

BC CRANBERRY GROWERS' ASSOCIATION

Perennial Crop Renewal Program - Sector Development

February 23, 2024

BEATON
RETTICH
WATERS
BETTER ORGANIZATIONS

ACKNOWLEDGMENT

This report is part of our work under the Perennial Crop Renewal Program (PCRP).

We gratefully acknowledge the financial support of the Province of British Columbia through the Ministry of Agriculture and Food.



PURPOSE

This report summarizes findings from research to understand cranberry market demand, current British Columbia supply and acreage, the gap in acres and costs to replant, break-even analysis and other factors to support industry decisions on replanting.

Financial projections contained within are built on assumptions and subject to uncertainty. It is intended to be used to support decisions within industry but is not intended to contain all the relevant information industry may require to make decisions about replanting varieties.

This report was prepared based on information obtained through interviews, surveys, secondary research and materials provided by industry stakeholders.

TABLE *of* CONTENTS

Topic

Slide

1. Summary of Results

05

2. Market Research and Analysis

18

3. Market Channel and Break-Even Analysis

24

4. Appendix Section

32

5. References

40

1. SUMMARY OF RESULTS

EXECUTIVE SUMMARY

Our Growers Survey suggests that growers intend to renovate around 46% of cranberry acres in British Columbia in the next five years. The survey sample represents around 12% of planted acres and was not randomly selected, so may not represent the intentions of all cranberry growers.

North America, which accounts for most of the global cranberry supply, has experienced significant increases in production over the past two decades. This production is largely the result of new varieties which yield substantially more cranberries per acre. This increase in production has resulted in periods of oversupply and decreased prices.

Despite increased production and competitiveness in the market there is opportunity for growers to reinvest in their unproductive fields and plant high yield varieties. If the price of inputs and overall cost structure remains relatively consistent, high yielding fields should be expected to generate positive returns with current prices, and even some scenarios with decreased prices.

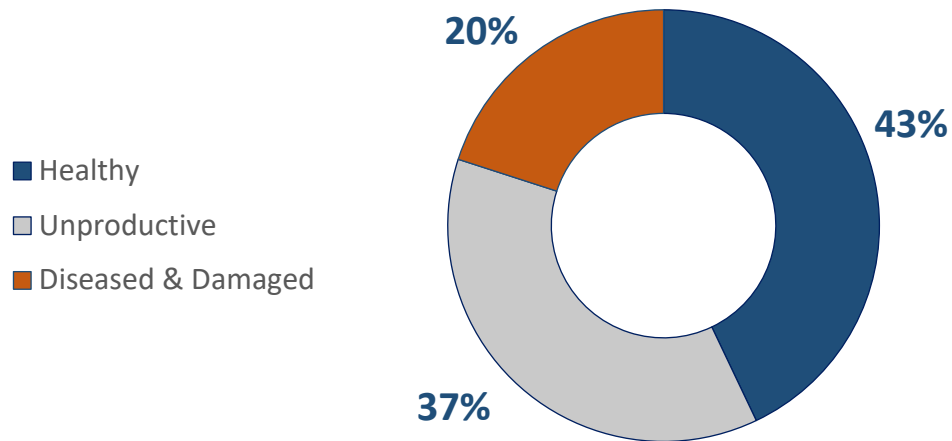
Growers who choose not to renovate or pursue high yield varieties may find it difficult to compete in an increasingly productive industry and will face downside price risk. Their below average yields will make it more difficult to generate positive contribution margins from their fields.

HEALTH & STATUS OF EXISTING ACRES

Health & Status of Acres

- 43% of acres were identified as healthy by growers in responses to the Growers Survey
- Over one third of acres are considered unproductive

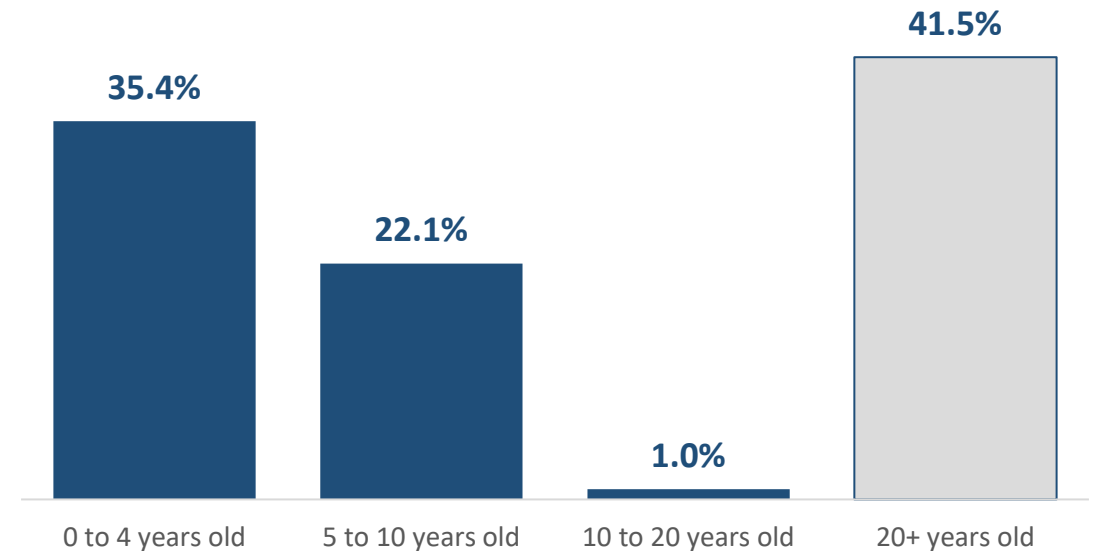
Health & Status of Acres per Growers Survey



Age of Healthy Acres

- Of the acres that were identified as healthy 35% are newly planted between 0 and 4 years old
- 42% of healthy acres are over 20 years old

Age Distribution of Healthy Acres per Growers Survey

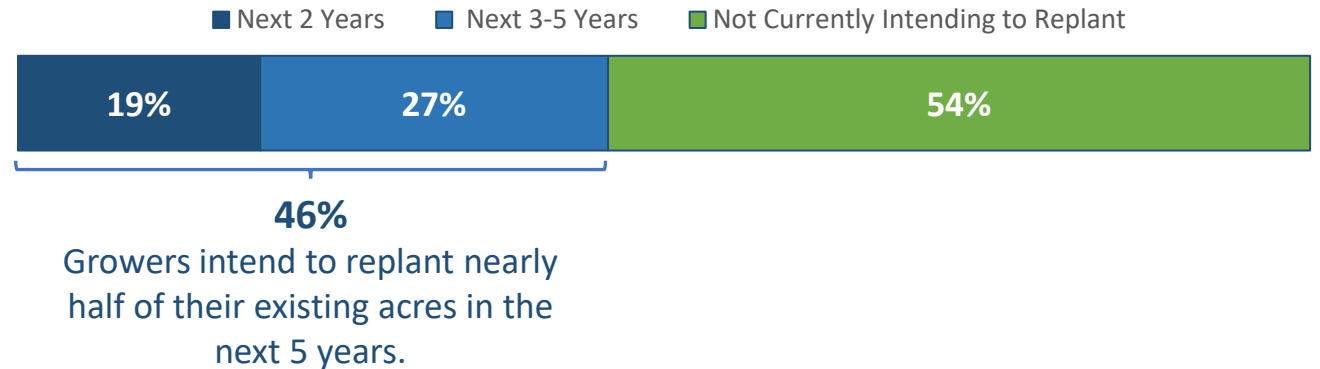


GROWER REPLANT INTENTIONS

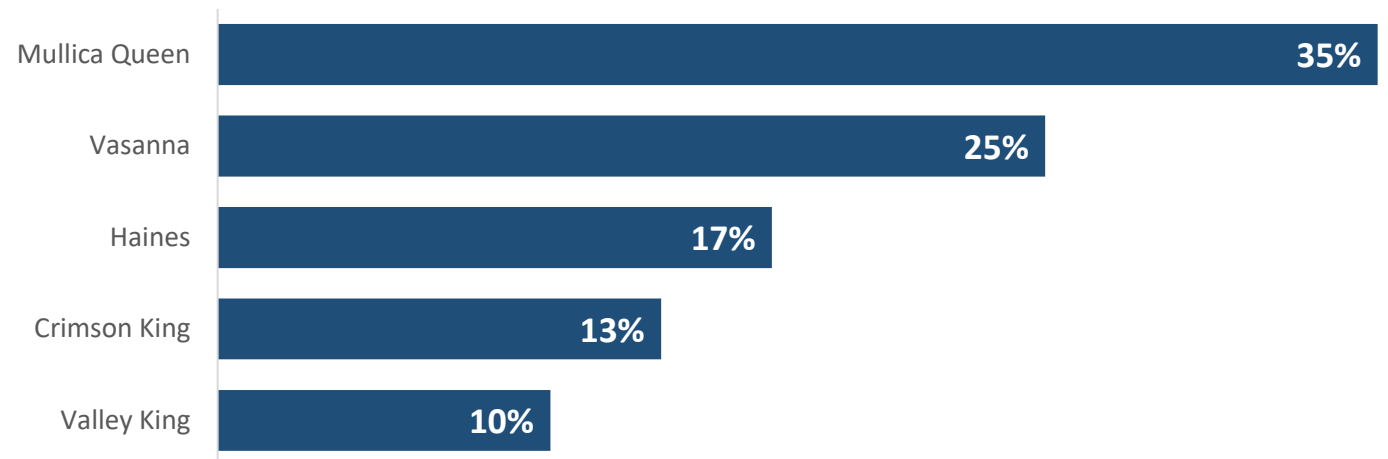
Replant intentions according to the results of the Growers Survey

- Growers Survey respondents intend to replant 19% of their acres in the next 2 years and 27% in the next 3-5 years.
- This would result in nearly half of their existing fields being replanted in the next 5 years.
- Survey respondents who reported an intent to replant closely correlated to those who reported unproductive fields.
- Respondents intend to plant newer, higher yielding varieties. No respondent identified Stevens as an intended variety.
- Reasons identified for variety selection include yield, fruit characteristics, and ability to establish and manage the crop.

