Executive Summary

In the fall of 2016, SaskOrganics conducted a survey to determine the research priorities of organic farmers in Saskatchewan for organic production. This report summarizes the results of the survey. The survey focused on research priorities in field crop production from the perspective of organic producers, in particular, the needs and challenges they faced in daily farming practices. This summary report identifies the research needs that will help organic producers in developing practical and sustainable solutions to address soil nutrient deficiencies, challenges in weed and pest control, as well as ensuring the future success of organic farming.

The recommendations in this report will provide direction on how research and extension activities can be focused to meet the needs of organic producers and to support organic agriculture in the province. It is hoped that this report will assist government, university researchers, agricultural specialists and funding agencies as they determine how they will invest their resources to best meet the needs of organic farmers in Saskatchewan.

The Organic Production Research Priority Survey listed six broad research topic areas, which included:

1) Soil health and quality
2) Farming practices
3) Weed control
4) Pest and disease
5) Organic livestock
6) Environmental, social and economic aspects

Within each research topic, several research subjects (or sub-topics) were listed for survey participants (mainly organic farmers) to prioritize their needs based on their scientific knowledge, daily farming experience and research expectation. Survey participants were asked to assign a number from 1 to 10 to each of the research sub-topics under each research topic, with 10 as the highest priority and 1 the lowest priority. The research topic areas were also presented for participants to rate for priority in the same way. The rate numbers are used for calculating research priorities: very high priority (10 & 9), high priority (8&7), medium priority (6&5), low priority (4&3) and very low priority (2&1).

Based on the survey findings, we recommend research work should be focused on the following subjects:

- Growing cover crops and green manure to improve soil quality and restore soil health;
• Developing crop rotations to fit the needs of sustainable organic production systems;
• The role of crop rotations, green manure and intercrops in improving weed control;
• Strategies for building soil organic matter and managing soil nutrients;
• Weed management, prevention and control of noxious perennial weeds;
• Research related to biology and nutrient cycling, biodiversity and its role in crop health;
• The impacts of GMOs on environment and economics of organic farmers;
• Nutritional quality, health benefits and integrity of organic food.

This report also provides a summary of the research priority survey results on each of the research sub-topic areas and discussions that led to the research priority recommendations. The recommendations in the report are intended as a guide for future approved organic agriculture research projects to help ensure they are relevant and responsive to the needs of organic farmers, ensuring the success and profitability of organic farming.
Background

Organic producers face unique challenges - from the availability of organic seeds and crop cultivars, to coping with soil nutrient deficiency, weeds and pests. Organic farming methods are knowledge-intensive and site specific. Specific research and extension that integrates scientific knowledge with local producers’ expertise to develop practical and sustainable solutions are key to advancing practices and technologies that meet the growing demand for organic products and ensuring the future success and profitability of organic farming.

Saskatchewan leads the nation in field crop organic production. This survey is focused on the field crop producers’ needs. Over 400 survey questionnaires were distributed to farmers on several occasions from November to December 2016, including at the 2016 Organic Connections Conference and Tradeshow, TransCanada Organic Certification Services Chapter Meetings, Organic Production Workshops and to the SaskOrganics membership. 48 completed surveys were returned (a 12% response rate). Of these participants, forty seven are field crop producers from Saskatchewan and one from Havre, Montana, United States. Forty two participants (88%) are certified organic grain producers and four (8%) are producers in transition to organic grain production. Eight producers (17%) reported they had livestock operations on their farms. Only one producer said he had vegetables grown on the farm.

Almost half of the participants (48%) have farm acreages from 1000 to 3000 acres. Slightly over a quarter of participants (27%) have cropping lands from 500 to 1000 acres. Thirteen percent have relatively smaller farm with <500 acres and 12% has relatively large farm acreage, evenly split with 6% each between the 3000 to 5000 acres and > 5000 acres. The participants evenly represented the farmers from Black soils (32%), Dark Brown soils (32%) and Brown soils (28%), with only 8% of them are farming on Grey soils.

