Background Briefing Document

Organic Science Prioritization Process, Including Results of the Strategic Research Prioritization Process

Prepared by:

Nova Scotia Agricultural College
Turo, NS

Contact:
Andy Hammermeister
Manager, OACC
Email: ahammermeister@nsac.ca Phone: 902-893-8037

DRAFT

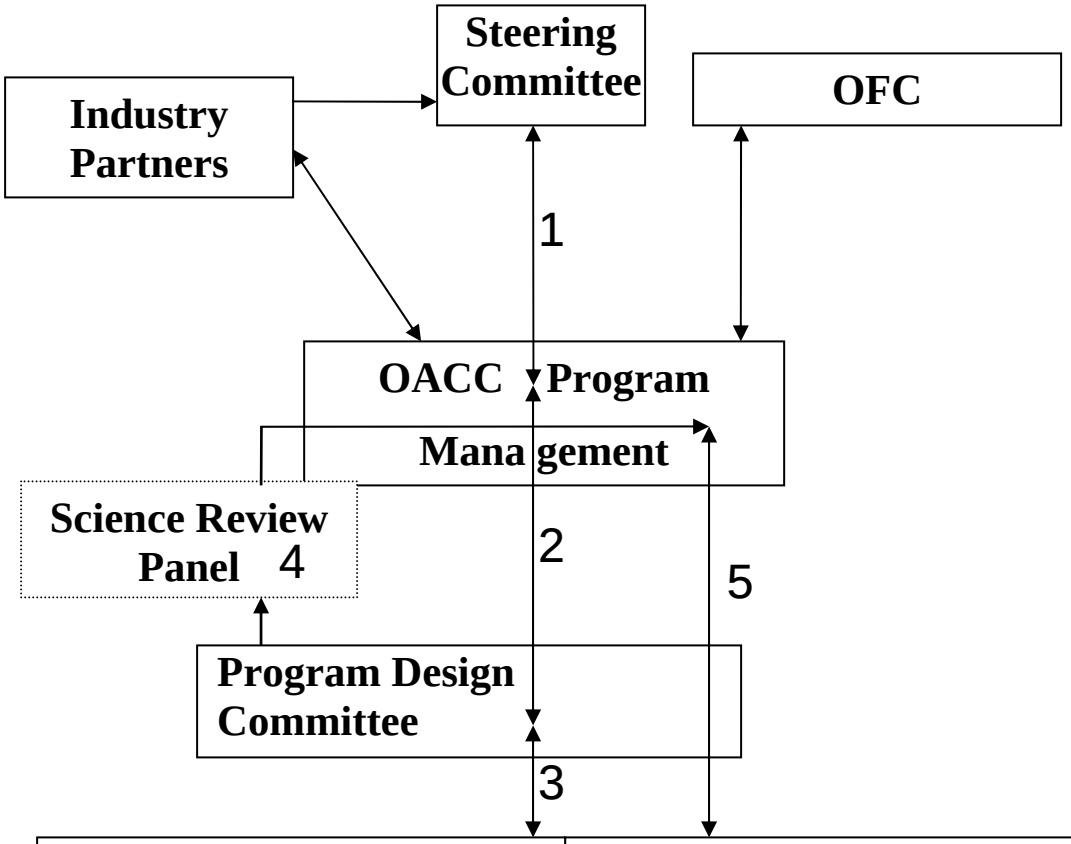
March 16, 2009

Table of Contents

The Organic Science Cluster

1. Part of Growing Forward
2. Sector oriented
3. National scope
4. Industry led
    a. Industry cash needed for matching
    b. Must meet the needs of industry (applied research)
5. Must be strategic
6. Must have deliverables with impact in 4 years
7. Organic is well positioned – we should apply ASAP after it is announced

Organic Cluster Research Design



Strategic Research Areas	Research Teams	
	University	AAFC
Cropping systems		
Dairy		
Greenhouses etc.		

Organic Cluster Research Design
— Oversight and/or influence and/or reporting
---- Cash flow
OFC – Organic Federation of Canada
SRA – Strategic Research Area
1. Steering Committee – Identifies strategic research areas, provides an advisory capacity and evaluates progress
2. OACC assembles Program Design Committee consisting of an AAFC and non-AAFC lead for each SRA
3. Program Design Committee – Program leaders identify research programs relating to their respective SRAs, assemble research teams, and works with the team to detail the design of research projects
4. Science Review Panel – Reviews research programs for scientific integrity and provides feedback through OACC to program leaders
5. OACC – Supports the administration of and management of research teams in each strategic area, prepares research agreements, coordinates distribution of funds, coordinates reporting

The Strategic Science Development Process

1. Trend analysis
2. Opportunities and Threats; Strengths and Weaknesses
3. Farmer survey
4. Prioritization process
    a. List of potential research questions
    b. Establishing criteria for success
    c. Rating the impact of research questions against criteria
    d. Prioritizing based on impact, likelihood of success and cost/time
5. Inventory of organic research(ers) in Canada
6. Cluster application

Science Categories, Impact Criteria, and Weighting

	Farmer gross margin	Increase capacity for sales	Increase production	Animal Welfare	Reduce envir. risk	Char. & support EG&S	Inform policy makers	Positive social climate	Evol. of organic
Soils	4	4	4		3	3	1	1	1
Plants	4	4	4		3	3	1	1	1
Animals	3	3	3	5	2	2	1	1	1
Ecol. Systems	2	2	2		6	6	1	1	1
Sustainability	2	2	2		6	6	1	1	1
Policy	1	1	1		3	3	4	4	4
Market	2	2	2		6	6	1	1	1
Health and Food	2	2	2		6	6	1	1	1

Identifying Strategic Research Areas – Considerations

1. Must increase **Profitability** and **Competitiveness** of Canadian agriculture (through **Transformative Innovation)**
2. Must be able to show **progress and impactful results** by 2013 (but some research can be longer term)
    a. Addresses **barriers**:
        i. Limiting transition
        ii. Limiting productivity/efficiency
        iii. Limiting market access
    b. Captures **opportunities**
        i. New markets
        ii. Trends in social, technological, economic, environmental, political
    c. Potentially **measureable** impact on indicators of profitability and competitiveness
        i. Retail sales
        ii. Farmer number, size, sales, costs, net return
    d. Note: impact extending beyond organic is very helpful
3. Must consider **feasibility**:
    a. Time
    b. Cost
    c. Likelihood of Success
    d. Scientists available
    e. Building on existing research programs