% of Existing Acres Growers Intend to Replant per Growers Survey



% of Acres Intended to be Planted by Variety Intended per Growers Survey



RENOVATING WITH PURCHASED PLUGS

Estimated costs of renovating existing acres with purchased plugs

Renovate with Purchased Plugs	
Scalping/Leveling/Fill	\$ 2,645
Drainage/Irrigation/Lines	\$ 5,160
Planting	\$ 3,351
Plugs	\$ 14,702
Shipping	\$ 1,764
Patent/License	\$ 2,700
Total Estimate	\$ 30,322

See Appendix A: Renovating with Purchased Plugs

- When renovating a field with purchased plugs the cost of the plugs, including shipping and patent costs, are expected to be at least half of the total cost of the renovation.
- Plugs generally need to be ordered a year in advance with some range in prices depending on if they are grown outside or in a greenhouse.
- Establishment costs will reflect grower's decisions and individual situations, they may differ significantly on a case-by-case basis.
- This estimate assumes only renovation to existing acres and does not include core infrastructure costs, such as pumps and pump houses, which can significantly increase the cost of a renovation.

RENOVATING WITH OWN SOURCE VINES

Estimated costs of renovating existing acres with own vine clippings

Renovate with Own Source Vines	
Scalping/Leveling/Fill	\$ 3,362
Trenching/Drainage/Lines	\$ 4,800
Loss on Clippings	\$ 3,950
Patent/License	\$ 2,700
Spread Vine	\$ 1,018
Total Estimate	\$ 15,830

See Appendix B: Renovating with Own Source Vines

- When renovating with vines from existing acres the cost of the vines will be significantly less than purchasing plugs or vines from external sources. The costs associated with the vines will include the loss production on the acres clipped.
- The varieties available to the grower will be limited to those they already have planted.
- Establishment costs will reflect grower's decisions and individual situations, they may differ significantly on a case-by-case basis.
- This estimate assumes only renovation to existing acres and does not include significant infrastructure costs which can significantly increase the cost of a renovation.

BREAK-EVEN ANALYSIS

The break-even analysis considers the payback of renovating an acre with purchased plugs of a high yield variety. Assumptions were informed by insights provided from the grower survey and secondary research.

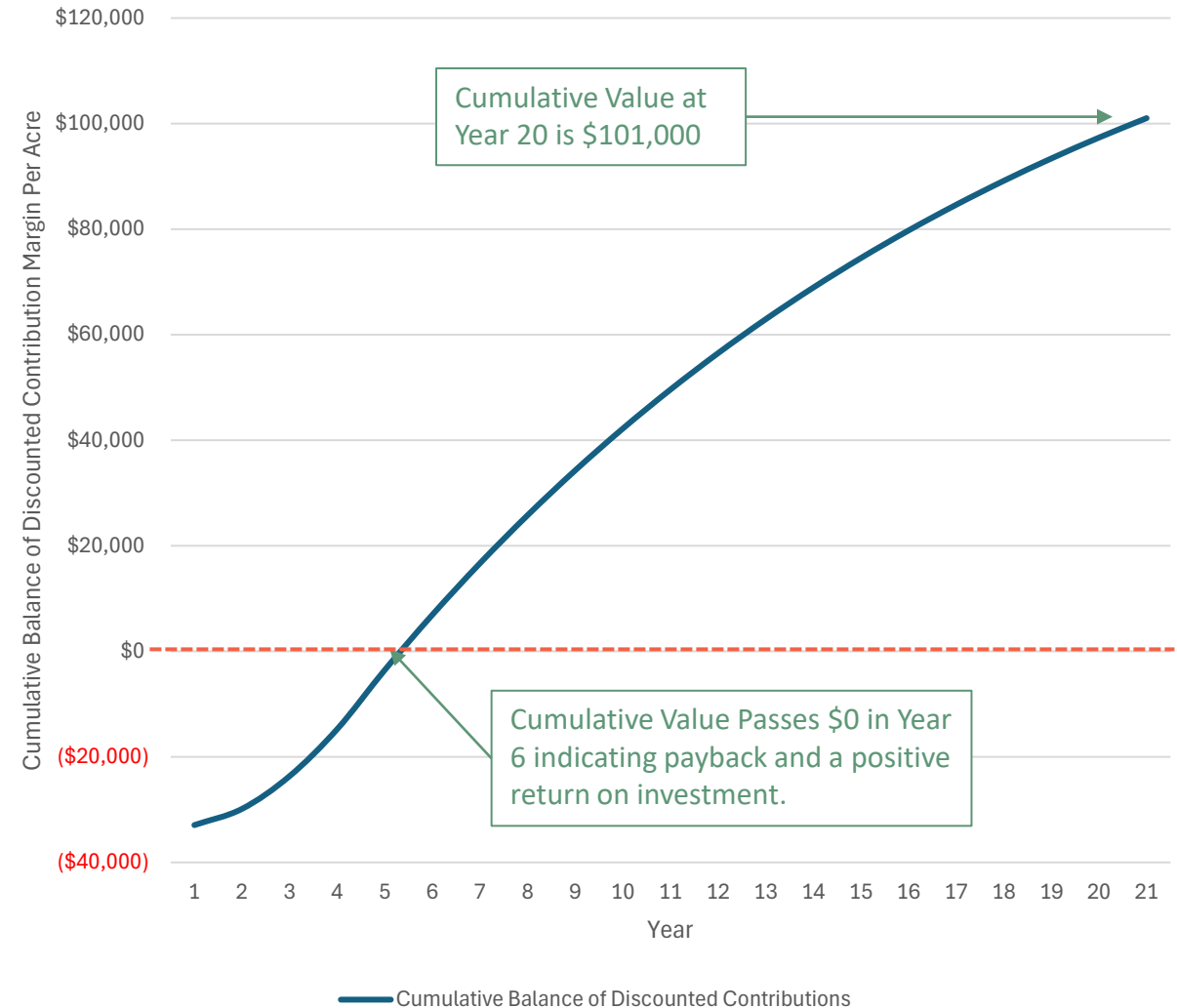
Fields are expected to reach full production by year 5.

The costs associated with a replant are expected to be repaid in Year 6 and generate a positive return over the period of analysis.

Key Assumptions

- Based on the calculated cost to replant an acre (\$30,322)
- Future income and losses discounted using current prime rate (7.2%)
- Yield at maturity is 349 Barrels per Acre
- Average price per lb received is \$55/Barrel
- See Appendix D for all assumptions

Estimated Payback Period to Renovate an Acre of Cranberries



RENOVATION SCENARIO ANALYSIS

A comparison of potential options for growers

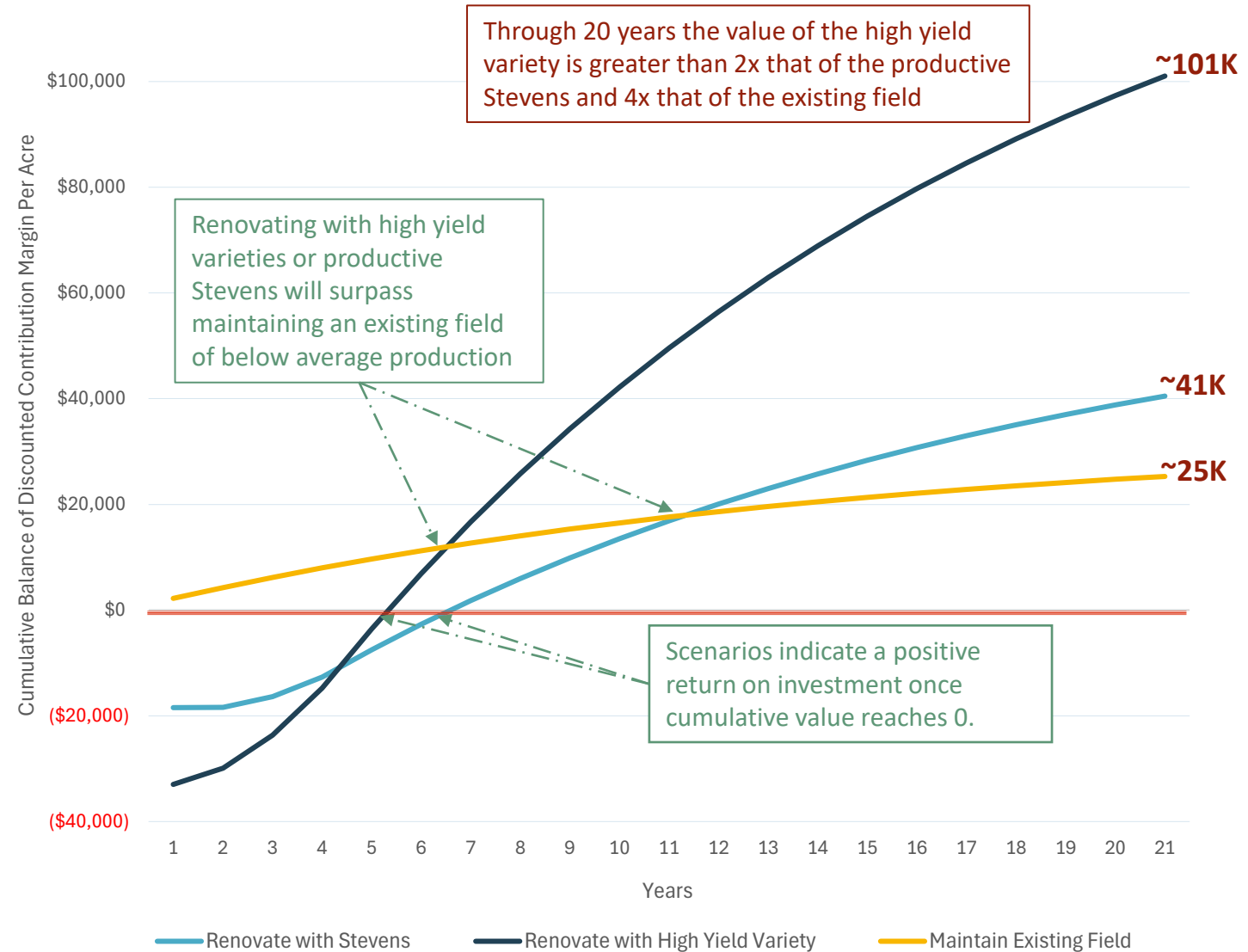
1. Renovate with plugs of a high yield variety
2. Renovate with productive Stevens vines
3. Maintain existing field, of below average production

As noted, growers will have options when renovating fields. The analysis illustrates how renovating with a newer, high yielding, variety significantly increases the value of the field when compared to maintaining an existing field of below average production or renovating with productive Stevens vines.

