Spray is underpaying its growers compared to the independent price.

On the other side, most growers are paradoxically relieved that Ocean Spray offers stability during downturns, even at the cost of lower prices during peaks. The vagaries could simply be a reflection of natural cycles in agricultural prices, but the shifts in quality standards over time and more generally, concerns about the lack of consistent direction, amidst the flurry of management shifts in Ocean Spray are a serious concern. As one Wisconsin grower put it, the characteristics are tied to the varieties, and we only change every 40 years. However, he and several other growers said they felt that fruit quality can be affected by growing techniques, and Ocean Spray should play a more significant role in studying the causal ties. More recently, according to interviewees, Ocean Spray has moved to a “continuous” pool whereby they pay within the year, as opposed to the previous delay of up to 24 months. Pool payouts depend on quarterly revenues. As Ocean Spray has reduced its debt, the new payment system should both please the growers through quicker payout and benefits the coop by reducing debt based on price distortion.

Even if these were more consistent, there are still grower member complaints about the delay, sometimes more than a year, before they get paid from Ocean Spray. Needless to say,

cash flow is already challenging for relatively new growers with large debt. Part of the challenge is inherent to the very challenging task of predicting future prices, and then Ocean Spray's need for a consistent price policy across very different growing regions. Ocean Spray's shift to continuous quarterly payments based on profits should alleviate some of these concerns. The biggest part of the challenge is finding harmony between the short-term cash flow/debt payment needs of growers vs. their collective needs for long-term investment in R&D, including new products and marketing. One expert notes that there is a wide gap among growers. Younger and larger operators are more attuned to long-term investment, while understandably those in debt and/or thinking of retirement are more short-term. Growers in general express a sense of remoteness from decision-making, thus feeling subject to a certain extent to forces beyond their control. This lack of consistency is perhaps best reflected in the overall lack of strategic direction for the company, in terms of its supply plan, R&D, or marketing direction or development. Thus, the principal-agent problem looms large with tensions/contradictions between management and grower aims manifest, meaning grower trust in the board is crucial. One step forward, post-pandemic, would be to increase the personal visits and interactions of Ocean Spray management to the various growing regions, to reduce the gap between management and grower.

One clear path on price consistency would be to shift the basic operating principle of Ocean Spray away from paying for any amount of crop produced on a certain amount of acreage towards only agreeing to purchase a certain amount of volume per farmer. This, however, would be a huge shift in the industry, and have negative effects on productivity and innovation incentives for growers. Interviewees note that Ocean Spray is increasing quality requirements as well as lowering its price. Some say that this is due to lower quality of new varieties, while others suggest that it is a way for Ocean Spray to reduce supply. Either way, it is creating resentment in the industry, and perhaps a broader conversation about a potential chronic oversupply situation is in order. Perhaps more alarming still is the fact that the much higher productivity of the new varieties will further increase supply, thus pushing towards consolidation along with many other discussed factors in the industry. Across the states interviewed, with the exception of NJ, where land is limited, consolidation, with a few large growers buying out those of smaller ones leaving the business, and many others simply leaving their farms fallow, is a fact.

An interviewee in Oregon said he estimated that there were at least 30 farms for sale now, “and those are just the ones advertised.” The ones consolidating in Oregon are the independents who went early into processing (thus allowing them to fill larger orders) and paid off the capital for such equipment while prices were high. Any number of growers stated that they would sell immediately if they could get a fair price, as their kids didn’t want to take over the farms. One said, “we grew cranberries to raise our kids, and we taught them that doing anything else would be (pay) better.” So many are close to retirement age that they have no options, and they are hanging on as long as they can. Interviewees across the clusters note ominously that lower prices lead to more farm renovation, new varieties introduction, in order to increase productivity, which, ironically leads to even more supply. As one Washington grower remarked, in noting a recent freeze had reduced B.C. production, “we are one crop away from another crisis.” In short, what is clear is that the average size of farms is bound to increase over time. What is missing is a way to ease the barriers to exit or the finance to grow, which, as discussed in the Québec discussion was crucial for their growth and reinforcing the conclusion that policy support is desperately needed. Another major gap is the lack of formal training programs for the industry, even more acute now that the demand for professional managers and, even for family farmers, the need for farm renovation and improved techniques, is growing. This is a major gap in the local university support system for the clusters.

In terms of developing new markets, especially for higher cost producers such as Massachusetts and New Jersey, there are still the cluster advantages of proximity to the large East Coast markets to reduce their transportation costs and already paid off land and sometimes equipment. Indeed, some growers there are trying to diversify beyond Ocean Spray, to perhaps find a niche in the farm to table movement, for direct sales. During my visits, I saw some working in fresh/frozen, and some producing new types of products such as cranberry honey. While cranberry wine does not have much traction, we have seen very successful berry-based liqueurs in Scandinavia, and that might be worth the effort.