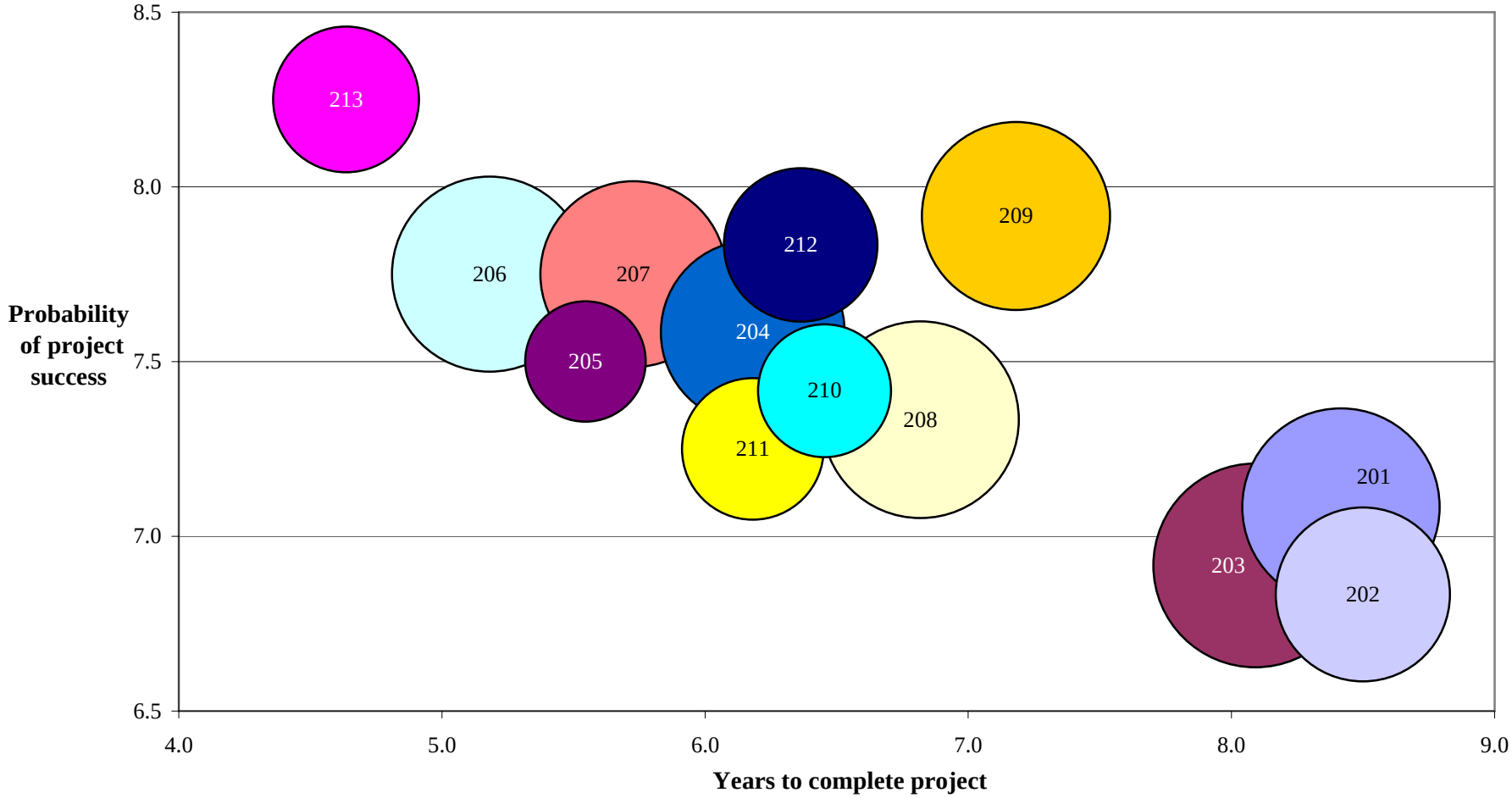
Recommendations:
A balance of projects is needed that produce short-term impactful results while also exploring and capturing the values (environmental, health, ethical, and social) that drive organic.
Need to identify:

1. Short-term high-impact projects that specifically address barriers with high likelihood of success (30%)
2. Innovative projects developing or testing products or tools that will increase competitiveness and profitability (lower likelihood of success) (20%)
3. Short-term projects which characterize environmental goods and services and efficiencies in production (higher likelihood of success) (15%)
4. Integrated projects which link management with ecological interactions among soil, plants and animals (longer term, lower likelihood of success) (35%)

Soils

Identifier	Farmer Rating	Project	impact
203-	FR 2/8	Identify integrated management practices to optimize soil quality as a substrate for crop growth	18.0
201-	FR 1/8	Identify or develop crop rotations that sustain soil fertility and meet overall regional yield averages	17.4
208-	FR 1/8	Identify integrated management practices for optimizing soil nitrogen in order to maximize economic crop yields	17.3
206-	FR 3/8	Develop nutrient budgeting tools that account for whole farm nutrient flows and/or nutrients contributed by different crops and amendments	17.2
209-	FR 3/8	Identify the risk of soil phosphorus depletion under regionally specific organic management systems and potential solutions for organic producers	16.6
207-	FR 7/8	Develop fertilization strategies for crops with high nutritional requirements while minimizing the environmental risk of applying excess nutrients	16.4
204-	FR n/a	Identify or develop organic farming techniques that can maintain soil quality and build soil organic matter with routine mechanical weed control	16.2
202-	FR 2/8	Explore specific cover crop sequences or mixtures interact with soil biota to stimulate plant resistance mechanisms and influence nutrient uptake	15.3
212-	FR n/a	Determine the amount and timing of nutrient release from different soil amendments and their efficacy in terms of improving plant nutrition	13.5
213-	FR n/a	Identify viable growing mediums and nutrient sources that are suitable for organic greenhouse and transplant production	12.9
211-	FR 6/8	Determine the nature and extent of deficiencies of macronutrients as possible links to the nutritional quality of foods	12.5
210-	FR 6/8	Determine the nature and extent of deficiencies of micronutrients and possible links to the nutritional quality of foods	11.7
205-	FR 4/8	Conduct efficacy testing on products marketed as soil microbial stimulants or biological enhancers	10.6

Prioritization of organic sector projects- Soils sector (n=27)