Key Assumptions

- Price per barrel received and production costs held constant for all scenarios
- High yield = 349 barrels/acre
- Productive Stevens = 204 barrels/acre
- Existing field = 120 barrels/acre
- See Appendix D for all assumptions

Scenario Analysis Estimated Payback Period of Renovations

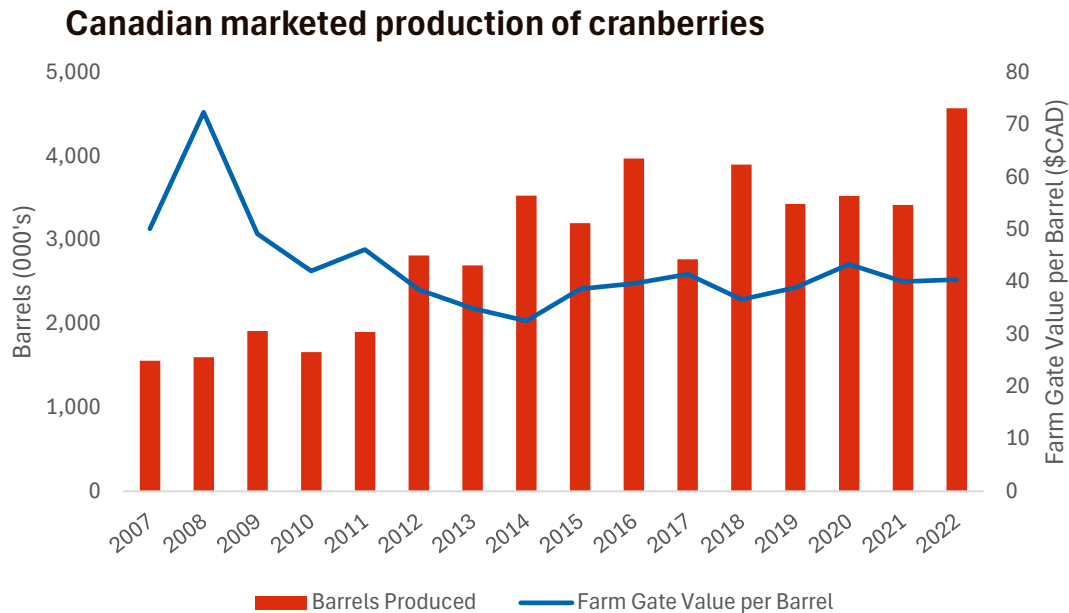


MARKET DEMAND & SUPPLY

North American production has increased over the past two decades

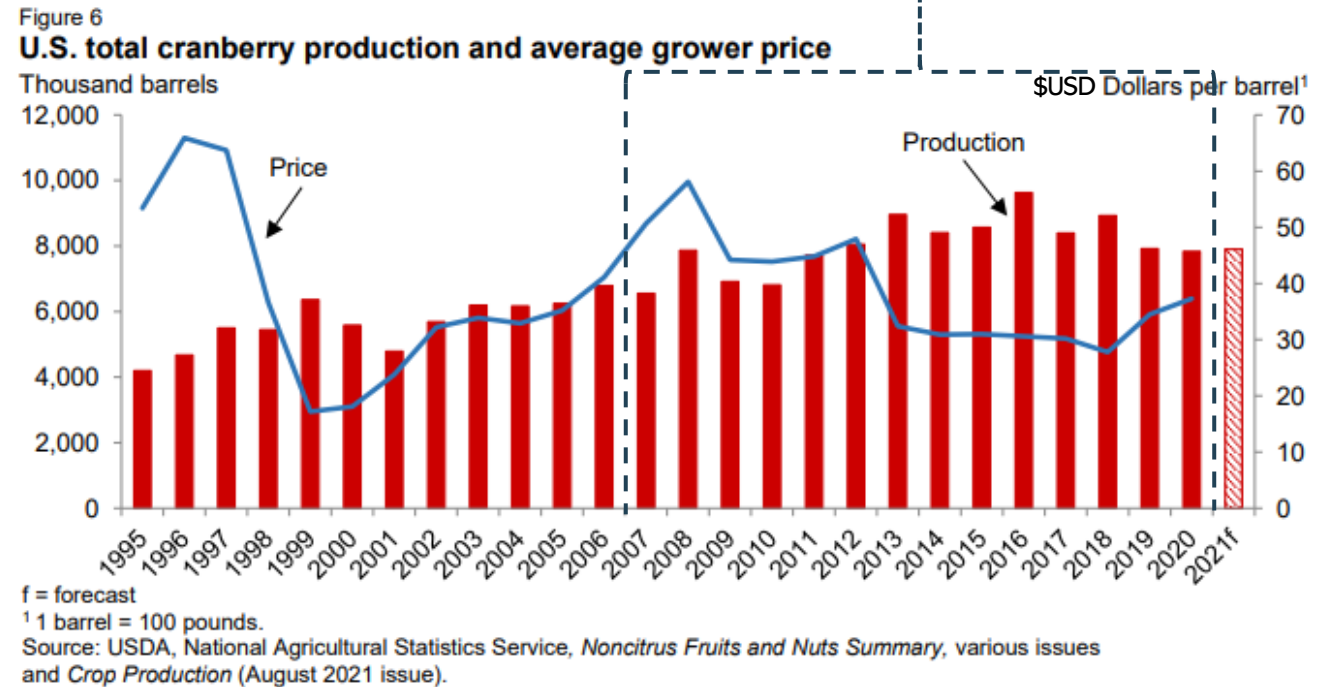
- Over the past two decades Canadian and US production of cranberries have increased significantly
- In the past decade prices have declined with concerns of periods of oversupply¹⁰.

The outlined portion overlaps the Canadian data (except 2021-22). Similar increases in production and movement in prices observed.



Source: Statistics Canada. (2023, February 16)⁷

Source: Raymond, J. (2020, November 25)¹⁰



Source: Kramer, J., Simnitt, S., & Calvin, L. (2021)²¹

RECOMMENDATIONS

1. Renovate with high yield varieties

- With expected constant demand and increased variety yield potentials, it is likely that there will be pressure on cranberry prices, slowing any increased price potential. With expected rising input costs, growers will need to generate more yield per acre to maintain contribution margins.
- Interviews and research suggest that older current planted varieties such as Stevens, will see declining yields as they become genetic hybrids. New planted varieties would be expected to yield 100-200 barrels an acre more which substantially outweighs renovation costs over the mid-term.

2. Variety selection and diversification

- While several varieties are producing high yields there are risks associated with one or two varieties becoming dominant which has the potential to create capacity constraints during harvest time. Having several varieties planted throughout the province minimizes these risks by potentially allowing for varieties that can be harvested earlier or later in the season and helps mitigate against variety specific issues that may arise.

FURTHER RESEARCH NEEDS

1. Demand Elasticity Research

- The industry lacks available demand and utilization forecasting that would better inform growers making near and medium-term decisions.
- This demand research should consider how an increased supply of cranberries can potentially result in lower prices and allow for expansion of the market by becoming a viable substitute to other, currently cheaper, dried fruit.

2. Pricing Statistics

- The Canadian market lacks publicly available pricing information and statistics, including the difference between fresh and processed, which would allow growers to make more informed decisions.

POTENTIAL BARRIERS

Replant Barriers

- The purchase of plugs of high yield varieties from propagators generally have a one-year lead time with some varieties potentially being unavailable.

Cost and Financial Barriers

- The investment required to renovate can be difficult for some growers, particularly smaller growers, to manage. This is exacerbated by higher interest rates making it more expensive to borrow.
- For a grower to renovate a field with vine clippings of a high yield variety they need to have already invested in those varieties. Growers will need to either have already invested, or now invest in plugs from a propagator.
- Most of the growers in BC receive payment in USD for their yield making them susceptible to exchange rate risks

GROWER CONCERNS & SUGGESTIONS

Challenges	
Water Supply	Ensuring and maintain adequate water for production and harvest. Changing weather patterns and droughts result in water shortage or timing issues.
Costs	The cost of replanting a field is relatively high and growers may either decide not to replant or will replant their fields at a slower rate both of which reduces their ability to compete with higher yielding producers.
Succession Planning	Some growers are facing difficulties in planning for the transfer or sale of operations as they move towards retirement. Issues identified included no successors to continue to operate the farm and limitations of the agriculture land reserve.
Areas for Support	
Horticulture Support	Improvements to practices and inputs used for weed management.
Market Support	Market support to contribute to increasing demand for cranberries as a means of supporting prices.
Funding	Grants and funding to help growers cover the costs of a replant which require a significant investment from growers but is likely required to maintain competitiveness within the industry.

2. MARKET RESEARCH *and* ANALYSIS

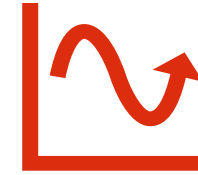
UNDERSTANDING MARKET DEMAND



The market for BC Cranberries exists within the North American and global markets. Upwards of 95% of BC cranberries are shipped to the US for use in value-added Ocean Spray products such as sweetened and dried cranberries, and juice. These products are distributed throughout North America and beyond²⁴.