Where would additional demand potentially come from? This is the central question for the future of the industry. Other products such as milk and almonds in the US have general industry promotion. Some suggest that market growth will come primarily in the dried fruit category, but there are no good data to back this up, and many interviewees suggest an oversupply in this

category as well. There are some laudable efforts to promote exports and to facilitate them. These appear to be primarily through the Cranberry Marketing Committee (CMC), which helps to broker transactions between would be exporters and imports and finds overseas representatives to promote cranberries. However, interviewees suggest such efforts are quite limited, and a few growers state that while the CMC and USDA helped with introductions, they still had to persist through many days of work to find appropriate export outlets. One Wisconsin handler suggested that about half of their production was going overseas, however, they had no help from government or the CMC in developing such markets. Québec handlers also said that they operated largely on their own. As one large East Coast grower noted, they have frequent tourists to their farms; many are from overseas, such as the U.K., and are always asking why can't they find the same variety of cranberry products on their shelves as they found on the tour? In short, on both the domestic and global levels, a polished and targeted marketing campaign to improve cranberry demand is called for. The CMC should look to coordinate better with USDA, Ocean Spray, the growing states, and the Canadian government, around a coordinated demand enhancement campaign. It is not clear why the CMC decided to focus almost exclusively on China and India, markets that are large but extremely complicated to enter and thrive in, and in the case of the former, are fraught with geopolitics. It makes sense to look beyond the shiny object of China, and towards a larger global marketing strategy including Latin America and other parts of Asia where there are sizable consumer markets. All of these smaller markets together would outweigh the one large prize in China. Frankly, a lot more marketing data around untapped markets, particularly consumer demographics and cultural and culinary predispositions are needed to create a proper global strategy. Ocean Spray has these, but they do not share them to inform global strategy. It might well make more sense to grow existing markets such as Japan or the E.U., where cranberries are already consumed in significant quantities, through extending types of consumption, a depth vs. breadth strategy, in the short run when the industry desperately needs more demand growth. As one interviewee from the handler community noted, "the industry tends to be reactive to consumer demand, rather than pro-active in seeking new growth."

Since Canadian producers are not subject to the Chinese or EU tariffs, their market share is likely to continue to increase. Yet, Canadian producers state that the Canadian government does not do much beyond allowing them to present their goods at trade shows. This suggests the

possibilities down the road that Ocean Spray may have differing internal interests among U.S. and Canadian members and ensuring harmonization will take some effort. So far, Ocean Spray and the industry generally are unwilling to invest enough into academic research that could potentially validate health claims and hugely expand the market. They could be afraid of negative results, but they are also ignoring the most logical path to growing the market.

Some projections suggest the SDC market alone could grow from \$170 million in 2018 to \$256 million in 2027 (FERENCE & COMPANY 2020, 128). Yet, here again, the industry does not have a coordinated global strategy. Unfortunately, Ocean Spray's current financial condition appears to prevent a major new marketing push, and the changeover in management, according to interviewees, has led to prevarication in terms of an overall marketing strategy. While the famous Tik Tok viral video of a person singing "Dreams" by Fleetwood Mac in 2020 while drinking from Ocean Spray is widely lauded in the industry, its importance reinforces the conclusion here- there is no clear vision for how to market the strategy or the overall brand identity. This is reflected in the so far unsuccessful forays into a vitamin water type product under previous CEO Pappadellis. Interviewees suggest that market penetration is fairly complete in the E.U., however, we could not find adequate data to check this claim. According to interviewees, the CMC's previous efforts led to some market gains in Mexico, and more recent efforts have focused on China and India. As we saw in the previous export tables, neither market accepts any significant amount of exports, however interviewees cite sales in China that were enabled by CMC efforts and that they are hopeful for the same in India. The CMC, and the industry as a whole, has high hopes for the Chinese market, as health concerns, particularly around H. pylori (a digestive tract disease) is a larger concern. Moreover, Chinese consumers are reportedly more open to tart and favor deep red fruit, as is the reputation of West Coast cranberries. One Oregon handler who exports there says there's no way that even if the Chinese start growing their own, that they will be able to satisfy domestic demand. He sees big possibilities for markets in India as well. However, the Trump trade war led to retaliatory tariffs on cranberries, both in the EU and in China. The Chinese tariffs have been reduced, but are still a major impediment, even though partly dampened in the short-term by compensation from the U.S. Government.

Another logical alternative would be to diversify to other crops and income sources. As noted above, Ocean Spray had earlier forays into the grapefruit market, but it seems to have truncated further development. Co-op members seem to be resistant based on the grapefruit experience. This is understandable, as the growing conditions and locations are quite different by crop. Blueberries, however, have similar growing conditions. Blueberries require similar growing conditions and are grown in most of the cranberry clusters. However, they are not a farm crop, and each cluster, plant and product require detailed and ongoing efforts at information and improvement. Moreover, interviewees point out that developing a farm requires a unique transformation of land and heavy sunk investments, ones not easily transformed into a blueberry grove. Once it gets to a certain size, maintenance is a full time job. Many nonetheless have a second income, either through a spouse or doing another job. The nature of cranberry land makes it unsuitable, according to many growers, to other crops. But that wouldn't prevent them or larger cranberries companies from diversifying by buying suitable adjacent land. As noted earlier, Ocean Spray had previously attempted to diversify, to include grapefruits, and their current lines also include blueberries. One could see them therefore acquiring other "dfs" (dried fruit lines), as does Mariani or even developing their own product lines such as granola cereal and bars that use cranberries, however, this would require growers to think outside of the box, and give more leeway to Ocean Spray management. Many struggle to simply diversify to local retail cranberry products. So, while it certainly makes sense for both farmers and Ocean Spray to consider crop diversification, their caution is also understandable. After all, only cranberries are mostly limited to North America, and up to now therefore offer the supply control and collective action discussed throughout this report.

