GF2 Project Plan

PROGRAM AREA: BIOSECURITY AND SURVEILLANCE	PROJECT: SURVEILLANCE OF CRANBERRY FRUIT ROT PATHOGENS, THEIR IMPACT & GROWER EDUCATION	DURATION: 4 YEARS
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A. Introduction

Surveillance of Plant Pathogens in Cranberry Fields in the Fraser Valley, their Impact on Pre- and Post-harvest Fruit Rot and Grower Education

The cranberry industry is one of the largest agri-industries in British Columbia (BC), producing cranberries for local, national and international markets. Cranberry production is concentrated in the lower Fraser Valley and on Vancouver Island, accounting for approximately 8% of cranberry production (2400 hectares in production, 43 million kg valued at $42-50 million) in North America.

Protecting cranberries from invasive plant pests, with the emphasis on plant pathogens responsible for pre- and post-harvest fruit rots, is important to sustain productivity and quality of cranberry production in BC and, thus, maintain market access locally and internationally. There is very limited knowledge of the incidence and distribution of critical plant pathogens responsible for fruit-rot and their impact on cranberries in BC. As a result, disease management strategies adopted by the growers often fail to minimize the impact of critical plant pathogens associated with pre- and post-harvest fruit rot, resulting in poor fruit quality and significant yield losses. BC cranberry industry has recognized the need for timely detection of critical plant pathogens, both established and invasive, on cranberry and development of appropriate management strategies to mitigate them and, thereby, ensure crop quality, market access and industry stability.

Project Overall Objective:

The purpose of the project is to understand the impact of fruit rot pathogens on cranberry production and transfer knowledge and educate growers and other interest groups in BC on timely detection of critical plant pathogens responsible for fruit loss and steps to be taken to mitigate the risks of introduction and spread of such pathogens. BC Cranberry growers will have the knowledge and tools to effectively mitigate risks, thus increase fruit quality and productivity.

Activity	Deliverable(s)	Duration/Deadline
Year 1 (2013/2014)		
1.1. Conduct existing literature review on critical plant pathogens, associated diseases and their impact on cranberry and management strategies. - existing knowledge/information on pathogens associated with pre- and post-harvest fruit rot diseases of cranberry - epidemiology of plant pathogens associated with pre- and post- harvest fruit rot diseases of cranberry - control/management strategies available for preventing/ minimizing pre- and post-harvest fruit rot diseases of cranberry 1.2. Characterize and identify the fungal pathogens isolated from cranberry fruit from fields in 2012, through a collaborative work with Agriculture and Agri-Food Canada, Agassiz.	A comprehensive *Literature Review* will analyze and document pre-existing knowledge of critical plant pathogens associated with pre- and post-harvest cranberry fruit rot – this information will contribute to the **Activities 3, 4, 5, 6, 7 & 8**	*1.1. November 14 – March 31, 2014 /March 31, 2014* *1.2. November 14 – March 31, 2014 / March 31, 2014*
Year 2 (2014/2015)		
2. Identify the prevalence, distribution and impact of critical plant pathogens (both invasive and established) responsible for cranberry fruit rot/spoilage in B.C. cranberry fields. *Surveillance:* minimum of 2-3 cranberry fields in each of 4 geographical locations (Delta, Richmond, Pitt Meadows, and Chilliwack) in the lower mainland will be included in the field surveillance/survey study. The study will include field observations, grower's input and sample collection. Field studies will focus on fruit rot incidence and distribution, pathogens associated with various fruit rot diseases, and their impact on cranberry production. *2.1.* Surveillance will be done at 2 to 4-week-interval from May 15th to October 31st, 2014. Cranberry samples will be collected periodically, every 2 to 4-week-interval during flowering, fruit set, fruit maturing, fruit ripening and harvest laboratory analysis. Sample size and number (replication) for each field will be determined based on cranberry production acreage. At harvest, two sets of samples will be collected; one for the laboratory analysis and one for incubation and assessment of fruit losses due to microbial infection. All relevant data will be collected and analyzed. *2.2. Laboratory analyses:* cranberry samples collected from the field will be analyzed as fallows for the presence of plant pathogens associated with both asymptomatic and symptomatic cranberries, a. incubation of samples followed by direct microscopic (morphological) examination b. isolation of pathogens associated with cranberry tissues on microbial growth media	A comprehensive *Research Report* will include the results from the Activities 2.1, 2.2, 2.3, 2.4, and 2.5 and discuss the prevalence, geographical distribution and impact of cranberry fruit rot diseases, both pre- and post-harvest, caused by plant pathogens in the lower mainland of BC. *Growers & other interest groups are educated*	2.1 April 1 – December 31, 2014 2.2. May 15, 2014 – December 31, 2014 2.3. September 1, 2014 – December 31, 2014 2.4. January 1, 2015 – February 15, 2015 2.5. February15, 2015 – March 15, 2015 2.6. February 2015