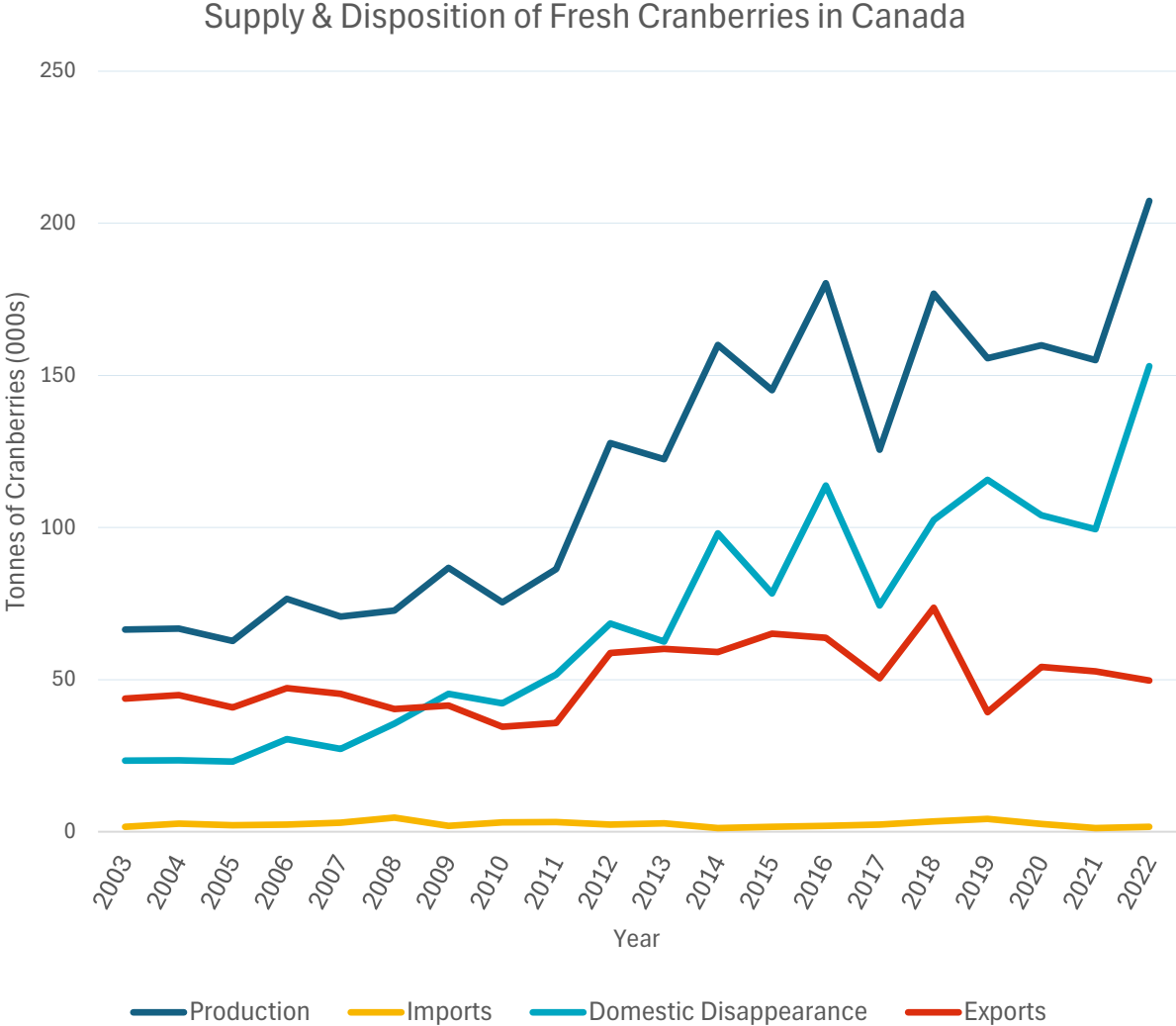
As a result, changes in supply or consumption within North America will have an impact on BC growers. Consumption patterns have changed as sweetened and dried cranberries have become the most popular processed cranberry product, surpassing juice and reducing the price of concentrate as a result¹.



The North American market has experienced increased production in recent decades which led to a period of suppressed prices which have recently reversed. If further increases in production outpace increases in demand the industry could face periods of oversupply.

CANADIAN CRANBERRY SUPPLY *and* DOMESTIC DISAPPEARANCE ARE INCREASING

- Over the past two decades Canadian cranberry production and domestic disappearance have increased significantly. With Canadian disappearance strongly correlated with production.
- Total volume of fresh cranberries exported has been relatively stable over the period. A period of growth from 2010-2018 has recently reversed.
- Exports as a % of total production has declined significantly. From 66% in 2003 to 24% in 2022.
- Imports of fresh cranberries have been stable and represent less than 1% of Canadian supply.

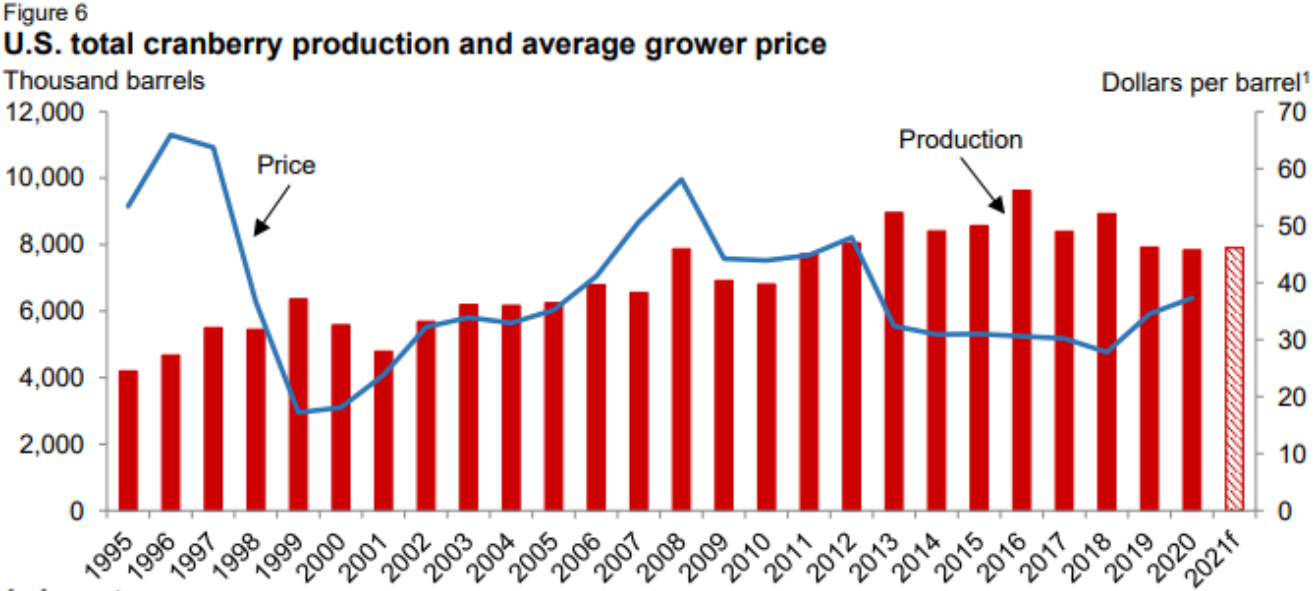


Source: Statistics Canada. (2023, May 31)⁴

INCREASED PRODUCTION IN THE US *and* CANADA CONTRIBUTED TO LOWER PRICES

A Decade of Declining Prices
 The US price per barrel of cranberries crashed in the late 90's after being driven up by speculators¹³. From there prices increased to a relative high in 2008 followed by a decade of decline characterized by flat demand and oversupply¹⁰.

Increased production in the US & Canada contributed to a period of oversupply and depressed pricing



- US cranberry production has increased in the past two decades, more than doubling between 2001 and its peak in 2016. This has coincided with the growth in Canadian production.
- According to the USDA “Increases in Canadian production, especially in the province of Quebec, have boosted competition and global cranberry supply. This increase in supply has contributed to lower domestic prices.”²²

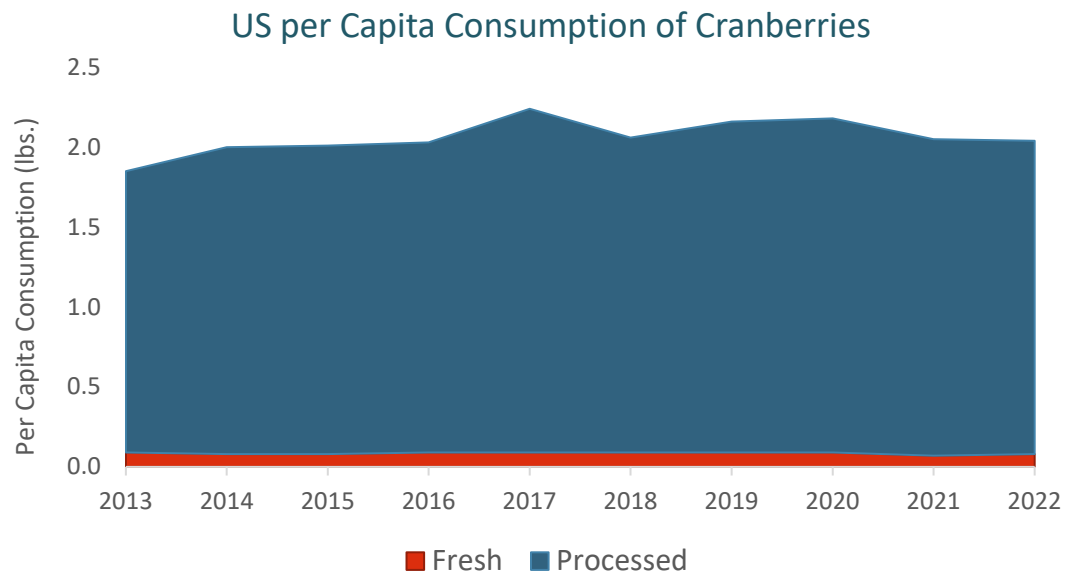
f = forecast
¹ 1 barrel = 100 pounds.
 Source: USDA, National Agricultural Statistics Service, *Noncitrus Fruits and Nuts Summary*, various issues and *Crop Production* (August 2021 issue).

Source: Kramer, J., Simnitt, S., & Calvin, L. (2021)²¹
 Source: Jones, T. (2002, November 3)¹³, Raymond, J. (2020, November 25)¹⁰, Weber, C., Simnitt, S., Wechsler, S., & Wakefield, H. (2023).)²²

TRENDS IN US CRANBERRY CONSUMPTION *and* PRICING

US Consumption

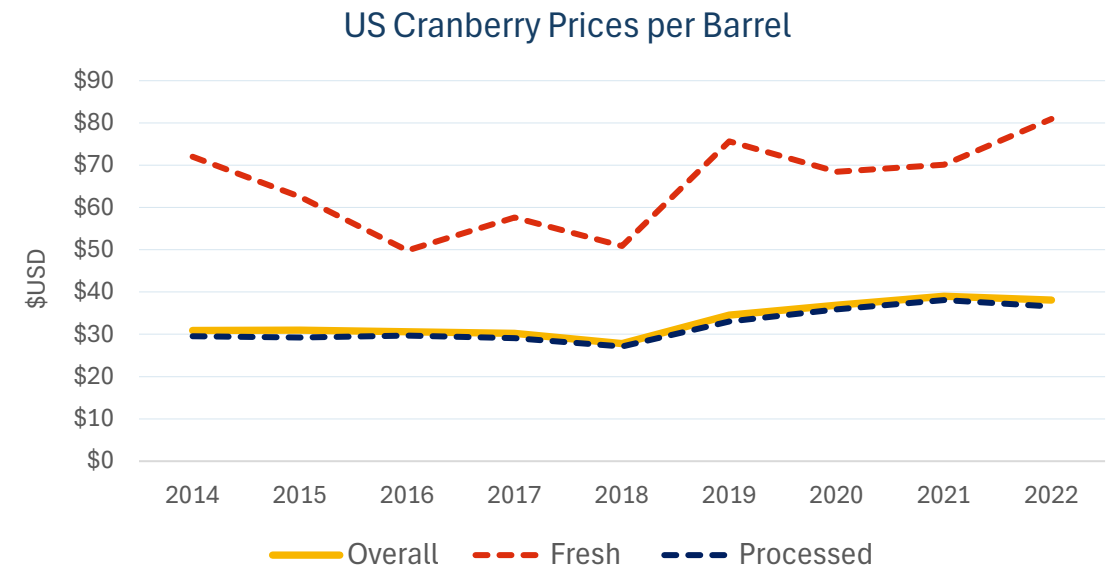
- US per capita consumption has remained relatively stable from 2013 to 2022.
- Processed cranberries accounted for 96% of all cranberries consumed during the period.
- Processed also accounted for the minor fluctuations observed as Fresh consumption remained almost constant.