Agritourism is also being pushed by some growers, with positive results so far in Mass. and New Jersey, though a few are resistant to the idea, stating that it is outside their area of expertise and would interfere with their ability to harvest efficiently. There are ads for participating in cranberry harvests in Mass. and New Jersey. However, there does not seem to be the concerted effort to organize public campaigns around this. A public campaign such as that which occurs in the wine industry would see a cranberry farm visit as part of a tourist package. It might include a retail tasting store with various cranberry-based items, fresh cranberries, and other souvenirs. More importantly, both the Mass. and NJ growers are quite close to tourist destinations along the

coast, so there could be possibilities of conducting tours during the summer peak tourist season. These things sound good in theory but are very hard to execute. Most of the growers interviewed are loath to enter into the tourist industry; it's not part of their personality type. As one Oregon handler suggests, the (independent Oregon) "cranberry grower nowadays needs two hats, one to farm, and one for marketing. And most people can't handle the marketing part." Another told the story of a local grower who started to pack her own fruit and sell it at local farmers' markets around the state. "She got so tired of doing the marketing part, she finally decided to go back to report keeping." Another pointed out that a grower could not sell fresh fruit to a local Safeway, "because he would have to have enough to sell to all the Safeways in the region." Besides the usually too large to achieve economies of scale and ultra-consistent product that large retailers want, there are numerous regulations required for food product sales at the retail level, another effective deterrent for most growers and handlers to try to capture more of the downstream supply chain. Simply put, there are no real opportunities in the middle, between individual or small batch sales and large retail outlets.

Ocean Spray could do much more to take full advantage of growing consumer concerns around large corporations and the desire for some connection with producers, as reflected in the growing fair/sustainable trade movements. Growers are now featured on the back of bottles, but the message is not coming through that they are part of a co-op. Ocean Spray is the premier example of grower cooperation, rather than corporate dominance, and its status as a co-op could be a major selling point, as reflected in past campaigns depicting farmers in farms. The campaigns could reflect the arduous loyalty of many multi-generational Ocean Spray growers. More generally, more marketing research is needed to better hone the message for the Millennial and subsequent generations of consumers. These consumers are increasingly ethically conscious about production methods and an anti-corporate message could resonate if paired with a health message. It could be that the lane markers against less sweet cranberries by common industry wisdom, in both juice and SDCs, might soften given the general health consciousness of younger generations. Moves in that direction are needed to cash in on the health message of the industry.

5.5: Finally Proving Health Benefits

The industry now needs to decide if it's willing to take that next step in promoting cranberries as a health product. The upside is huge, but uncertain, and the de-emphasis of juice

blends that are central to Ocean Spray would be painful. This is where the independents come in. Their lesser interest in blended juice means they are more likely to innovate into trying to develop healthier juice and SDC products, with less sugar (and calories). However, such efforts succeed in creating great new products, unless the industry is on the same marketing page, it will be very difficult for the average consumer to truly distinguish between the healthy, more healthy, and traditional cranberry products. Some juice blends reportedly have 5% or less of cranberry content. The industry should shift towards more standardized labeling if it wants to enhance the health appeal of higher or 100% blends. Many health conscious consumers including the authors are willing to adapt to a tart(er) taste if there are significant personal benefits. By personal observation, one can see the introduction of sugar free chocolates and candies and sodas has become mainstream. The same could work absolute wonder in supplements as well, a growing market where the average consumer is in the dark as to product quality.

Many interviewees would like to see a reset of the investments into health research, which could act as a demand trigger. They would like to see Ocean Spray become the champion for arm's length research that would dispel what they see as unfair criticism around the health benefits of cranberries, which they say have a proven record in reducing H. pylori and uterine tract infections. Health experts working on cranberries similarly decry the unregulated use of supplements, as well as the attempts to use concentrate from creating sweetened dried cranberries as likely lacking the key anti-infection ingredients, which can reduce the current over-use of anti-biotics. Whether true or not, a large number of interviewees say that the health market reports that SDC-derived juice does not have the same health benefits, thus tainting cranberry juice in general. Interviewees suggest Ocean Spray's previous sponsorship of health research backfired amidst negative media coverage of the fact that new health claims were tied directly to Ocean Spray sponsorship and placement of personnel as authors, creating the appearance of a conflict of interest. Similarly, there are contentions that concentrate derived from sweetened dried cranberries does not have the same health properties as directly derived juice. This swirl of claims deserves more independent scrutiny, as it currently has the potential to undercut research studies as well as the health brand of cranberries more generally.