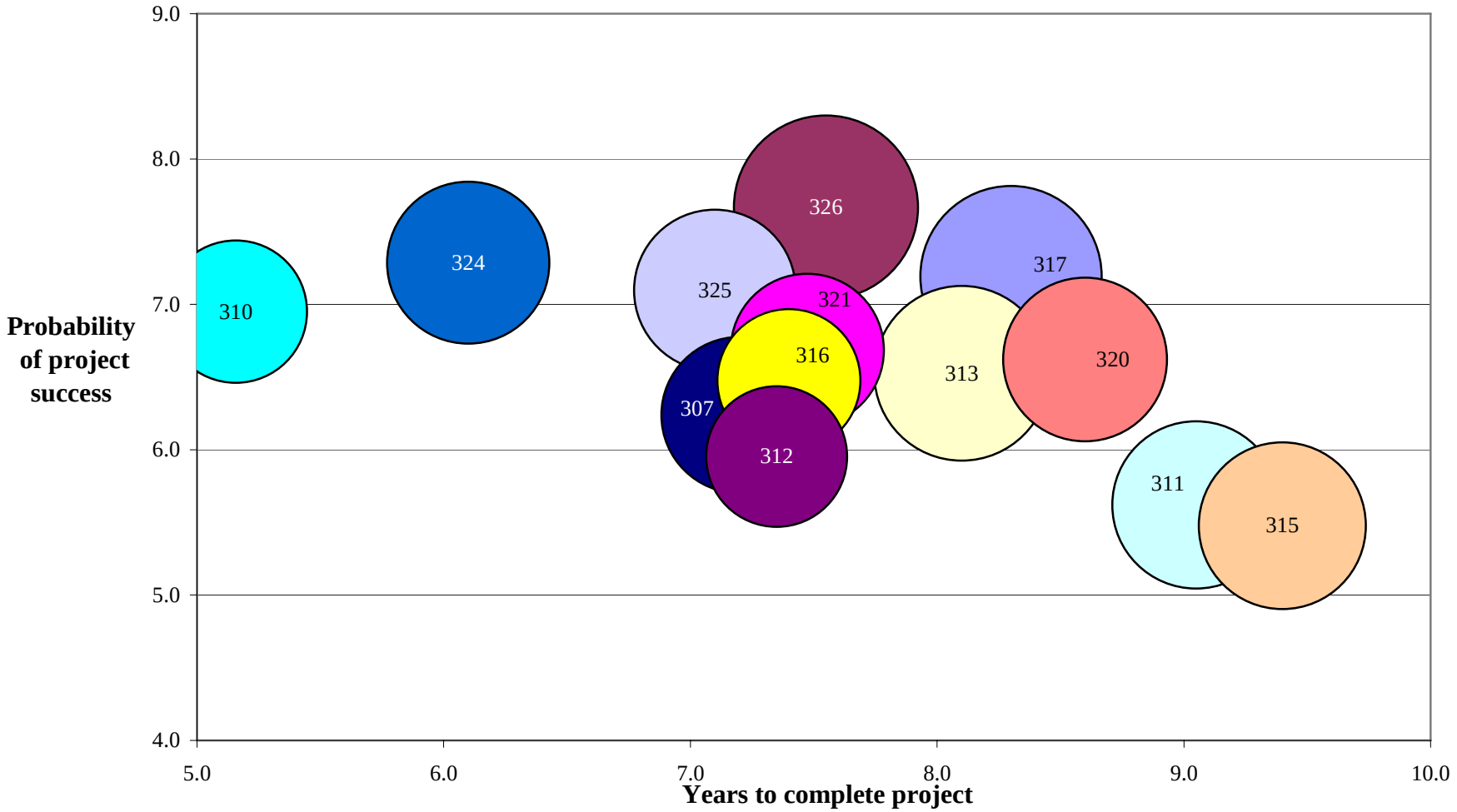
*FR entries in the legend refer to farmer ranks identified by the Final Results of the First Canadian Organic Farmer Survey of Research Needs in 2008

† QC entries in the legend refer to priority projects identified by the Organic Agriculture Committee of the Quebec Agriculture and Agri-Food Reference Centre

Plants

Identifier	Farmer Rating	Project	impact
326-	FR 1,2,3/20 (QC)	Identify and/or develop integrated approaches to weed management	17.7
317-	FR 1,2,7,8 & 18/20 (QC)	Integrated approaches to insect management to reduce yield losses due to disease by >80%.	17.5
313-	FR 9/20 (QC)	Integrated approaches to disease management to reduce yield losses due to disease by > 80%.	16.9
311-	FR 12/20 (QC)	Identify and/develop crop cultivars to reduce harvestable yield losses due to disease by >80 %.	16.2
315-	FR 12/20 (QC)	Identify and/or develop crop cultivars to reduce yield losses due to insects by at least 80 percent.	16.1
320-	FR 6,12/20 (QC)	Identify and/or develop crop cultivars with a competitive advantage against weeds.	15.8
324-	FR 10/20	Identify and/or develop mechanical, thermal or other weed controls to reduce losses by >80%.	15.6
325-	FR 10 and 16/20 (QC)	Develop reduced- and no-tillage organic systems of weed control & design suitable machinery.	15.6
307-	FR n/a	Develop marketable products and/or markets for cover crops used in organic management.	15.1
321-	FR 6,12/20 (QC)	Identify and/or develop cover crops with weed suppressive abilities.	14.8
316-	FR 20/20 (QC)	Identify and/or develop insect control products to reduce yield losses due to insects by >80%.	13.8
310-	FR n/a	Identify and/or develop organically acceptable means of reducing post-harvest storage losses.	13.7
312-	FR 18/20 (QC)	Identify and/or develop control products to reduce yield losses due to disease by at least 80 %.	13.6
318-	FR 5/20	Develop cultural practices to activate induced systemic resistance in crops.	13.4
327-	FR 2/20 (QC)	Refine soil fertility management systems to minimize weed pressure.	13.1
323-	FR 19/20 (QC)	Identify or develop weed control products with at least 80 percent efficacy.	12.7
319-	FR n/a	Develop insect pest thresholds for organic management systems.	12.7
314-	FR 18/20 (QC)	Analyze the risk of overuse of copper or sulphur fungicides and explore potential alternatives.	12.4
308-	QC	Determine the cost of production associated with different organic vegetable farming practices.	11.0
322-	FR 3/20	Investigate weed seed bank dynamics under organic management systems.	10.5
309-	FR n/a	Determine the effectiveness and economics of seed coatings including micronutrients, growth promoters and/or mycorrhizae.	9.5
304-	FR 4/20	Identify long-term cropping systems and/or rotations with higher yield and economic stability under variable climatic situations.	6.7
305-	FR 1/20	Develop intercropping systems, crop sequences & cropping practices with pulse crops & other legumes to increase N fixation.	6.2
306-	FR n/a	Conduct a detailed analysis of legumes in organic farming systems RE: strengths, weaknesses opportunities and threats.	6.0
301-	FR 12/20	Identify or develop crop cultivars and/or crop traits for organic management with a five percent yield advantage.	5.5
302-	FR 12/20	Develop perennial grain varieties for organic management systems.	5.4