Source: Cranberry Marketing Commission. (2023)¹⁸

US Pricing

- US prices slowly trended downward to 2018 where they hit a relative low of \$28 dollars/barrel. Prices have increased since.
- The overall price of cranberries moves in line with the processed price, as to be expected given its proportion of the total market.
- Fresh cranberries receive higher prices but are subject to greater volatility.



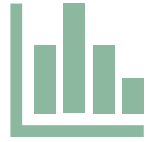
Source: United States Department of Agriculture. (2023)¹⁴ (2021)¹⁵ (2019)¹⁶ (2017)¹⁷

MARKET DEMAND SUMMARY

1. Upwards of 95% of cranberries are sold as processed products. The extended shelf-life and transportability of these processed products allow them to be sold throughout North America and abroad.
2. As a result, the expected price of a barrel of cranberries closely mirrors that of processed berries.
3. Fresh berries offer a higher price but represent a small fraction of the market.
4. The Canadian farm gate value per barrel has been stable since a recent low in 2014, averaging \$39.92 over the eight years since (2015-2022), with a value of \$40.42 in 2022.
5. Production has increased significantly in recent decades creating periods of oversupply, resulting in lower prices for growers.
6. Consumers are shifting towards different processed products, illustrated by the rise in sales of sweetened and dried cranberries.
7. Reliable forecast demand data is not readily available.

3. MARKET CHANNEL *and* BREAK-EVEN ANALYSIS

MINIMUM OPERATION SIZE *and* MARKET CHANNELS



Minimum Operation Size

A minimum operation size to be profitable has not been calculated. An operation will be profitable based on yield, price received and cost structure which is not necessarily a function of the size of the operation. An operation must be large enough to support the required infrastructure such as pumps, pump houses etc.



Market Channels

Market research and survey results provided limited insight into the market channels available to growers. While fresh cranberries generally receive higher prices than processed, it is a very small percentage of the total market. Additionally, within BC significant acreage is already under contract to agencies.

There is potential for some independents to expand into new markets and products, but it would be expected to have limited overall impact within the current industry.

RENOVATING A FIELD – KEY DECISIONS

In deciding to renovate an acre growers will have several considerations and limitations that will shape their decisions.

Variety & Yield

Growers renovate fields to increase the output, which will almost certainly result in growers replanting newer, high yield varieties, or vines from existing fields that are more productive.

Costs

Renovating a field is a significant investment for a grower. Purchasing plugs of newer, high yielding, varieties is significantly more expensive than clipping an existing field to plant. The volume of additional supplies such as sawdust as well as availability of labour and access to machinery have significant impacts.

Plant Sourcing

A grower that can clip their own fields and replant those vines can renovate for less than a grower that must purchase plugs or vines of new varieties. To do this growers must have already purchased and planted these new varieties in the past, meaning this is not an option for all growers.

ESTIMATED PAYBACK PERIOD PER ACRE OF RENOVATION USING PLUGS

The break-even analysis considers the payback of renovating an acre with purchased plugs of a high yield variety. Assumptions were informed by insights provided from the grower survey and secondary research.

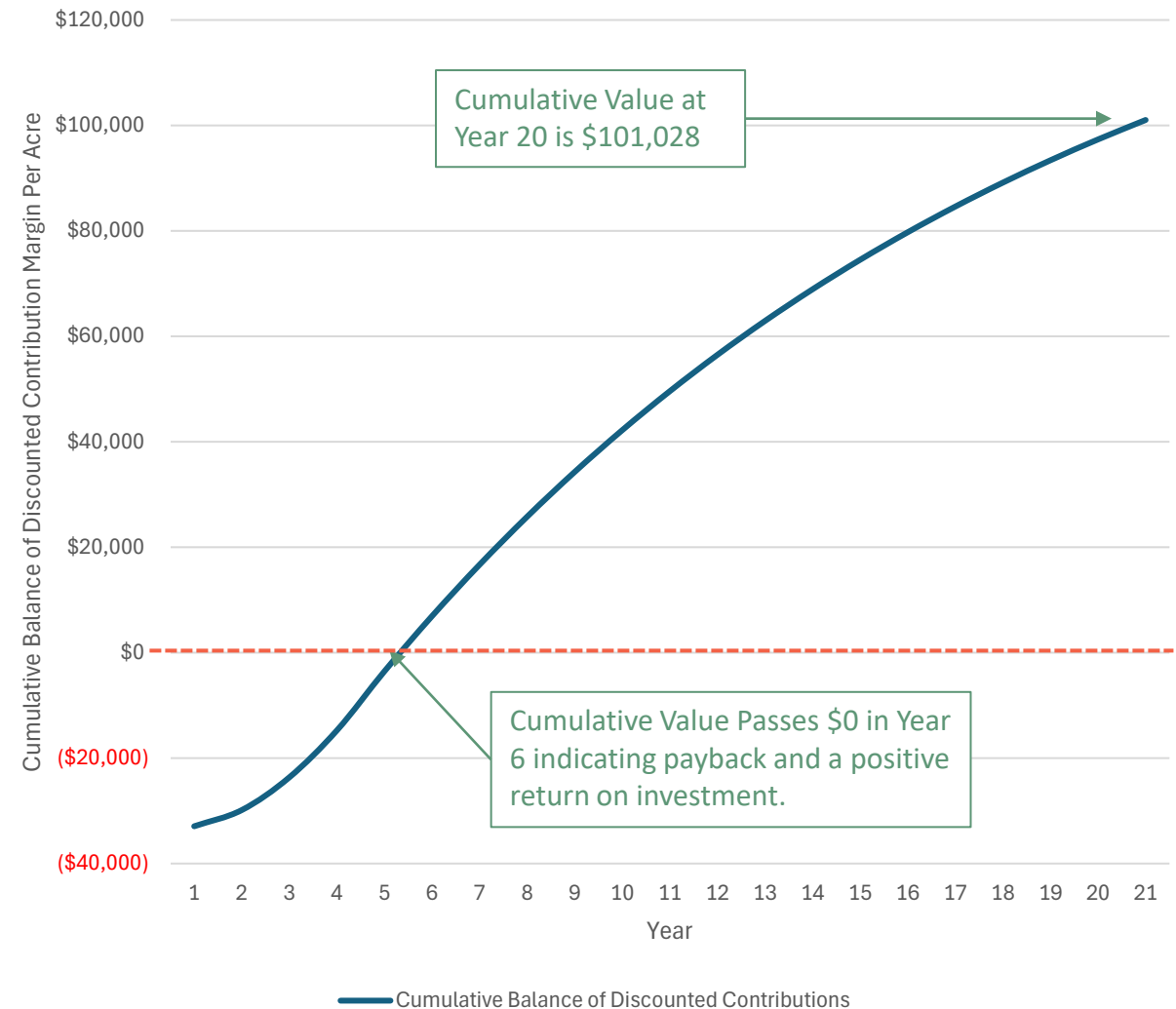
Fields are expected to reach full production by year 5.

The costs associated with a replant are expected to be repaid in Year 6 and generate a positive return over the period of analysis.

Key Assumptions

- Based on the calculated cost to replant an acre (\$30,322)
- Future income and losses discounted using current prime rate (7.2%)
- Yield at maturity is 349 Barrels per Acre
- Average price per lb received is \$55/Barrel
- See Appendix D for all assumptions

Estimated Payback Period to Renovate an Acre of Cranberries



SCENARIO ANALYSIS OF INCREASED YIELDS AND DECREASED PRICES

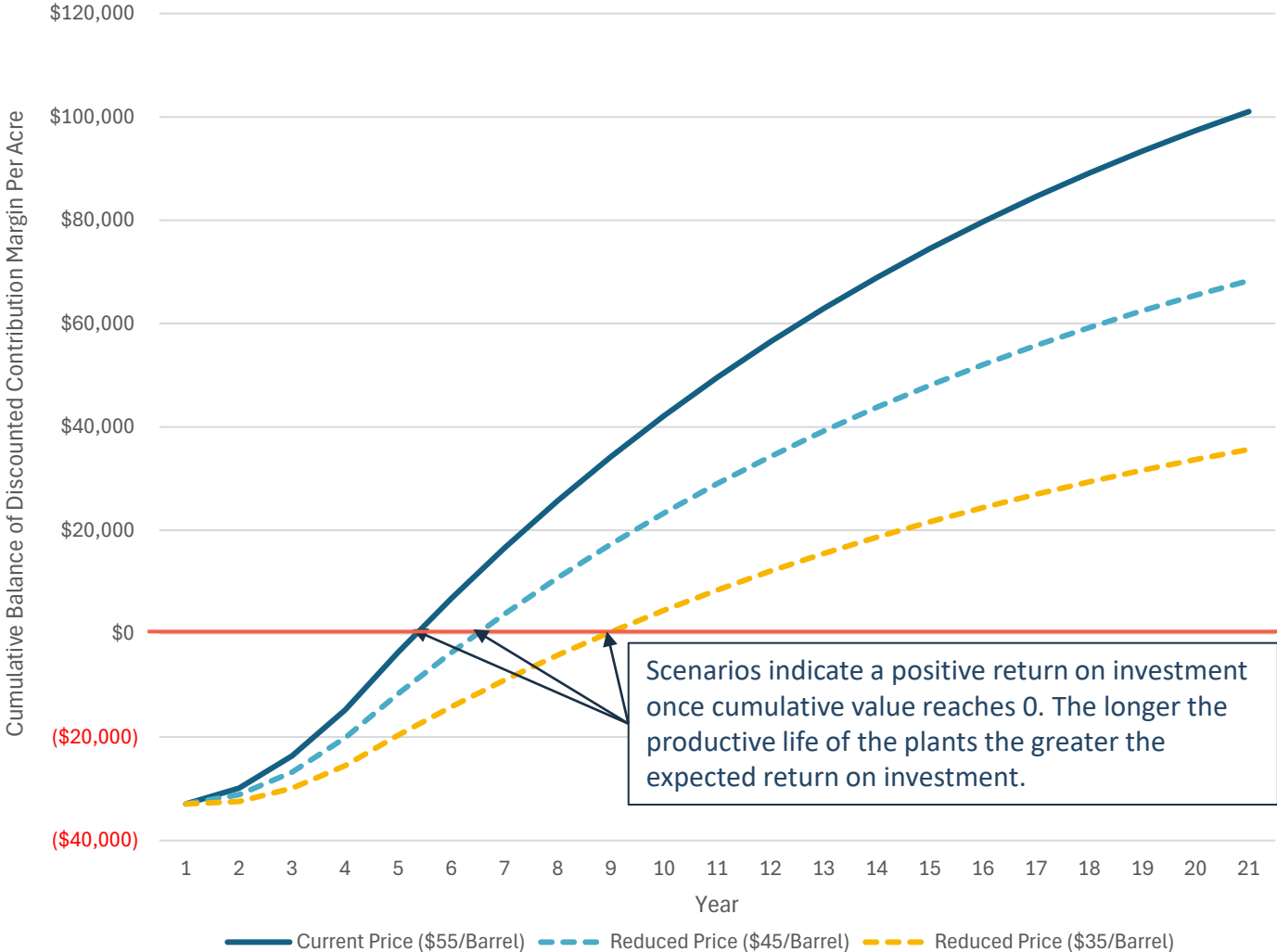
Payback Period Scenario Analysis

- 1. Price received is \$55/acre reflecting current pricing
- 2. Price received is \$45/acre reflecting an 18% decrease in price
- 3. Price received is \$35/acre reflecting an 36% decrease in price