Much of this strategy, in turn, depends on health claims, which require much more research. The CMC sponsored a recent study in China on the effectiveness of cranberries in reducing H.

pylori, however early assessments are that the studies may have flaws and are otherwise non-definitive. According to the NIH website, there is potential for cranberry to help with “bladder, stomach, and liver disorders, as well as diabetes, wounds, and other conditions,” and “urinary tract infections” however:

there’s still some uncertainty about the effectiveness of cranberry because some of the research has not been of high quality. Also, studies in certain populations at increased risk of UTIs, such as elderly people in long-term care and pregnant women, have had inconsistent results, and studies in other high-risk populations, such as women undergoing gynecological surgeries or people with multiple sclerosis, have not found cranberry to be beneficial.³⁷

Thus, the same website notes that the Food and Drug Administration (FDA) as of 2020 now permits producers to claim there is “limited evidence” around health benefits of cranberries. In a recent article, Zhao et al. (2020) state that cranberries could potentially help with a variety of ailments beyond UTI and digestive health, including cardiac issues and cancer, however, “clinical trials with improved study design are urgently needed to demonstrate cranberries' benefits on urinary tract health and cardiometabolic diseases. Hypothesis-driven studies using animals or cell culture are needed to elucidate the mechanisms of cranberries' effects on digestive health.”

The CMC sponsored a recent study in China on the effectiveness of cranberries in reducing H. pylori, however early assessments are that the studies may have flaws and are otherwise non-definitive.

5.6: Finding New Ways to Fund Industry R&D and Marketing

We could not find an exact funding breakdown for the extension centers in Massachusetts, Wisconsin, and New Jersey, or for projects funded by the Cranberry Institute or Cranberry Marketing Committee. However, the number of personnel and the descriptions of the activities and projects given suggest a woeful shortage of funding for the industry, exacerbated by reported cutbacks by Ocean Spray of their research budget. Having CI operate on a voluntary

³⁷ <https://www.nccih.nih.gov/health/cranberry>, Accessed Mar. 6, 2022.

sponsorship basis obviously leads to inadequate funding. Conducting annual fundraisers on the state level in addition to local levies and stringing together small amounts of grants from CMC, Ocean Spray, and the Cranberry Institute is simply not being adequately matched by public funding to conduct long-term research needed to renovate the industry. Because Ocean Spray conducts its own product and marketing R&D the knowledge produced there is proprietary, though knowledge tends to diffuse over time. Nonetheless, interviewees across clusters are concerned about having more funding for the Cranberry Institute, in order to engage in larger research projects, including health. It should be easier, in theory, for the CI to gain matching public funding as a neutral non-profit institute. It would be useful for it to more pro-actively seek out long-term funding alliances, e.g. with NIH and major universities beyond its current partners. At the moment, there appears to be limited ability to take advantage of major revolutions in genomics or GIS (geographic information systems) innovations or to deal with long-term threats such as climate change that would provide systematic data beyond breeding to identify varietal performance, including mapping out susceptibility to pests on the basis of micro-conditions (e.g. weather, climate, temperature, precipitation, etc.).

While individual researchers in Rutgers and Wisconsin are working on genetic mapping of the cranberry, this is not at all proportionate to the potential offered by such technologies, such as the ability to produce less acidic varieties. Early attempts appear to produce berries without the cranberry taste, which includes tart. Climate change could be a gradual factor affecting growing practices because of the changes it might bring to cranberry cycles, which are highly dependent upon temperature, from ripening to freezing to break out of dormancy, all of which has to take place in a certain temperature range. Moreover, cranberries require ready access to fresh water; climate change could affect water levels. For instance, interviewees in Washington state report drier growing seasons, and New Jersey growers suggest increasing pest and rot issues. Oregon growers are concerned about prolonged dry seasons and earlier rises in temperatures. Higher temperatures will also bring greater incidence of rot, though there is no clear data link between climate change and these claims. New Jersey has had rot problems for many years. Québec experts say that their harvest time is starting to come earlier. Wisconsin researchers state that increased volatility of weather conditions can stress plants, and that developing hardier varieties may be needed. Growers are always concerned about excessively warm summers and heavy

precipitation events, which can increase fruit rot, and early warm spells in winter, which can bring plants temporarily out of dormancy, but then make them susceptible to freezing. Despite these signs, Gareau et al. (2020), in a survey of Massachusetts growers, find little evidence of cluster discussion or adjustments to growing techniques; the industry seems more focused on more immediate priorities. When asked about climate change, most growers and industry experts say that weather conditions are always changing, and there are not enough observational patterns to reach any conclusions. The same can be said about the blindness among policymakers and the lack of research projects on climate change in agriculture more generally, as growers' concerns, like election cycles, are much shorter-term in nature.