2.3. *Analyses of post-harvest fruit rot:* cranberry samples collected at harvest will be processed, as per the protocol used by cranberry fruit processing/packing facilities, incubated at ambient conditions and assessed for percentage fruit rot due to infection by plant pathogens. 2.4. *Identification/characterization of plant pathogens:* pathogens recovered from cranberry samples (steps 2.2a & 2.2b) will be identified by their morphology and/or using PCR-based genetic markers, DNA sequencing and GenBank-database analysis. *2.5. Data processing & Report writing:* Relevant data collected in Activities 2.1 to 2.4 will be analyzed for incidence, percent occurrence, and geographical distribution of the pathogens responsible for pre- and post-harvest fruit rot of cranberry. *2.6.* Knowledge transfer (please refer to section ***C – Communications Plan***)		
Year 3 (2015/2016)		
3.1. Repetition of Year 2 studies 3.2. Identify the pathways of introduction and spread (epidemiology) of critical cranberry fruit rot pathogens 3.3. Wherever applicable, adopt or develop timely detection tools/protocols to identify critical plant pathogens in cranberry fields. *3.4. Data processing & Report writing:* Relevant data collected in Activities 3.1 to 3.4 will be analyzed for incidence, percent occurrence, and geographical distribution of the pathogens responsible for pre- and post-harvest fruit rot of cranberry. 3.5. Knowledge transfer (please refer to section ***C – Communications Plan***)	Epidemiology of the critical cranberry pathogens are understood Timely detection methods for critical cranberry pathogens are known Growers & other interest groups are educated A comprehensive Research Report will include the results from the Activities 3.1, 3.2, 3.3, 3.4, and 3.5	*3.1. April 1, 2015 – December 31, 2015* *3.2. April 1, 2015 – December 31, 2015* *3.3. April 1, 2015 – December 31, 2015* *3.4.* February15, 2015 – March 15, 2016 3.5. March 2016
Year 4 (2016/2017)		
4.1. Develop and propose effective strategies to mitigate the introduction and spread of critical cranberry fruit rot pathogens 4.2. Final research report writing and submission 4.3. Knowledge transfer: Information gathered from activities 1-4 will be coordinated & communicated to cranberry growers and other interest groups via various outreach channels (please refer to section ***C – Communications Plan***)	*Preventative measures for pathogens' introduction and spread are strategized* A comprehensive Final Research Report will include the results and discussions from all 4 yearend interim reports *Growers & other interest groups are educated*	*4.1. April – December 2016* *4.2. March 15, 2017* *4.4. March 31, 2017*