As new varieties substantially increase the yield per acre there may be concern that the industry will face oversupply challenges which have occurred previously. Modeling the expected yields against decreased prices suggests that growers could absorb some price reduction if increased yields are maintained.

All three scenarios generate a positive return on investment over the 20-year period examined, with payback achieved in years 6, 7, & 9, respectively.

Scenario Analysis Estimated Payback Period to Renovate An Acre



Scenarios indicate a positive return on investment once cumulative value reaches 0. The longer the productive life of the plants the greater the expected return on investment.

See Appendix D for All Assumptions

SCENARIO ANALYSIS OF RENOVATIONS

Accumulated Contribution Margin Scenario Analysis

1. Renovated with plugs of a high yield variety
2. Renovated with productive Stevens vines
3. Maintain existing field, below average production

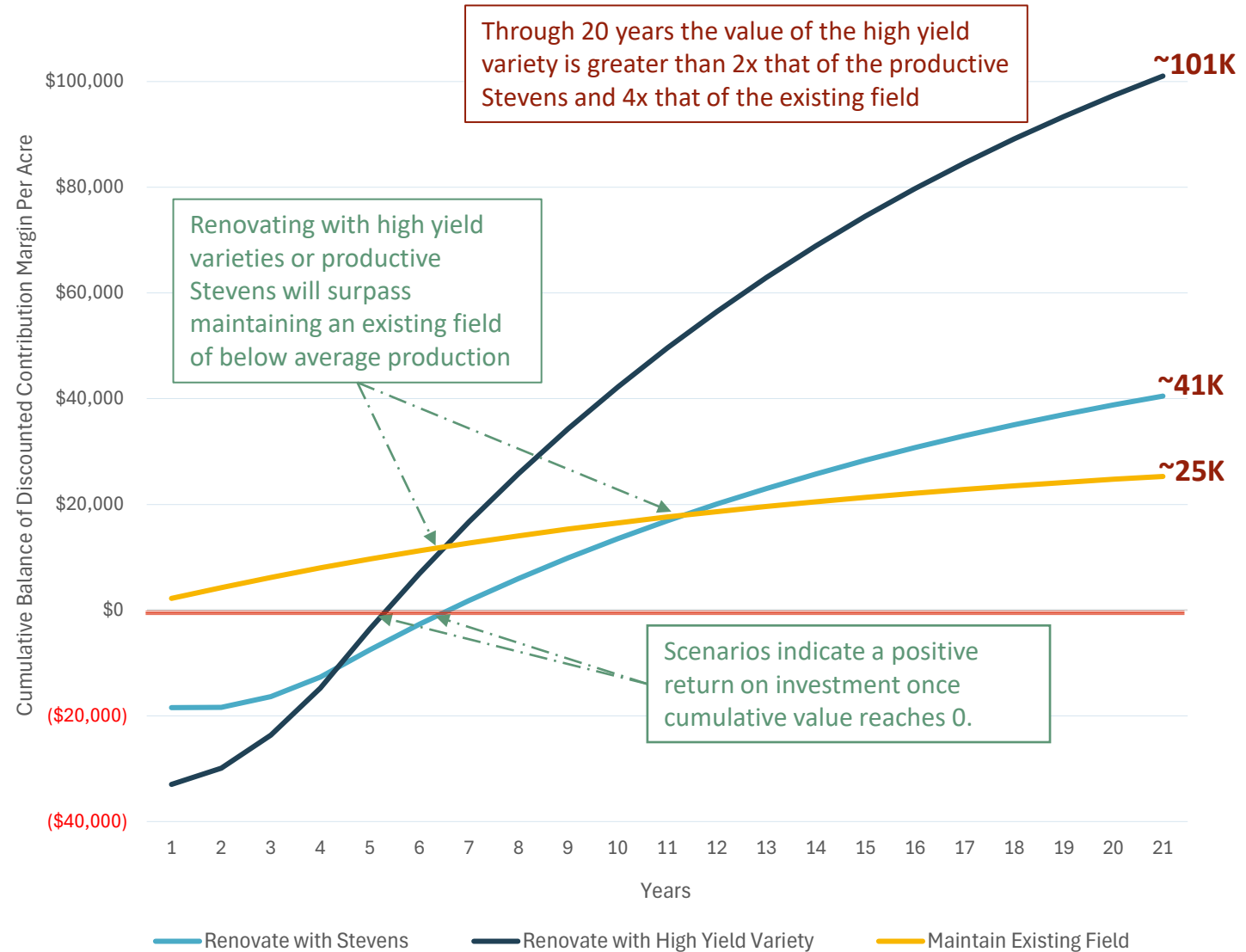
As noted, growers will have options when renovating fields. The analysis illustrates how renovating with a newer, high yielding, variety significantly increases the value of the field when compared to maintaining an existing field with below average production or renovating with productive Stevens.

Key Assumptions

- Price per barrel received and production costs held constant for all scenarios
- High yield = 349 barrels/acre
- Productive Stevens = 204 barrels/acre
- Existing field = 120 barrels/acre

See Appendix D for All Assumptions

Scenario Analysis of Estimated Payback Period of Renovations



CONTRIBUTION MARGIN SENSITIVITY ANALYSIS

Assuming production costs remain relatively stable contribution margin can be increased by increasing the yield or price received

Increasing Yield

- Renovating unproductive fields with higher yielding varieties is the most impactful means of increasing yield.
- Maintaining horticulture practices such as pruning, appropriate spraying, and pollination among others can increase the plant production while also reducing loss.

Increasing Price

- Moving more product to Fresh vs. Processed will generally result in higher prices but the market for fresh is limited and not an option for most cranberries produced.

Sensitivity Analysis

The sensitivity analysis below illustrates how changes in yield and price can will impact the contribution per acre. This analysis assumes the production costs per acre remains the same in each scenario (\$4,387 per acre).

Contribution per Acre		Price/Barrel		
		\$ 45	\$ 55	\$ 65
Yield Barrels /Acre	120	\$ 1,013	\$ 2,213	\$ 3,413
	200	\$ 4,613	\$ 6,613	\$ 8,613
	280	\$ 8,213	\$ 11,013	\$ 13,813
	360	\$ 11,813	\$ 15,413	\$ 19,013

COSTING ESTIMATES FOR FIXED AND VARIABLE COSTS

Costs Estimates

- Variable production costs are largely driven by the price of inputs such as fertilizer, pesticides, labour and fuel.
- The use of vehicles and machinery results in costs related to repairs, licenses, insurance and other costs required for operation and maintenance.
- Renovation costs assume that essential infrastructure such as pumphouses, dikes etc. are in place and will not be added or replaced. If required, the cost to renovate is likely to increase significantly.
- Fixed costs are a result of repayment of investment and additional overhead costs such as administrative costs, interest, land etc. These costs will vary significantly based on the grower.

Estimated Variable Costs per Acre

Production Costs/Acre	\$ 3,372
Attributed Machine & Repair Cost/Acre	\$ 1,014

See Appendix A, Appendix B & Appendix C

Estimated Fixed Costs per Acre

Renovation Costs – Purchase Plugs	\$ 30,322
Renovation Costs – Own Vine Clipping	\$ 15,830
*Overhead Costs	TBD

**Overhead costs including administration costs, interest, land etc. could not reasonably be estimated per acre as they would vary greatly depending on the grower and the structure and size of their operations.*

4. APPENDIX SECTION

APPENDIX A – ESTIMATED COST OF RENOVATING WITH PURCHASED PLUGS

Assumptions & Data Sourcing

Renovate with Purchased Plugs	
Scalping/Leveling/Fill	\$ 2,645
Drainage/Irrigation/Lines	\$ 5,160
Planting	\$ 3,351
Plugs	\$ 14,702
Shipping	\$ 1,764
Patent/License	\$ 2,700
Total Estimate	\$ 30,322

1. Costs associated with Scalping, Leveling, Fill, Trenching, Drainage, Lines, and Planting are based on the BC Cranberry Return on Investment Model, and discussions with industry professionals. Where existing resources were available and used, increases in costs were calculated applying Stats Canada Agriculture Inputs Indexes specifically for British Columbia.
2. Plug prices are based on a cost of \$0.25USD per plug based on discussions with propagators and industry professionals.
3. Calculations are based on 43,560 plugs per acre based on discussions with propagators and industry professionals.
4. Shipping costs were estimated at a cost of \$0.03USD per plug based on information provided by propagator.
4. Patents & License fees were estimated at \$2,000 USD per acre. These fees can range from \$1,500 USD to \$2,500 USD depending on several factors such as the variety, the propagator purchased from, and whether the grower is a member of a co-operative or other group which may receive favorable rates.
5. All costs in the table to the left are in CAD. USD was converted to CAD at a rate of \$1.35 CAD to \$1.00 USD, the Bank of Canada exchange rate at the time of conversion, January 23rd, 2024.
6. This estimate assumes only renovation to existing acres and does not include core infrastructure costs, such as pumps and pump houses, which can significantly increase the cost of a renovation.