Similarly, we could not find any researchers or long-term funding dedicated to cranberry product innovation and marketing, or overall industry strategy, outside of Ocean Spray's internal efforts. One person in Rutgers and two at Wisconsin seem to be managing most of the research on breeding. Many of the other personnel are involved in daily extension activities, an important function, but one that creates tension with the ability to do long-term research. The main pressure for university activities seems to come from state growers' associations, whereas a combined approach pooling resources, and establishing dedicated cranberry research positions would be more effective, with the understanding that the location of the researcher not undermining their dedication to the industry as a whole. As one current researcher put it, "We spend most of our time responding to the needs of our local growers, helping them to solve the problems they face on a daily basis. We simply don't have any more bandwidth to undertake long-term research." There are 5 USDA regional specialists who are supposed to work on cranberries, but they tend to focus on the clusters to which they are assigned. On the other hand, substantial amounts Rutgers University and University of Wisconsin are reaping in terms of royalties show that investment in R&D can pay off, and that there needs to be pressure mounted to ensure a reasonable proportion of those royalties are circulated into more research, ensuring a virtuous circle of industry investments and benefits. There is particular interest in finding biological controls as substitutes for pesticides, which obviously would reduce the costs of organic production.

One solution to consider would be to institute an industry-wide "check off" levy based on size/profitability/production data from the marketing order that would fund a joint marketing and

research board, which would include representatives from industry, academia, and policy, and indicate a more serious approach to research and development. This would effectively combine some of the operations in these areas of the Cranberry Institute and the CMC. This joint organization could be modeled on the Triple Helix model, as reflected in the wine boards of Australia and New Zealand as discussed by Hira (2013b). The difference here being that the dominant presence of Ocean Spray would require an adjustment to the arrangements to allow its leadership and ability to conduct such activities for its own brand, while funneling more resources and efforts into projects that have a common interest, such as cranberry health research and developing new demand through new product innovation and new demand. One big, but surmountable, challenge would be to get the industry to abandon the marketing order, so that Canadian producers can be brought into the fold. This would not be easy given the reliance for many years on the CMC and the continuing dominance of Ocean Spray, but as we have discussed, the marketing order is no longer effective. More challenging still, Ocean Spray would have to acknowledge its ability to solve all the problems of the industry is now more limited, not an easy step. The gradual decline of Ocean Spray's position over the past 3 decades has reportedly declined from 85 to 65%, an estimate shared by multiple interviewees. Ocean Spray needs to adjust its strategy to match this emerging reality, though one suspects it will try to reverse this decline. It is hard to see how a Northland type scenario would unfold given the difficulties presented in purchasing the quickly growing competition from Québec, where interviewees state acreage is continuing to increase.

The “holy grail” for varieties as one researcher put it, would be to develop new strains of cranberries that are less acidic and naturally sweeter. The researchers at both Rutgers and University of Wisconsin-Madison are both working on this.³⁸ This would help to counter the current anti-sugar sentiment among consumers, though such attitudes ignore all the natural sugars of other juices. If combined with the health benefits in a dual campaign, one could see more palatable versions of cranberry being taken up by the growing numbers of consumers who are concerned about diabetes. After all, non-sweet products have done well in markets over the past decade based on health benefits, such as green tea, maca tea, beet juice, kale, wheatgrass,

³⁸ On UW efforts, see www.nama.org › *Students* › *Univ of WI-Madison Executive Summary_Final*, Accessed: 10/4/2019.

and spinach all being part of the fresh juice craze. Consumers will adopt all kinds of ingredients if they are tied to health benefits. In fact, there are now 100% cranberry juices (without sweetener) available now in grocery stores, demonstrating that a market does exist, but it's so far still limited.

Long-term research in health to back up product claims requires considerable expense, not only at identifying promising compounds, but also carrying out large-scale clinical trials. The lack of a health care team is concerning, with just one dedicated person at Rutgers who could be identified. There does not appear to be a clear research agenda for the industry, one that could work towards leveraging the kinds of matching funds from NIH or other potential funders. Reinforcing the lack of funding issues is a lack of coordination. While a biannual meeting (NACREW) brings horticultural cranberry research personnel together, there do not appear to be any large-scale research efforts. Interviewees in the Canadian clusters mentioned the importance of knowledge flows through attendance at other clusters' winter cranberry congresses, the main event for the industry in each cluster to discuss issues and share knowledge, including short classes, presentation of recent horticultural research (funded by Ocean Spray and the various growers' associations) and visits to farms and demonstration farms. Québec growers highlighted the importance of knowledge flows from Wisconsin, while B.C. growers participate in a biannual Pacific Northwest Congress. Similarly, interviewees note that the CMC-funded research separately from the Cranberry Institute, and Ocean Spray, while participating in both institutions, also has its own research agenda. What is missing is a way to organize the research into long-term strategic directions and move beyond horticulture to health and marketing.