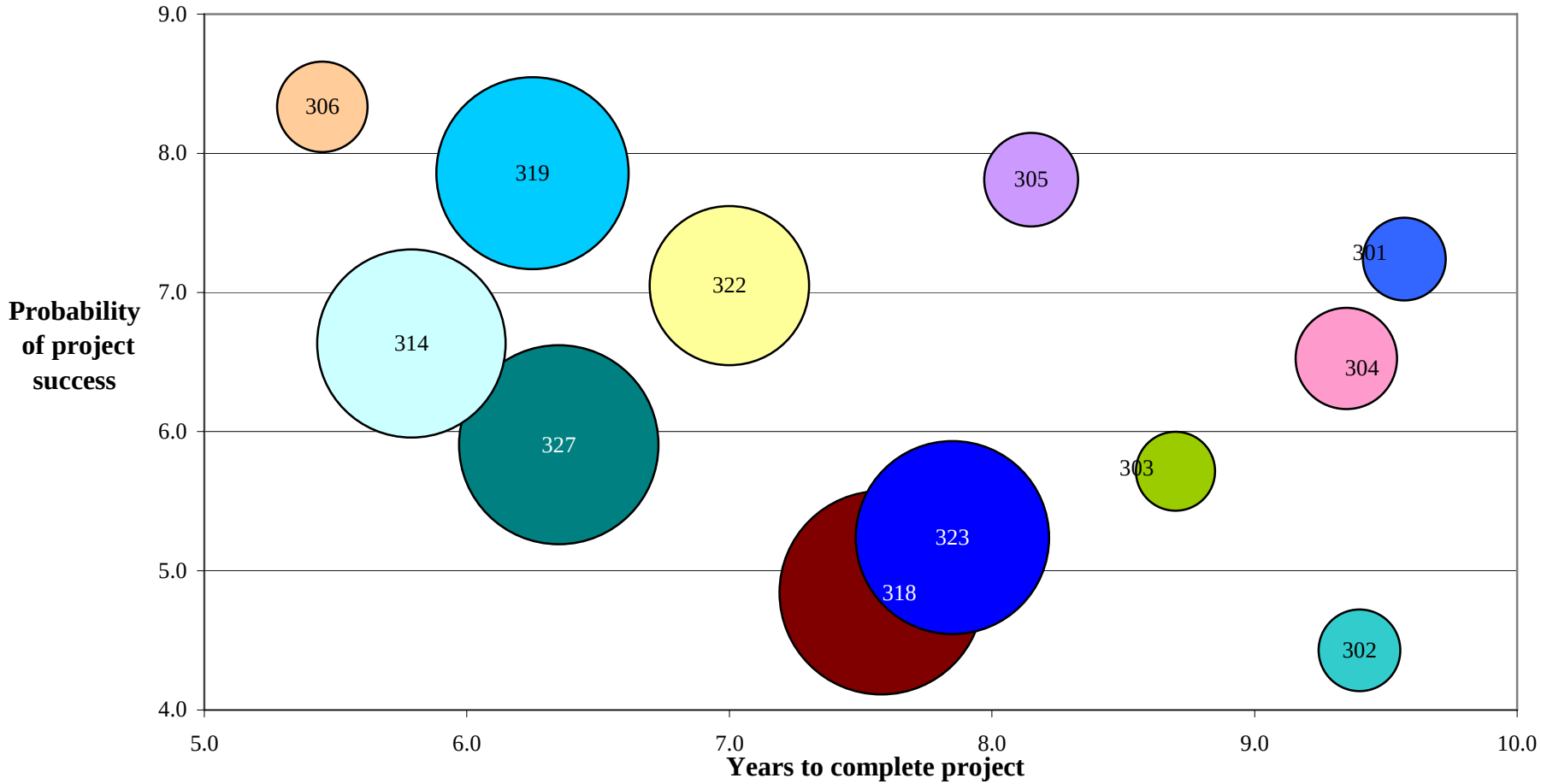
Part 1: Rank 1-13: Prioritization of organic sector projects - Plants (n=37)



*FR entries in the legend refer to farmer rankings identified in the Final Results of the First Canadian Organic Farmer Survey of Research Needs in 2008

† QC entries in the legend refer to priority projects identified by the Organic Agriculture Committee of the Quebec Agriculture and Agri-Food Reference Centre

Part 2: Rank 14-27, Prioritization of organic sector projects - Plants (n=37)

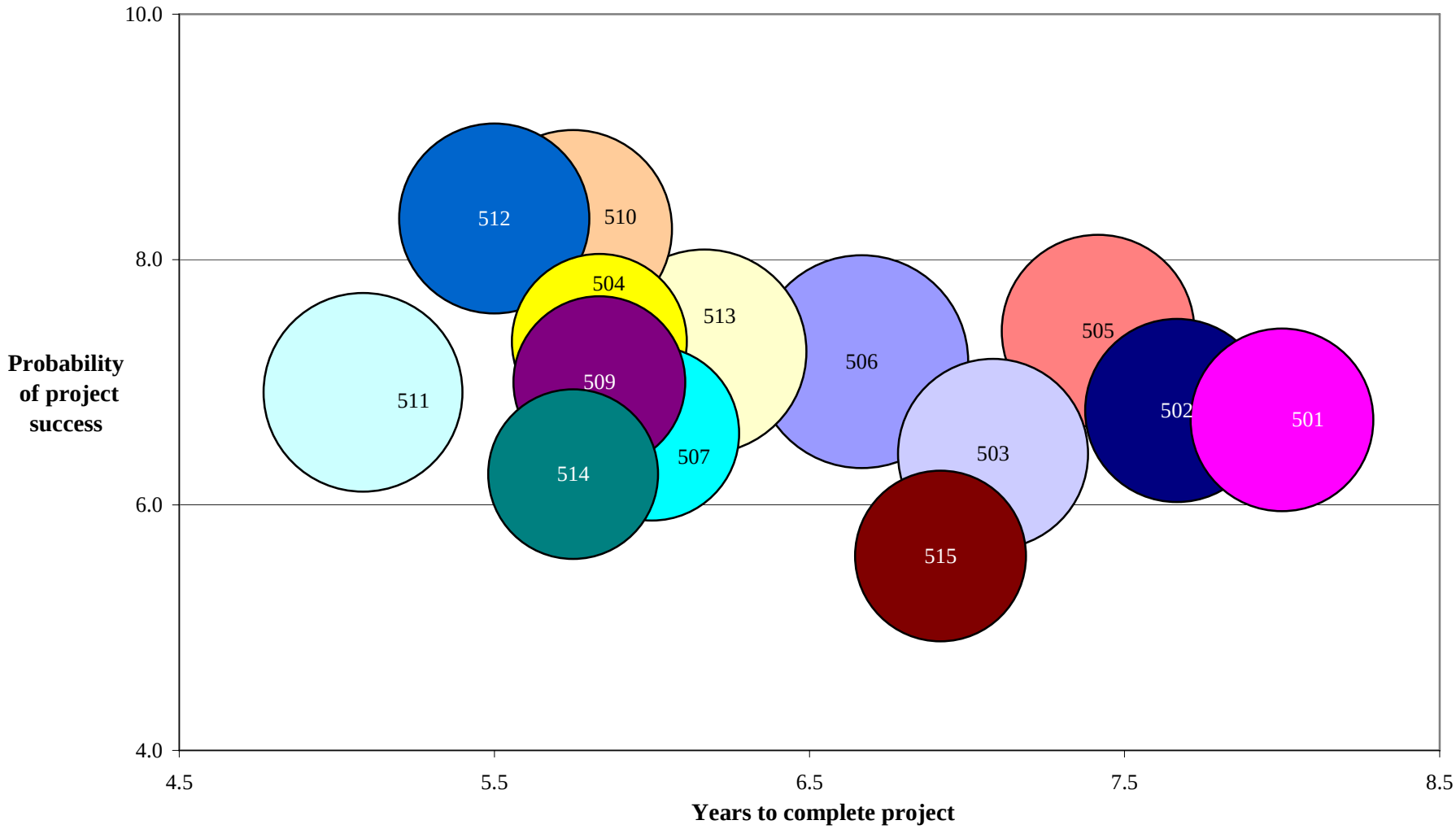


*FR entries in the legend refer to farmer rankings identified by the Final Results of the First Canadian Organic Farmer Survey of Research Needs in 2008
† QC entries in the legend refer to priority projects identified by the Organic Agriculture Committee of the Quebec Agriculture and Agri-Food Reference Centre