Source: BC Cranberry Marketing Commission. (2020)²⁵, Statistics Canada. (2024)^{3,5}

APPENDIX B – ESTIMATED COST OF RENOVATING WITH OWN SOURCE VINES

Assumptions & Data Sourcing

Renovate with Own Source Vines	
Scalping/Leveling/Fill	\$ 3,362
Trenching/Drainage/Lines	\$ 4,800
Spread Vine	\$ 1,018
Patent/License	\$ 2,700
Loss on Clippings	\$ 3,950
Total Estimate	\$ 15,830

1. Costs associated with Scalping, Leveling, Fill, Trenching, Drainage, Lines, and Spreading Vines are based on existing cranberry budget resources and discussions with industry professionals. Wages used in calculations were based on Stats Canada employee wages by industry, specifically British Columbia agriculture.
2. Loss on clippings are calculated using an estimated yield per acre of 349 barrels for the field being clipped, at a price of \$55/acre. Losses are assumed to have occurred over a three-year period; Year 1 – 100% loss, Year 2 – 50% loss, Year 3 – 25% loss. These losses total \$33,951. Assuming the clippings of 1 acre can be used to renovate 8.5 other existing acres the total loss per clippings for each acre renovated will be \$3,950 (\$33,951/8.5)
4. Patents & License fees were estimated at \$2,000 USD per acre. These fees can range from \$1,500 USD to \$2,500 USD depending on several factors such as the variety, the propagator purchased from, and whether the grower is a member of a co-operative or other group which may receive favorable rates.
5. All costs in the table to the left are in CAD. USD was converted to CAD at a rate of \$1.35 CAD to \$1.00 USD, the Bank of Canada exchange rate at the time of conversion, January 23rd, 2024.
6. This estimate assumes only renovation to existing acres and does not include core infrastructure costs, such as pumps and pump houses, which can significantly increase the cost of a renovation.

APPENDIX C – ESTIMATED ANNUAL PRODUCTION COSTS

Table A.) Annual Production Cost – Used in Modelling

Production cost per Acre \$ 3,372

Table B.) Annual Production Cost per Grower Survey

Production cost per Acre \$ 3,358

Table C.) Annual Production Cost per Acre – Updated BC Return on Investment Model

	2024 Estimate	Included in Year 1 Production Cost
Fertilizer	283	Yes
Herbicide	566	Yes
Insecticide	477	Yes
Fungicide	119	Yes
Labour General	535	Yes
Labour Harvest	267	
Fuel	639	Yes
Pollination	307	
Pruning	107	
Tissue Sampling	25	
IPM Consulting	61	
Total Production Cost/Acre	\$ 3,387	
Total Year 1 Production Costs	\$ 2,619	

Table D.) Allowance for repairs, licenses and insurance, machinery and motor vehicles

Per Acre \$ 1,014

Assumptions & Data Sourcing

1. Table A - Annual production costs per acre of \$3,372 is the average of the estimates identified in notes 2, and 3.
2. Table B - Production Costs per Acre - \$3,358 per acre – A calculated weighted average based on responses received in the Grower Survey. Respondents were asked for their production costs, any costs that are required to produce, harvest and deliver crop such as labour, fertilizers, pesticides, pollination, transportation, fuel, etc. not including overhead costs such as bank loans, interest, office costs, insurance etc. The weighted average received was \$3,358 per acre.
3. Table C - Annual expenses in the BC Cranberry Return on Investment Model were updated to reflect cost estimates in 2024.
 - 2024 costs (excluding wages) were calculated by adjusting 2020 costs using Stats Canada's Farm input price index, quarterly.
 - Wages were adjusted using Stats Canada Employee wages by industry, annual, specifically for British Columbia agriculture
 - For categories where British Columbia specific index numbers were available those were applied
 - For categories which British Columbia specific index numbers were not available the Canadian index was applied
4. Costs identified as Year 1 Production Costs were included in the model as costs that growers would incur above and beyond the renovation costs identified in Appendixes A & B. These are production costs that are expected to be incurred even the year of a replant.
5. Table D - An allowance for repairs, licenses and insurance, machinery, and motor vehicles expenses was calculated using a multiplier from Stats Canada Farm operating revenues and expenses, annual data. Using the 2022 data for British Columbia fruit and tree nut farming, approximately \$0.30 was spent on repairs, licenses and insurance, machinery, and motor vehicles expenses for every \$1.00 spent on crop production and fuel expenses. The calculated average production cost of \$3,372 x 30% = \$1,014 per acre.

Source: BC Cranberry Marketing Commission. (2020)²⁵, Statistics Canada. (2024)^{3,5}, Statistics Canada. (2023)²⁶

4. APPENDIX D – ASSUMPTIONS FOR PAYBACK CALCULATION

1. Yield per Acre of High Yield Varieties –349 barrels per acre – Based on the data provided in “BC Cranberry Variety Assessment 2022 Final Report”, the seven-year average (2015-2022) of the estimated marketable yields of the following varieties; Crimson Queen, Mullica Queen, Welker, Haines, Vasanna, and Valley King. These varieties were selected to be included in the high yield variety average as they were all identified as varieties that growers intended to plant in the growers survey.
2. Yield per Acre of productive Stevens – 204 barrels per acre – Based on the data provided in “BC Cranberry Variety Assessment 2022 Final Report”, the five-year average from(2018-2022)of estimated marketable yield of Stevens.
3. Yield per Acre of Below Average Production – 120 barrels per acre – Selected as an example that produces below provincial average but is still expected to generate a positive contribution margin.
4. Average Price Received - \$55 per Barrel - Calculated based on grower survey responses. The weighted average price per barrel received for 2023 based on the results of the growers survey was \$41.04 USD per barrel. Converted to CAD at a rate of 1.35 CAD to USD, the converted price per barrel is \$55.41, rounded to \$55.
5. Production Costs per Acre - \$3,372 per acre - Calculated based on grower survey responses and external research. Respondents were asked for their production costs, any costs that are required to produce, harvest and deliver crop such as labour, fertilizers, pesticides, pollination, transportation, fuel, etc. not including overhead costs such as bank loans, interest, office costs, insurance etc. The weighted average received was \$3,358 per acre. The BC Cranberry Return on Investment Model was updated to reflect 2024 costs and had production costs of \$3,387 per acre. The average of these two numbers (\$3,358 and \$3,387) was taken as the production costs per acre. See Appendix C for details.
6. Production Costs in Year 1 - \$2,619 per acre – Based on the 2024 costs estimates of the BC Cranberry Return on Investment Model as discussed in Note 5, the cost items expected to be incurred in the year of planting were identified and included as production costs in the year of replant. See Appendix C for details.
7. Machinery & Equipment costs - \$1,014 per acre - An allowance for repairs, licenses and insurance, machinery, and motor vehicles expenses was calculated using a multiplier from Stats Canada Farm operating revenues and expenses, annual data. Using the 2022 data for British Columbia fruit and tree nut farming, approximately \$0.30 was spent on repairs, licenses and insurance, machinery, and motor vehicles expenses for every \$1.00 spent on crop production and fuel expenses. The calculated average production cost of \$3,372 x 30% = \$1,014 per acre. See Appendix C for details.
8. Renovation costs of an acre using purchased plugs was estimated at \$30,322. See Appendix A for details.
9. Renovation costs of an acre using own source vines was estimated at \$15,830. See Appendix B for details.
10. Costs per Acre in Year 1 is the renovation costs and the associated Year 1 production costs. See Appendix C for details.
11. Bank of Canada Prime Rate – 7.2% - was taken as of January 24th, 2024.
12. Yield for Years 1 through 5 was estimated based on discussions with industry professionals and secondary research. Using a conservative estimate it is assumed that a new field will produce at 0% in Year 1, 40% in Year 2, 60% in Year 3, 80% in Year 4 and 100% from year 5 onwards.
13. Additional fixed costs and overhead vary significantly by grower and were not included in this calculation

4. APPENDIX D (CONTINUED) – FINANCIAL TABLES FOR PAYBACK PERIOD ANALYSIS

Data Tables – Scenario Analysis, Replant with High Yield, Stevens or Maintain Existing

Replant with High Yield Variety			
Year	Yield	Revenue	Expenses
1	-	-	32,941
2	140	7,680	4,387
3	209	11,520	4,387
4	279	15,359	4,387
Year 5 & Beyond	349	19,199	4,387

Replant with Productive Stevens			
Year	Yield	Revenue	Expenses
1	-	-	18,449
2	82	4,487	4,387
3	122	6,730	4,387
4	163	8,973	4,387
Year 5 & Beyond	204	11,217	4,387

Maintain Existing Field – Below Average Production			
Year	Yield	Revenue	Expenses
1	120	6,600	4,387
2	120	6,600	4,387
3	120	6,600	4,387
4	120	6,600	4,387
Year 5 & Beyond	120	6,600	4,387

Data Tables – Replant with High Yield Variety & Reductions In Price Received

Price Received - \$55/Barrel			
Year	Yield	Revenue	Expenses
1	-	-	32,941
2	140	7,680	4,387
3	209	11,520	4,387
4	279	15,359	4,387
Year 5 & Beyond	349	19,199	4,387

Price Received - \$45/Barrel			
Year	Yield	Revenue	Expenses
1	-	-	32,941
2	140	6,283	4,387
3	209	9,425	4,387
4	279	12,567	4,387
Year 5 & Beyond	349	15,709	4,387

Price Received - \$35/Barrel			
Year	Yield	Revenue	Expenses
1	-	-	32,941
2	140	4,887	4,387
3	209	7,331	4,387
4	279	9,774	4,387
Year 5 & Beyond	349	12,218	4,387