It may be worth researching other possible uses for cranberries as well; one interviewee suggested potential uses for animal feed or in fish farms. Some interviewees suggest Ocean Spray is not as receptive to new research as it should be, and that its desire to develop proprietary knowledge may get in the way of new product development. Ocean Spray faces the classic "innovator's dilemma," as described by Christensen (2000) where because of its large size, previous success, and pressure from shareholders (growers) to preserve and significantly grow revenues in foreseeable ways and in predictable timeframes, it becomes reluctant to enter into blue sky research, even as those product breakthroughs are the foundation of its own historical success. Emerging market niches are generally not of interest to giants, as Christensen explains,

because their risk is high and reward is uncertain, however, by the time they grow into sizable markets the giant may have missed the learning and branding opportunities necessary to gain a dominant position in the new categories. In the case of Ocean Spray, for example, management is naturally reluctant to undercut its dominant, if shrinking presence in the juice market, where its brand is known for sweet blends. The same is true for the quickly growing organic market, where it seems to hope that a largely unknown existing Québec brand, Atoka, will give it entrée without disrupting existing markets. The danger with this conservative if understandable position is that the younger generation of sugar-wary and health conscious millennials and overseas consumers may find their way to cranberries via a different route. Ocean Spray's launching of Pact™, cranberry-infused water, is an interesting if limited step. It's unclear if it is still being sold. While Ocean Spray sells "diet" and "lite" versions of cranberry juice, these are not featured in its marketing strategy, and they do solve the problem of concerns associated with juice more generally. Yet, bringing awareness to its low sugar products would effectively undercut its still strong business in blended juice. It has recently made cautious forays into the supplement markets and chocolate covered fruit markets, and there is now a light, low calorie juice blend, which show that the giant is moving. Even aside from these brand dilemmas, there is nothing to stop it from investing in R&D for new products. However, moving away from sugar presents some major challenges, according to interviewees. Aspartame and the usual sugar substitutes are often viewed skeptically as well. Several interviewees state that stevia is far too expensive and difficult to use in the SDC sweetening process and would affect the firmness of the SDC to be readily amenable to adoption. Sugar substitutes for the juice taken out during the drying process. Some interviewees are skeptical about how much sugar is affecting the SDC market, seeing it as limited to a reduction in juice sales. Thus, the holy grail of finding a new varietal with higher natural brix remains.

Conflicts of interest in research can be resolved through arms' length relationships, directing long-term large pools of research money to research teams through third party administrators, such as universities or foundations. Such efforts would require considerable investment of time and money, but since the health benefits would be universal, it would make sense for the different regions and organizations to pool their efforts and seek federal funding from NIH (National Institutes of Health) or some other reputable body. Publication through peer review

creates bona fides around the integrity of the research. Some in the industry are concerned, given past experience, that there will not be definitive proof of the health benefits of cranberries. The logical response would be that the current uncertainty over benefits leads to skepticism. There appears to be adequate research to back up claims of effectiveness in recurrent urinary tract infections, and more generally, cranberries have anti-oxidants, with proven health qualities. The upside for health research is simply too great to ignore.

Finally, the Land O'Lakes mini-case (in the forthcoming book) shows the upside of a more concerted and organized global strategy. It, along with our other cases, reflects the historical importance of personal and collective leadership and vision. By contrast, the cranberry industry seems cautious and lacking in strategic vision about how to manage global supply and demand. The occasional historical reliance on USDA marketing orders to restore stability to the market during very low prices does not seem to be an option as the general conclusion is that Canadian and U.S. producers cannot collaborate on supply according to free trade rules (though this should be challenged or a workaround sought). The ability to rely on the USDA is effectively shrinking, and the industry has fallen into arguing about which particular market to target rather setting up the more vociferous approach required to increase demand through spreading across markets. Such would require not only more marketing efforts, but greater efforts to find local market partners, including perhaps through mergers and acquisitions. The bottom line is that the increased production represented in Québec represents a higher supply equilibrium, one that could not be corralled by USDA through marketing orders or Ocean Spray because of the large number of independents. A thorough examination of potential markets, channels, and product distribution beyond the current focus on China is necessary. It will require greater investment in resources. The expenses for developing new markets and R&D can be shared across Canada and the U.S., turning the budding rivalry into an industry-wide vector of cooperation.

The sincere hope of the authors is that the unique experiment in agricultural cooperation in the cranberry industry can adapt and continue to provide an alternative model of governance. Whether that happens depends on a combination of market forces and industry decisions, and government support. It seems clear that painful adjustments to supply need to be made, but at the same time, the industry could pull itself together to make the investments in overseas market development and R&D that could grow demand over the long-run.

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Appendix B Ethics (Confidentiality) Forms

Consent Form and e-mail script for Cranberry Clusters Survey

This e-mail will be forwarded by the US Cranberry Marketing Committee to all US growers and by the provincial growers' associations to Canadian growers in Dec. 2021.