B. Performance Measurement

Performance Indicator	Target	Measurement Activity
Survey of cranberry fields for fruit rot incidence and distribution	Periodic assessment of 6-9 fields during crop season for disease incidence.	Number of cranberry fields in each geographical location surveyed.
Information transfer and education via Cranberry growers' field days, Cranberry annual congress, North American Cranberry Research and Extension Workers' Conference, Plant pathology-related scientific forums	70-80 cranberry growers, 10-15 field scouts/ consultants, BC Cranberry Growers' Association, BC Cranberry Marketing Commission, 2-3 pesticide registrants, federal agencies, Representatives of other cranberry producing regions in North America	Number of representatives from each group as identified under "Target" attended.
Generate outreach material including information factsheet, interim and final research reports on ministry and industry websites and manuscript in peer-reviewed journal.	Cranberry growers, extension staff, industry associations, interest groups, pesticide and pest management companies	Number of commutation channels used to distribute information
Presentations at cranberry growers' field days, annual cranberry research congress both Canadian and North American and scientific conferences.		Number of representatives from each group as identified under "Target" attended.

C. Communications Plan

Communications Activity	Objective(s)	Target Audience	Approximate Date
<u>Presentations</u> 1. BC Cranberry Growers' Field days 2. BC's Annual Cranberry Congress 3. North American Cranberry Researcher & Extension Workers' Conference 4. Plant Pathology-related Scientific forums <u>Publications</u> 1. Ministry's Berry Production Guide 2. Factsheets & Reports on Ministry & Industry websites, and Manuscript in peer-reviewed journal (if applicable)	Educate & advise cranberry growers, industry associations, field extension workers & other interest groups on surveillance and prevention of critical cranberry pathogens responsible for fruit rots.	70-80 cranberry growers, 10-15 field scouts/consultants, BC Cranberry Growers' Association, BC Cranberry Marketing Commission, 2-3 pesticide registrants, 2 federal agencies, Representatives of other cranberry producing regions in North America, Other interest groups	*<u>Presentations</u>* *1. August 2014, August 2015 & August 2016* *2. February 2015, February 2016 & February 2017* *3. June 2015 & June 2017* *4. 2014, 2015, 2016 & 2017* *<u>Publications</u>* *1. March 2015 & March 2017* *2. March 2017*

D. Annual Program Budget

Federal Funding	Provincial Funding	Total

	Cash	In-kind	
Year 1 (2013/2014)	14,000		14,000
Year 2 (2014/2015)	56,000		56,000
Year 3 (2015/2016)	80,000		80,000
Year 4 (2016/2017)	30,000		30,000
TOTALS	**180,000**		**180,000**

CALENDARIZATION OF COSTS

	Q1 Apr-June	Q2 July-Sept	Q3 Oct-Dec	Q4 Jan-Mar	Total
Year 1			*3,000*	*11,000*	*14,000*
Year 2	*15,000*	*15,000*	*16,000*	*10,000*	*56,000*
Year 3	*18,000*	*24,000*	*24,000*	*14,000*	*80,000*
Year 4	*10,000*	*10,000*	*5,000*	*5,000*	*30,000*

COST CATEGORY DISTRIBUTION

Cost Category	Federal Funding	Provincial Funding			Total
		Cash	In-kind	Total Provincial	
Program Costs (funds directly transferred to, or used for the direct benefit of, final recipients) – Year 1: (November 12, 2013 to March 15, 2014)					
STOB 50 – Salaries (include details)					
STOB 52 – Benefits					
STOB 57 – Staff Travel	500				500
STOB 60 – Professional Services (GSAs)					
STOB 65 – Office & Business Expenses					
STOB 69 – Lab Supplies	2,500				2,500
STOB 80 – Shared Cost Arrangements					
Subtotal Program Costs	3,000				3,000
Administration Costs (costs that arise from activities carried out to administer, audit and evaluate, or are otherwise related to, a GF2 program)					
STOB 50 – Salaries (include details) (wages – November 12, 2013 – March 15, 2014) Position # 106999 (Level 5)	9,000				9,000

STOB 52 – Benefits	2,000				2,000
STOB 60 – Professional Services (GSAs)					
STOB 65 – Office & Business Expenses					
Subtotal Administration Costs	11,000				11,000
TOTAL	**14,000**				**14,000**

AGRI time allocation:

Siva Sabaratnam 0.05 FTE

Mark Sweeney 0.02 FTE