9. APPENDIX I - GROWERS SURVEY

Question	Response Options/Question Type	Responses
1. How significant are cranberries to your total farming activities? (Select one)	"Cranberries are the only crop we farm.", "Cranberries make up most of our farming.", "Cranberries make up some of our farming.", "Cranberries make up a little of our farming."	10
2. How many acres of cranberries do you farm?	Open-ended	10
3. How many barrels of cranberries did you harvest and deliver in each year below?	"2023 harvest", "2022 harvest ", "2021 harvest", "2020 harvest", "2019 harvest"	9
4. In 2023, how many of the barrels were harvested using the methods below?	"Dry Harvest", "Wet Harvest"	10
5. What % of your crop is typically harvested using dry harvest and wet harvest?	"Dry Harvest %", "Wet Harvest %"	10
6. Please indicate the cranberry varieties that you currently have planted and what percentage of your total acreage they represent. Please ensure that the total sums up to 100%.	Ben Lear %, Bergman %, BG %, Crimson Queen %, Demoranville %, Grygleski Hybrids %, Haines %, Mullica Queen %, Pilgrim %, Stevens %, Valley king %, Vasanna %, Welker %, Other (please specify the variety and %), Other (please specify the variety and %), Other (please specify the variety and %)	9
7. What is the status of your cranberry plants by acreage? Please ensure that the total sums up to 100%.	Healthy %, Damaged (Ex. Frost, Harvest, Pump Damage) %, Diseased (Ex. Insect, Pathogen) %, Unproductive and why? (Ex. Vine Purity, Field Decline) %, Unplanted area %	9
8. For healthy acres, what percent of your crop falls into the following age categories? Please ensure that the total sums up to 100%.	0 to 4 years old %, 5 to 10 years old %, 10 to 20 years old %, 20+ years old %	9
9. What percent of your cranberry sales are in the following categories? Please ensure that the total sums up to 100%.	Processed %, Fresh %	10
10. Are you an Agency Grower?	Yes/No	10
11. Are you a Grower/Vendor?	Yes/No	10
12. How many barrels did you sell this season through each of the market channels identified below? (Numeric answers by category)	Agency, Selling Direct to Grocery Stores, Selling Direct to Consumers, Other (please specify)	10
13. What is the average price per barrel you received this season for sales to each of the following? (Numeric answers by category)	Agency \$ per barrel, Selling Direct to Grocery Stores \$ per barrel, Selling Direct to Consumers \$ per barrel, Other (please specify) \$ per barrel	8
14. How many barrels of cranberries do you estimate were lost due to production and/or harvest issues in each year below (ex. Tip Worm, Drought, Machine Damage etc.) (Please provide a numeric answer)	"2023 harvest", "2022 harvest ", "2021 harvest", "2020 harvest", "2019 harvest"	8
15. For the losses mentioned above, what percentage of the loss do you estimate are the result of the following causes? Please ensure that the total sums up to 100%.	Weather Conditions (e.g., drought, frost, flood) %, Insect Issues %, Disease or Fungal Issues %, Weed Issues %, Pollination Issues %, Harvest Water Supply Issues %, Other Factors (please specify factor and quantity) %, Other Factors (please specify factor and quantity) %, Other Factors (please specify factor and quantity) %	10

9. APPENDIX I - GROWERS SURVEY (CONTINUED)

Question	Response Options/Question Type	Responses
16. How many barrels of harvested cranberries do you estimate were unsellable or rejected in each year below (Please provide a numeric answer)	"2023 harvest", "2022 harvest ", "2021 harvest", "2020 harvest", "2019 harvest"	9
17. For the losses mentioned above, what percentage of the loss do you estimate are the result of the following causes? Please ensure that the total sums up to 100%.	Poor/Fruit Rot %, Discoloration/White Fruit %, Other Factors (please specify factor and quantity)%, Other Factors (please specify factor and quantity)%, Other Factors (please specify factor and quantity)%	10
18. How many of your existing acres do you intend to replant?	In the next 2 years, In the next 3 to 5 years	9
19. How many new acres do you intend to plant?	In the next 2 years, In the next 3 to 5 years	9
20. What varieties do you intend to plant?	Ben Lear %, Bergman %, BG %, Crimson Queen %, Demoranville %, Grygleski Hybrids %, Haines %, Mullica Queen %, Pilgrim %, Stevens %, Valley king %, Vasanna %, Welker %, Other (please specify the variety and %), Other (please specify the variety and %), Other (please specify the variety and %)	6
21. What are your main reasons for selecting the varieties you choose to plant?	Open-ended	7
22. What were your cranberry production costs in the past year? Production costs are any costs that are required to produce, harvest and deliver crop such as labour, fertilizers, pesticides, pollination, transportation, fuel, etc. Please do NOT include overhead costs such as bank loans, interest, office costs, insurance etc. Please specify the total amount in Canadian dollars (CAD) or the cost per acre, as you prefer.	Open-ended	8
23. What are the challenges you encounter or foresee in your cranberry farming activities, particularly in meeting market demand and replanting efforts?	Open-ended	8
24. How could your cranberry growing operation be further supported to increase the value of your crop?	Open-ended	8

5. REFERENCES

REFERENCES & READING LIST

1. Ferrence & Co. (2020). *Market Opportunities Assessment for BC Berries*. Vancouver: Canadian Agricultural Partnership.
2. Government of Canada. (2022, December). *Statistical Overview of the Canadian Fruit Industry 2021*. Retrieved from Government of Canada: <https://agriculture.canada.ca/en/sector/horticulture/reports>
3. Statistics Canada. (2024, January 05). Retrieved from StatCan: Table 14-10-0064-01 Employee wages by industry, annual
4. Statistics Canada. (2023, May 31). Retrieved from StatCan: Table 32-10-0053-01 Supply and disposition of food in Canada (x 1,000)
5. Statistics Canada. (2024, January 16). Retrieved from StatCan: Table 18-10-0258-01 Farm input price index, quarterly
6. Statistics Canada. (2024, January 08). *Canadian International Merchandise Trade Web Application*. Retrieved from Statistics Canada: <https://www150.statcan.gc.ca/n1/pub/71-607-x/71-607-x2021004-eng.htm>
7. Statistics Canada. (2023, February 16). Retrieved from StatCan: Table 32-10-0364-01 Area, production and farm gate value of marketed fruits
8. Prasad, R. (2023). *BC Cranberry Variety Assessment 2022 Final Report*. BC Cranberry Growers Associate and BC Cranberry Research Farm Society. <https://www.bccranberries.com/growers/research-project-results/>
9. Behm, S., & Michel, T. (2020, September 9). *2020 cranberry outlook - cranberry industry growth fueled by consumer demand and efficiency gains* | FCC. <https://www.fcc-fac.ca/en/knowledge/economics/2020-cranberry-outlook>
10. Raymond, J. (2020, November 25). *Too Many Cranberries*. <https://asmith.ucdavis.edu/news/too-many-cranberries#:~:text=In%202019%2C%20the%20USDA%20imposed,according%20to%20the%20USDA's%20ERS.>
11. BC Cranberry Marketing Commission. (2023, March). *ANNUAL REPORT 2022*. <https://www.bccranberries.com/wp-content/uploads/2023/03/2022-cranberry-Marketing-Annual-Report-WEB.pdf>
12. BC Cranberry Marketing Commission. (2022, March). *ANNUAL REPORT 2021*. <https://www.bccranberries.com/wp-content/uploads/2022/03/2021-BCCMC-FINAL-Digital-1.pdf>
13. Jones, T. (2002, November 3). Cranberry Farmers Struggle To Escape Slough of Surplus. *The Washington Post*. <https://www.washingtonpost.com/archive/politics/2002/11/03/cranberry-farmers-struggle-to-escape-slough-of-surplus/a8aac06b-fed4-46bb-a381-fcaee57714b4/>
14. United States Department of Agriculture. (2023). *Noncitrus Fruits and Nuts 2022 Summary* (ISSN: 1948-2698). National Agricultural Statistics Service. <https://downloads.usda.library.cornell.edu/usda-esmis/files/zs25x846c/zk51wx21m/k356bk214/ncit0523.pdf>
15. United States Department of Agriculture. (2021). *Noncitrus Fruits and Nuts 2020 Summary* (ISSN: 1948-2698). National Agricultural Statistics Service. <https://downloads.usda.library.cornell.edu/usda-esmis/files/zs25x846c/sf269213r/6t054c23t/ncit0521.pdf>
16. United States Department of Agriculture. (2019). *Noncitrus Fruits and Nuts 2018 Summary* (ISSN: 1948-2698). National Agricultural Statistics Service. <https://downloads.usda.library.cornell.edu/usda-esmis/files/zs25x846c/0z7096330/7s75dp373/ncit0619.pdf>
17. United States Department of Agriculture. (2017). *Noncitrus Fruits and Nuts 2016 Summary* (ISSN: 1948-2698). National Agricultural Statistics Service. <https://downloads.usda.library.cornell.edu/usda-esmis/files/zs25x846c/0z7096330/7s75dp373/ncit0619.pdf>
18. Cranberry Marketing Commission. (2023). *Per Capita Cranberry Consumption*. US Cranberries. <https://reports.uscranberries.com/Report/View/47>
19. Watters, A., & Higgins, H. (2018). *Canada: Canadian Processed Cranberry Exports Double in Five Years* (GAIN Report Number:CA18012). USDA Foreign Agricultural Service. https://apps.fas.usda.gov/newgainapi/api/report/downloadreportbyfilename?filename=Canadian%20Processed%20Cranberry%20Exports%20Double%20in%20Five%20Years_Ottawa_Canada_2-12-2018.pdf
20. Statistics Canada. (2024, January 09). *Canadian International Merchandise Trade Web Application*. Retrieved from StatCan: <https://www150.statcan.gc.ca/n1/pub/71-607-x/71-607-x2021004-eng.htm>
21. Kramer, J., Simnitt, S., & Calvin, L. (2021). *Fruit and Tree Nuts Outlook: September 2021* (FTS-373). United States Department of Agriculture. <https://www.ers.usda.gov/webdocs/outlooks/102267/fts-373.pdf?v=8594#:~:text=U.S.%20tree%20nut%20supplies%20in,grower%20prices%20for%20these%20crops.>
22. Weber, C., Simnitt, S., Wechsler, S., & Wakefield, H. (2023). *Fruit and Tree Nuts Outlook: September 2023* (FTS-377). United States Department of Agriculture. <https://www.ers.usda.gov/webdocs/outlooks/107540/fts-377.pdf?v=8531.1>
23. Jones, C. (n.d.-b). *Business Planning and Economics of Cranberry Bog Establishment and Cost of Production in Nova Scotia*. Nova Scotia Department of Agriculture. <https://novascotia.ca/agri/documents/business-research/CranberryReport.pdf>
24. BC Cranberry Marketing Commission. (n.d.). *Frequently Asked Questions*. Retrieved January 19, 2024, from <https://www.bccranberries.com/consumers/faq/>
25. BC Cranberry Marketing Commission. (2020). *RETURN ON INVESTMENT MODEL* [Excel Workbook]. https://www.bccranberries.com/wp-content/uploads/2020/02/BC-Cranberry-Return-on-Investment-Calculator-V9-final-2_3_20.xlsx
26. Statistics Canada. (2023, December 06). Retrieved from StatCan: Table 32-10-0136-01 Farm operating revenues and expenses, annual

BC CRANBERRY GROWERS' ASSOCIATION

Perennial Crop Renewal Program - Sector Development

Thank you,

Scott A. Beaton, CPA, CFA

D: 778-900-4534 **M:** 250-575-8377

Scott@BeatonRettich.com

Myles Evans

D: 778-900-4536

Myles@BeatonRettich.com

BEATON
RETTICH
WATERS
BETTER ORGANIZATIONS