Consent Form and e-mail script for Cranberry Clusters Survey

Andy Hira

Simon Fraser University, Dept. of Political Science

e-mail: ahira@sfu.ca

[to be sent by e-mail]

Dear colleague:

My name is Andy Hira and I am a Professor of Political Science at Simon Fraser University in Vancouver, Canada. I am part of a team led by Dr. Paul Gottlieb of Rutgers University and funded by the US Dept. of Agriculture to study what makes agricultural clusters successful. Our hope is to find lessons that governments and trade associations can use to develop more robust supply chains, knowledge dissemination, and local support institutions for particular agricultural commodities. As part of the study, I am conducting an in depth study of the cranberry industry throughout North America. I am asking you, as a participant in the industry, to voice your opinion by filling out an on-line or hard copy survey so we can better understand growers' and others' concerns. As a participant in the cranberry industry, you have a unique perspective that can help improve policies to promote these concerns.

Your responses will help me to complete a study that looks at long-term trends and strategy for the industry. The study will be made publicly available in 2022.

The survey should take about 30 minutes. If possible, I would also like to conduct a 20 minute follow up interview with you in person, or via skype, e-mail, or telephone at a mutually convenient time. Pls. note that only in person and skype are considered secure means of communication by the ethics board. I can send you the interview questions ahead of time if you

prefer. You can also indicate your willingness to do the interview in the last question of the survey. As a participant in the cranberry industry, you have a unique and important perspective that can help inform and improve policies to promote them.

In recognition of the value of your time, **we are going to randomly award 16 survey respondents a \$50 Amazon gift card.** We will select and send the cards to the winners after the surveys are in. If you would like to be considered for the award, we ask you to fill in your contact details (e-mail address) on the last screen. We will not use your address for any other purpose, and once the awards are given, we will destroy the identifiers from any subsequent use of the survey. To be clear, the addresses will not be identified or linked in any way to the survey results. Your responses will be anonymous.

You can find the link for the survey here: <http://websurvey.sfu.ca/survey/370383696>

Please note that the survey link may not work on the Firefox browser. It will work on Microsoft Edge or Google Chrome.

In accordance with Canadian standard ethics procedures I wish to inform you of the following. The survey is completely voluntary and you are free to not answer any questions. I would like to assure you that your responses will be kept confidential and will be reported anonymously unless you specifically give me permission to discuss your company. There is absolutely no risk to you. Since I am contacting you for your opinions as an individual, I have not requested permission from your organisation. However, I am happy to do so if need be. Refusal to participate or withdrawal/dropout after agreeing to participate cannot have any adverse effect or consequences on your employment. I am a researcher with no ties to or influence upon your company or any government, so my only motivation is to find the truth to create better policies.

The survey is run through Simon Fraser University and is secure; only I will have access to the results that identify participants. Once I finish with the research, I will download the data to a SFU Vault, a secure server that is password protected. Any hard copy surveys will be shredded. After the study is completed, upon request, I will make anonymized versions of the data available to you and other researchers upon request. If you have any doubts or questions, or would like a copy of the results, please contact me at ahira@sfu.ca. You can also contact the

Principal Investigator for the whole project, Dr. Paul Gottlieb, by e-mail at pdgott@sebs.rutgers.edu_ If you have any questions regarding ethics procedures, you may contact Dr. Jeff Toward, Director, Office of Research Ethics, jtoward@sfu.ca, 778-782-6593. The ethics file number for this study is 2017s0141.

Your agreement by e-mail to participate in the study will be taken as consent to the ethics procedures outlined here. You will see at the end of the survey the possibility to leave contact information in order to enter into the Amazon card sweepstakes.

Thank you very much for your time and consideration.

Cranberry Clusters Interview growers (Hira)

Dear colleague:

My name is Andy Hira and I am a Professor of Political Science at Simon Fraser University in Vancouver, Canada. I am part of a team led by Dr. Paul Gottlieb of Rutgers University and funded by the US Dept. of Agriculture to study what makes agricultural clusters successful. I will be conducting the interviews during 2019-21 for our case study, the cranberry industry. Our hope is to find policy lessons so that the US and other governments can promote the development of supply chains and local businesses around agricultural industries. As part of the clusters study, we are conducting an in depth national study of the cranberry industry.

I am writing to ask for your cooperation in participating in an approximately 45 minute interview with you in person, or via skype, e-mail, or telephone at a mutually convenient time. Pls. note that only in person and skype are considered secure means of communication. We will send you the interview questions ahead of time. As an important participant in the cranberry industry, you have a unique and important perspective that can help inform and improve policies to promote them.

I would prefer to do the interviews in person, however I am flexible. I will be visiting your growing area for approximately 2 weeks during Fall 2021, and would like to interview you at that time if it's convenient. I recognize that covid is a continuing concern. I have been double vaccinated. I will follow SFU's communicable disease protocols (<https://www.sfu.ca/srs/work-research-safety/general-safety/cdp.html>). I suggest we try to conduct the interview outside. I will wear a mask and maintain a distance of at least 2 meters. If we are inside, we can maintain the same distance. If you are uncomfortable with meeting in person, we can set up a time for a zoom or phone call at a time of your convenience.