Ecological Systems

Identifier	Farmer Rating	Project	impact
508	FR 1/5	Investigate long term effects of organic systems on crop yield, environmental impact, soil quality, nitrogen fixation, crop quality, and economic stability.	17.8
506	FR 5/5	Determine the impact of organic production practices on greenhouse gas emissions from farms and identfiy ways to reduce emissions by at least 20 %.	17.8
513	FR 4/5	Identify means of reducing the energy required to produce each calorie of food by at least five percent.	17.1
511	FR n/a	Compare the external costs of organic and non-organic production systems on natural capital.	16.6
510	FR n/a	Identify current management practices in organic systems that affect sustainability in terms of productivity, environment and economic return.	16.6
505	FR 1/5 and 3/5	Determine the impact of organic practices on soil quality, health, production capability and/or other biological properties.	16.1
512	FR 4/5	Determine the effect of scale and type of farm on energy use efficiency in organic systems.	15.9
503	FR n/a	Compare the ecological, physical and societal impact of organic production systems on water quality to high input non-organic agricultural systems.	15.9
502	FR 4/5	Develop a mechanism for increasing water use efficiency in organic crop production by at least 10 percent.	15.3
501	FR 2/5	Compare the biodiversity of wildlife, flora, microfauna and macrofauna above and below ground in organic and high input non-organic systems.	15.3
504	FR 1/5	Determine the ecological impact of manure, compost and green manures used in organic systems compared to synthetic sources of nutrients.	14.7
507	FR 5/5	Determine the amount of soil carbon captured by different organic production systems compared to that captured in high input non-organic systems.	14.6
509	FR 3/5	Assess the role of pollinators and level of risk to pollinators in organic systems compared to pollinator roles and risk in high input non-organic systems.	14.4
515	FR 2/5	Contrast long term cumulative and interactive impacts of synthetic pesticides applied at minimal rates with few products to high rates and many products.	14.3
514	FR n/a QC	Assess the optimal use of classes 1, 2, 3 and 4 land on organic farms for sustainable production of food, feed, fuel and fibre.	14.2

Prioritization of organic sector projects- Ecological Systems (n=22)



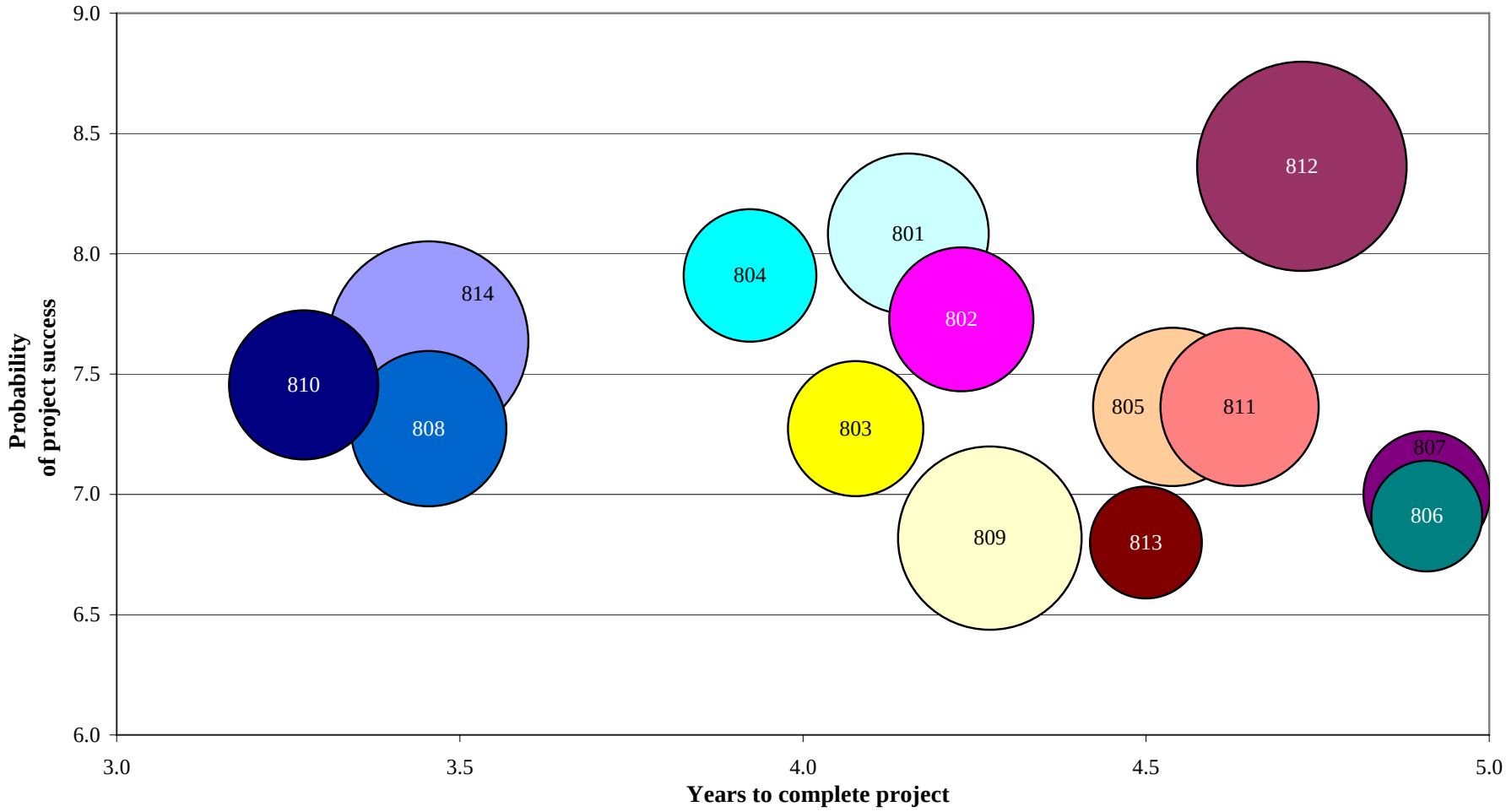
*FR entries in the legend refer to farmer rankings identified by the Final Results of the First Canadian Organic Farmer Survey of Research Needs in 2008

† QC entries in the legend refer to priority projects identified by the Organic Agriculture Committee of the Quebec Agriculture and Agri-Food Reference Centre

Sustainability

Identifier	Farmer Rating	Project	impact
812	n/a	Investigate and identify opportunities for increasing Canadian processing of Canadian products.	14.8
814	n/a	Examine threats to the future of organic agriculture such as genetic engineering and nanotechnology.	14.2
809	n/a	Determine the feasibility of urban organic agriculture.	13.0
801	n/a	Determine the economic constraints and opportunities relevant to the viability of small- and medium-scale organic farms.	11.4
805	n/a	Develop transition and extension strategies based on a demographic analysis of Canadian organic farmers.	11.2
811	n/a	Identify ways to use organic agriculture to strengthen the relationship between rural and urban communities.	11.2
808	n/a	Determine the amount of vacant agricultural land by region and determine the potential for organic production of food, feed, fuel and fibre in these areas.	11.1
815	n/a	Create linkages with researchers in developing countries to support organic agriculture as a sustainable livelihood within each of a variety of biological regions.	10.9
810	n/a	Analyze consumer behaviour to determine the extent to which producer integrity has been affected in organic and high input non-organic agriculture.	10.6
802	n/a	Determine cost of production for both organic and non-organic production systems for crops and animals.	10.2
803	n/a	Determine if organic farms are more profitable than high input non-organic farms when there is no price premium.	9.6
804	n/a	Determine local and global trends in organic price premiums by product and region and the implications for organic farmers supplying these different markets.	9.4
807	n/a	Impact of new entrants to the market and supply trends in domestic and international organic products to determine the level of risk associated with downward price pressure.	9.0
813	n/a	Determine organic agriculture's potential risk of losing government support by comparing the GDP with the Genuine Progress Index.	7.9
806	n/a	Analyze rural population demographics and the resilance in order to determine if population trends in rural communities could affect organic production capacity.	7.9

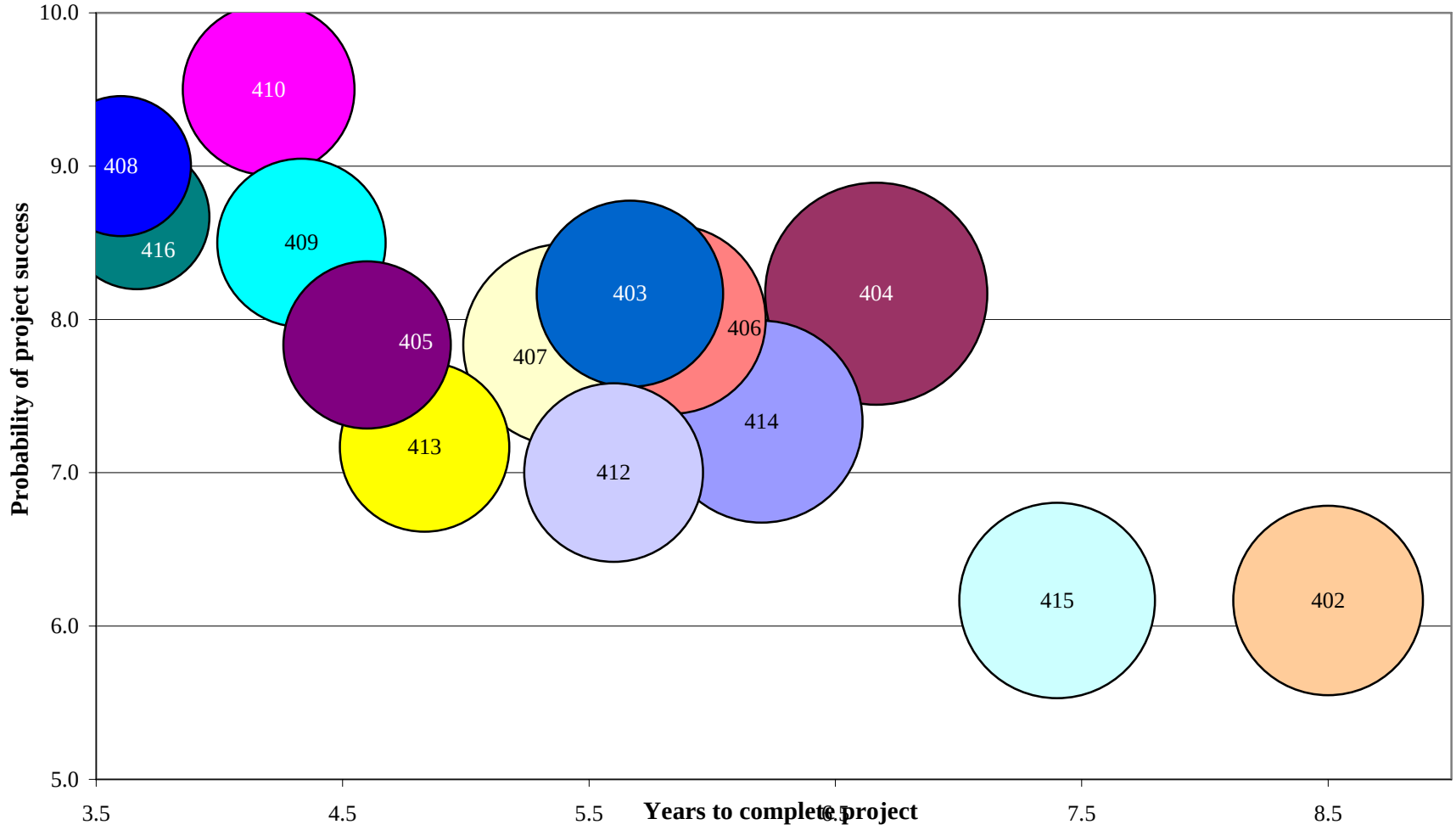
Prioritization of organic sector projects- Sustainability (n=21)



Animals

Identifier	Farmer Rating	Project	impact
404	FR n/a	Identify and/or develop integrated management systems that optimize health, welfare, productivity, quality and profitability.	18.8
414	FR 1/7	Develop a pork, cattle and/or sheep management systems that reduce the incidence of parasite productivity losses.	17.2
407	FR 3/7	Optimize the nutritional balance of pasture and/or grain-fed livestock to improve their productivity and/or specific attributes.	17.2
415	FR 1/7	Identify products within the management system that are effective for controlling parasites, suppressing illness/disease and promote health.	16.6
402	FR 2/7	Identify and/or develop livestock breeds that are suited to organic management.	16.1
406	FR n/a	Identify opportunities for realizing greater efficiency and profit margins in livestock operations.	16.1
403	FR 1 and 5/7 (QC)	Identify and/or develop organically permitted substances that are effective in managing parasites and/or disease.	15.8
412	FR 5/7	Identify methods and/or systems to consistently reduce somatic cell counts in dairy systems to within acceptable limits.	15.2
401	FR 2/7	Identify and/or develop livestock breeds that are resistant to parasites and/or diseases.	15.0
410	FR 6/7	Identify the land area required per animal unit for sustainable production, optimum animal welfare and manure management.	14.6
413	FR 7/7	Develop an outdoor poultry management system that reduces the risk of avian flu to 'negligible' levels.	14.4
409	FR n/a	Identify organic forage and grain feeding systems that optimize the feed conversion ratio without jeopardizing animal health or welfare	14.3
405	FR 5/7	Identify and/or develop emergency health care treatments for poultry and livestock that are compliant with the Canadian Organic Standards.	14.2
411	FR n/a	Develop a welfare index for farm animals raised in organic systems that is compatible to that used in non-organic livestock management.	12.4
416	FR n/a	Develop methods of organic management to optimize the finishing of beef cattle.	12.3
408	FR 3/7 (QC)	Identify or develop feed and/or ingredients that contain organically acceptable vitamins and amino acids for livestock rations.	11.9