Because I am asking for your opinions as an individual, I have not sought approval from your organization. However, if you think it necessary, I can ask for permission before we set up the interview.

If you are a cranberry grower (farmer), I will not list your name anywhere in the report. I will simply state in the beginning of the report, that I spoke to x # of growers in x state/province. In highly exceptional circumstances, I may ask your permission to attribute a quote to you, but only if you give me explicit permission first. It is important to note that that study is based on looking at broader patterns across the industry, not individual opinions. I will also send you an advanced copy of the report before it's publicly available, to raise any objections in regard to passages that might identify you. You will have 2 weeks to respond with any concerns, or longer if you request it. I will make modifications to the report before it's published if you raise them with me, to ensure your confidentiality in regard to the information in the report. Thus, the answers you provide will be amalgamated into a wider survey of cranberry clusters around the country, in which case all the answers you provide would be anonymized. In exceptional circumstances, we might want to use a direct quote from you. In that case, we would run it by you and ask for your permission before doing so.

In accordance with SFU/Canadian ethics standards, I would like to inform you of the following. The interview is completely voluntary and you are free to not answer any questions. We would like to assure you that your responses will be kept confidential and responses will be reported anonymously as outlined above. There is no foreseeable risk to you. Refusal to participate or withdrawal/dropout after agreeing to participate can not have any adverse effect or consequences on your employment. We are researchers with no ties to or influence upon your company or any government, so our only motivation is to attain information that may be used to create better policies.

The interview data will be kept by Andy Hira at Simon Fraser University on a secure SFU server (SFU Vault); only Hira will have access to the results that identify participants. For the interview, we will make some notes on our laptops, which can only be opened with a password. Once the research is completed and published, Hira will then place an anonymized version of the data in SFU's data depository, available on-line through the SFU library website, so it might be used by other researchers. No companies or individuals will be reported in the results unless we receive explicit permission from them first. After the study is completed, upon request, we will make anonymized versions of the data available to you and other researchers upon request. If you have any doubts or questions, or would like a copy of the results, please contact me at ahira@sfu.ca. You can also contact the Principal Investigator for the whole project, Dr. Paul Gottlieb, by e-mail at pdgott@sebs.rutgers.edu. If you have any questions regarding ethics procedures, you may contact Dr. Jeff Toward, Director, Office of Research Ethics, jtoward@sfu.ca, [778-782-6593](tel:778-782-6593). The ethics file number for this study is 2017s0141.

Your agreement by e-mail to participate in the study will be taken as consent to the ethics procedures outlined here.

Thank you very much for your time and consideration.

Cranberry Clusters Interview for experts (Hira)

Dear colleague:

My name is Andy Hira and I am a Professor of Political Science at Simon Fraser University in Vancouver, Canada. I am part of a team led by Dr. Paul Gottlieb of Rutgers University and funded by the US Dept. of Agriculture to study what makes agricultural clusters successful. I will be conducting the interviews during 2019-21 for our case study, the cranberry industry. Our hope is to find policy lessons so that the US and other governments can promote the development of supply chains and local businesses around agricultural industries. As part of the clusters study, we are conducting an in depth study of the cranberry industry in the U.S. and Canada.

I am writing to ask for your cooperation in participating in an approximately 45 minute interview with you in person, or via skype, e-mail, or telephone at a mutually convenient time. Pls. note that only in person and skype are considered secure means of communication. We will send you the interview questions ahead of time. As an important participant in the cranberry industry, you have a unique and important perspective that can help inform and improve policies to promote them.

I would prefer to do the interviews in person, however I am flexible. I will be visiting your growing area for approximately 2 weeks during Fall 2021, and would like to interview you at that time if it's convenient. I recognize that covid is a continuing concern. I have been double vaccinated. I will follow SFU's communicable disease protocols (<https://www.sfu.ca/srs/work-research-safety/general-safety/cdp.html>). I suggest we try to conduct the interview outside. I will wear a mask and maintain a distance of at least 2 meters. If we are inside, we can maintain the same distance. If you are uncomfortable with meeting in person, we can set up a time for a zoom or phone call at a time of your convenience.

Because I am asking for your opinions as an individual, I have not sought approval from your organization. However, if you think it necessary, I can ask for permission before we set up the interview.

It is important for the credibility of this study to demonstrate an effort to collect the views of a diverse group of stakeholders across the cranberry industry. **As a distinguished expert, I ask your permission to list your name at the top of the report as an interviewee. However, I will not link your name to any particular piece of information or quote, unless I first receive your explicit permission. You can also opt to go completely off the record if you prefer.** It is important to note that that study is based on looking at broader patterns across the industry, not individual opinions. I will also send you an advanced copy of the report before it's publicly available, to raise any objections in regard to passages that might identify you. You will have 2 weeks to respond with any concerns, or longer if you request it. I will make modifications to the report before it's published if you raise them with me, to ensure your confidentiality in regard to the information in the report. Thus, the answers you provide will be amalgamated into a wider survey of cranberry clusters around the country, in which case all the answers you provide would be anonymized.

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