Prioritization of organic sector projects- Animals (n=10)

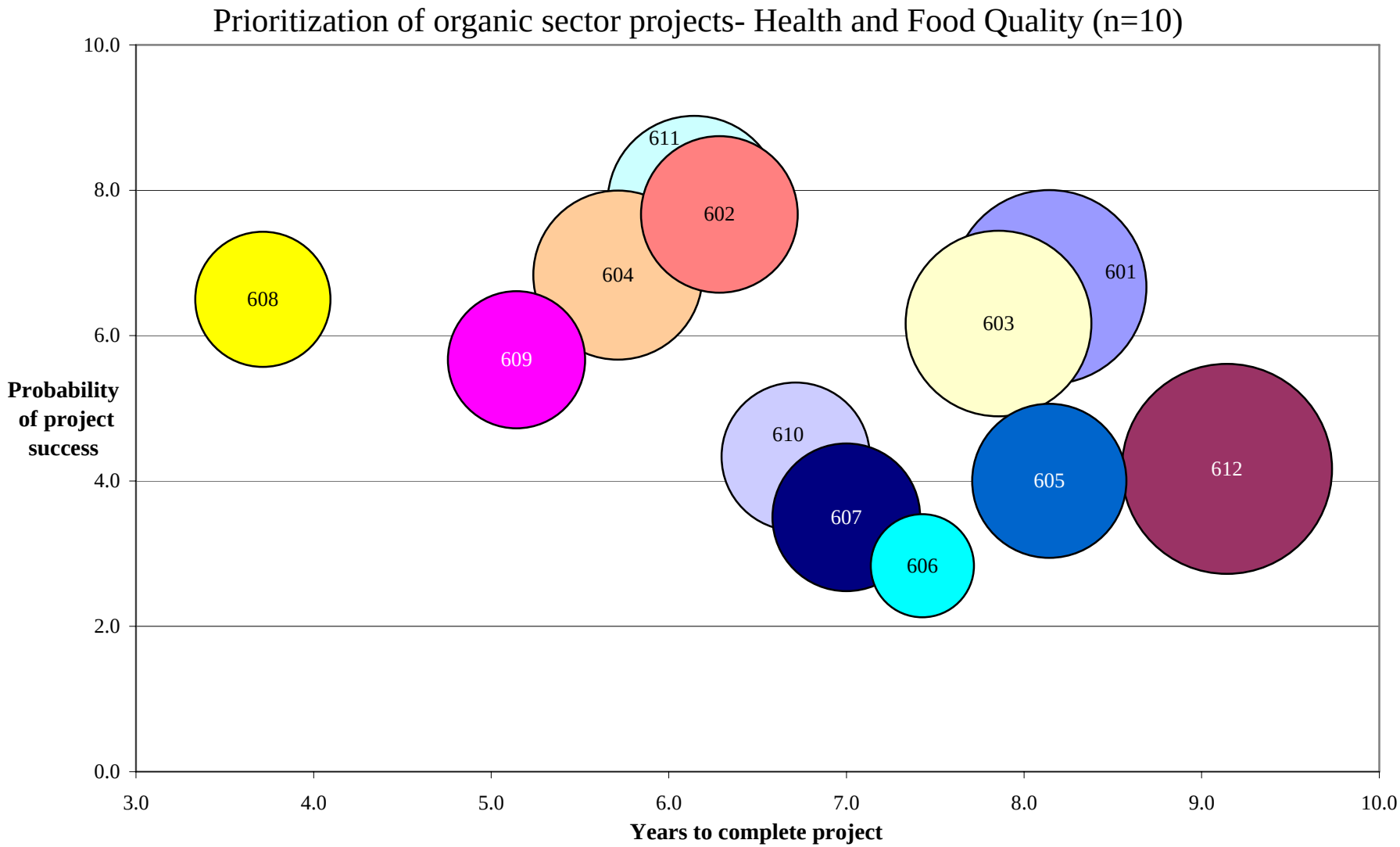


*FR entries in the legend refer to farmer ratings identified by the Final Results of the First Canadian Organic Farmer Survey of Research Needs in 2008

† QC entries in the legend refer to priority projects identified by the Organic Agriculture Committee of the Quebec Agriculture and Agri-Food Reference Centre

Health and Food Quality

Identifier	Farmer Rating	Project	impact
612	FR 4/5	Determine the health risk associated with agricultural pesticide use as well as occupational, environmental, and/or food exposure to pesticides.	17.9
601	FRn/a	Identify key factors linking organic food quality with the quality of soils, amendments, plants and animals in the organic production system.	16.6
603	FR 1/5	Identify production practices that optimize the concentration of nutrients, antioxidants and other bio-constituents in food products.	15.8
611	FR n/a	Analyze post-harvest food storage and handling practices; develop mechanisms to increase shelf life and reduce the risk associated with post-harvest storage systems.	14.8
604	FR n/a	Determine the effects of organically permitted pesticide use on crop physiology and product quality.	14.4
602	FR 1/2	Determine the nutritional value, including the concentration of nutrients, antioxidants and other bio-constituents of Canadian organic food products.	13.4
605	FR 1/5	Determine if consumers with at least 75 percent of their food coming from organic sources are more resistant to illness or disease.	13.2
610	FR n/a	Investigate disease transmission risks from animals to humans and determine how disease transmission can be affected, controlled and managed.	12.7
607	FR 1/5	Determine the level of health risk reduction associated with the consumption of organic foods compared with non-organic food products.	12.6
609	FR 5/5	Determine the degree of risk associated with the level of microbiological activity in Canadian organic meat production when antimicrobial agents are not used.	11.7
608	FR n/a	Analyze food safety practices and determine whether or not the development of special safety practices would be required for organic food production systems.	11.5
606	FR 4/5	Determine the health risk associated with the consumption of natural secondary metabolites produced by plants in response to stress from insects and diseases.	8.8

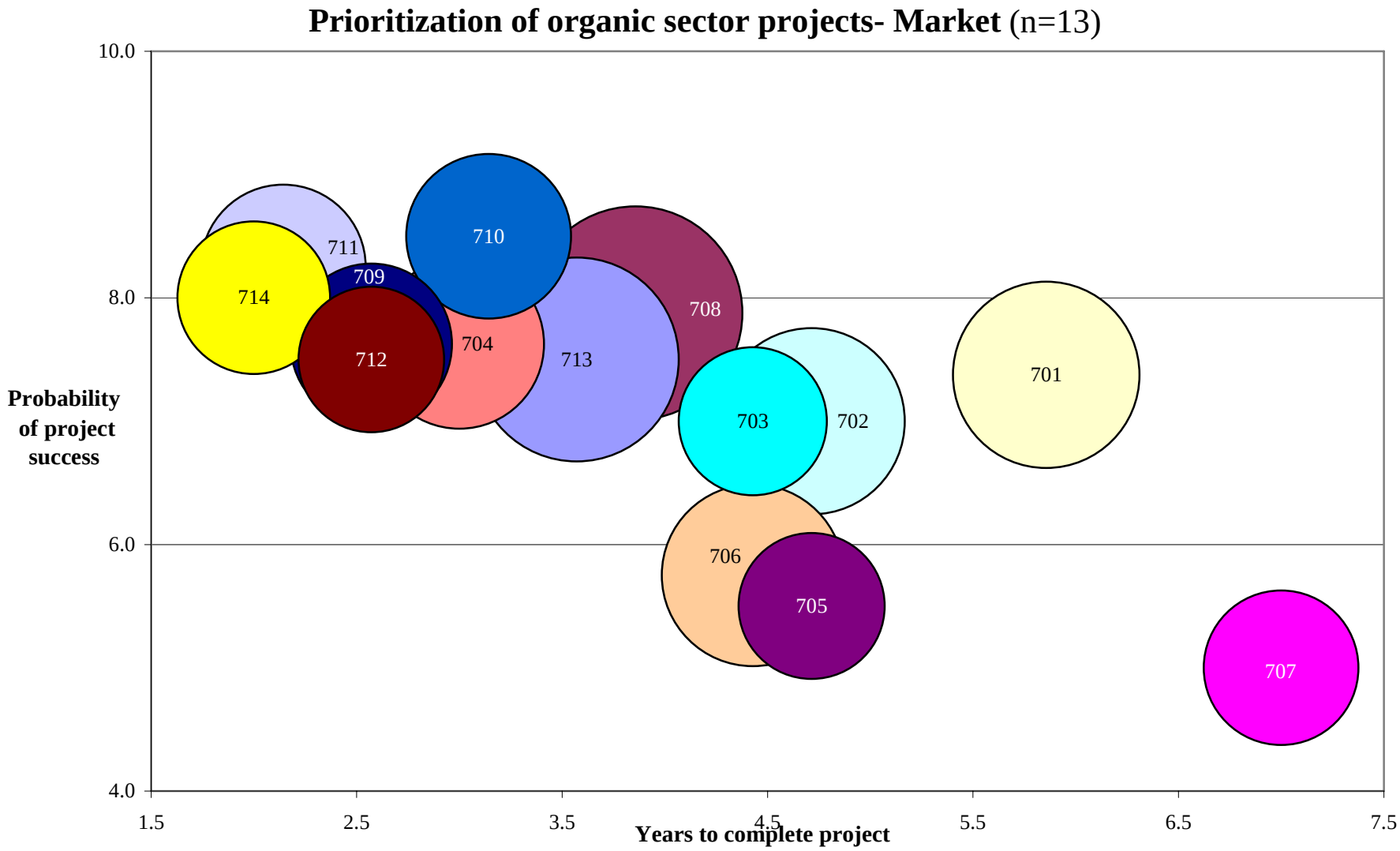


*FR entries in the legend refer to farmer rankings identified by the Final Results of the First Canadian Organic Farmer Survey of Research Needs in 2008

† QC entries in the legend refer to priority projects identified by the Organic Agriculture Committee of the Quebec Agriculture and Agri-Food Reference Centre

Marketing and Market Development

Identifier	Farmer Rating	Project	impact
708	FR 4/19	Determine the impact and opportunities for alternative marketing models such as cooperatives, local marketing and fair trade goods.	16.1
713	FR n/a	Identify key opportunities for import replacement and sector development in Canada.	15.3
701	FR 8/19	Develop innovative approaches to processing or marketing organic products.	14.0
702	FR 14/19	Determine the feasibility of developing micro-processing facilities as opposed to accessing existing infrastructure (ie.access to value-added markets).	14.0
706	FR 6 and 7/19	Determine the market potential for organic fibres, fuels and pharmaceuticals and the making specific adjustments these current standards.	13.7
704	FR 4/19	Determine the potential for organic beverage production and/or processing in Canada.	12.7
710	FR 4 and 7/19	Identify trends and purchasing behaviour for Canadian organic markets: imports and exports markets and the nature of organic food distribution channels.	12.4
711	FR 13/19	Identify the best marketing strategies for Canadian organic products, impact of a Canada Organic Logo and emerging "branded production or labelling systems".	12.4
709	FR 4 and 5/19	Conduct a real-time analysis of organic market conditions that would include an analysis of products for import and export.	12.1
707	FR 8/19	Analyze novel substances for compliance with organic standards and the potential to use these substances as productions inputs.	11.6
714	FR n/a	Analyze the export of organic goods from Canada in order to create strategies for the development of the organic sector in Canada.	11.5
703	FR n/a	Develop practices for extending the shelf life of organic produce and assesss the associated trade-offs.	11.1
705	FR 6 and 7/19	Determine the feasibility of developing a line of Canadian organic nutraceuticals and/or functional foods.	11.0
712	FR 15/19	Determine the potential for all Canadian organic production to meet the minimum standards for a "Fair Trade" desination.	10.9



*FR entries in the legend refer tofarmer rankings identified by the Final Results of the First Canadian Organic Farmer Survey of Research Needs in 2008

Policy

Identifier	Farmer Rating	Project	impact
903		Conduct a holistic analysis of organic agriculture in terms of social investment, employment, environmental impact economics and social well being, among other factors.	18.3
904		Analyze global initiatives in Ecological Goods and Services (EG&S) payment programs and determine their applicability to and impact on organic agriculture.	18.2
906		Make public policy recommendations for organic agriculture as a form of sustainable agriculture that is environmentally, socially and economically responsible.	18.1
902		Identify policies that increase organic production with the goal of increasing production by at least 25 percent.	17.7
905		Compare external costs of organic and high input non-organic production on natural capital (ie. off-farm costs and societal costs, etc).	16.3
910		Investigate the impact of different land use models and/or programs on land values and the availability of land for organic farming.	16.0
901		Investigate models for programs for new entrants to organic agriculture with the goal of increasing the number of entrants by at least 25 percent.	15.8
907		Assess the impact of Genetically Engineered (GE) crops on organic systems (i.e. GE threshold levels, contamination pathways, effects on pollinators and legislative models).	14.6
909		Assess the impact of nano-technology on organic systems.	14.3
908		Investigate alternative models of intellectual property ownership to ensure public access to genetic diversity in crop varieties used in the organic sector.	14.2

Prioritization of organic sector projects- Policy (n=14)