Table 1 Survey Participants Summary

<table>
<thead>
<tr>
<th>Participant</th>
<th>Number</th>
<th>Percentage (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Operation</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Certified organic grain production</td>
<td>42</td>
<td>88</td>
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<tr>
<td>Transitional grain production</td>
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<td>8</td>
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<tr>
<td>Conventional grain production</td>
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<td>4</td>
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<tr>
<td>Mixed grain and livestock production</td>
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<tr>
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<td>1</td>
<td>2</td>
</tr>
<tr>
<td>Acreage</td>
<td></td>
<td></td>
</tr>
<tr>
<td>with &lt; 500 acres</td>
<td>6</td>
<td>13</td>
</tr>
<tr>
<td>With 500-1000 acres</td>
<td>13</td>
<td>27</td>
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<tr>
<td>With 1000 – 3000 acres</td>
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<td>With 3000 – 5000 acres</td>
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<td>6</td>
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<tr>
<td>With &gt; 5000 acres</td>
<td>3</td>
<td>6</td>
</tr>
<tr>
<td>Soil zone</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Black</td>
<td>15</td>
<td>32</td>
</tr>
<tr>
<td>Dark Brown</td>
<td>15</td>
<td>32</td>
</tr>
<tr>
<td>Brown</td>
<td>13</td>
<td>28</td>
</tr>
<tr>
<td>Grey</td>
<td>4</td>
<td>8</td>
</tr>
</tbody>
</table>
There were six research topics included in the survey:

1) **Soil health and quality**

The emphasis in this research area is on the interaction between soil health and farm management measures, like tillage, on overall soil quality. The needs identified include: soil conservation and restoration with growing cover crops and green manures; soil fertility and its interaction with soil biology; nutrient availability and management measures; nutrient testing methods in organic systems; and testing and evaluating soil amendments that are developed to improve soil productivity.

2) **Farming practices**

Agronomic practices that affect organic production are included in this research topic. Included in this sub-topic are: the breeding and testing of new crop varieties suitable for organic production to crop rotation; growing cover crops; green manure and intercropping; and the use of animal manure and compost to the integration of crop production with livestock. In this research topic, on-farm research of specific crops (e.g. hemp and quinoa), irrigation, water use, flooding/drought management and post-harvest grain handling are also included.

3) **Weed control**

This topic includes the need for weed prevention, mechanical methods, cover crops, rotation and intercrop management to control weeds. Weeds included in this research topic were Canada thistle, bind weeds, quack grass and other perennial weeds. Developing and evaluating organic weed control products was also included.

4) **Pest and disease**

This research topic includes: the investigation of new and invasive insect species; the impact of intercropping, crop rotation on pests and diseases and using trap crops for insect control; the evaluation of organic crop diseases in comparison with conventional farming; and the development of integrated pest management strategies and biological control for specific insects.

5) **Organic livestock**

Organic livestock farmers experience particular issues related to food safety standards, animal health, and veterinarian care. However, as Saskatchewan organic production is mainly field crops, this research topic is mainly focused on subjects closely related to crop production. The specific areas are: livestock health management, environmental and economic impact of farm grazing, integration of livestock operation with organic grain farming and waste management and environmental risk evaluation.

6) **Environmental, social and economic of organic farming**

Research topic includes: evaluation of environmental impacts of organic farming; developing climate friendly organic farming practices - such as energy efficiency/less greenhouse gas emission; assessment of farming economics and environmental markets; and value-added initiatives to current production and processing. Nutrient integrity, nutritional quality and health benefits of organic food and GMO impacts on organic farming are also included in this research topic.
Based on producers’ response to these research topic areas, soil health and quality emerged as a top priority with an average rating of 9.4 out of 10, followed by weed control (8.9) and farming practices (8.6) (Table 2). Clearly, organic producers expressed the need for solutions to resolve issues in regards to soil fertility, nutrient deficiencies and weed control. After many years of organic farming, soils require restoration (building soil organic matter) and nutrient to maintain profitability. Increasing N and P supplies through agronomic practices, including crop rotations, cover crops and green manure or intercrops is particularly of interest.

<table>
<thead>
<tr>
<th>Research topic</th>
<th>Rating (with 10 as highest priority)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Soil health and quality</td>
<td>9.4</td>
</tr>
<tr>
<td>2. Weed control</td>
<td>8.9</td>
</tr>
<tr>
<td>3. Farming practices</td>
<td>8.6</td>
</tr>
<tr>
<td>4. Pests and diseases</td>
<td>7.3</td>
</tr>
<tr>
<td>5. Environment, social and Economic</td>
<td>7.2</td>
</tr>
<tr>
<td>6. Organic livestock</td>
<td>5.6</td>
</tr>
</tbody>
</table>

*Table 2  Average rating for research topics*

Weed control is one of the “most wanted” research topics for organic producers. The survey findings indicate that most organic producers are struggling with weed control, although they might be dealing with different species of weeds. Noxious weeds, like Canada thistle, wild mustard, wild oats, bindweed, quack grass and other perennial weeds are common concerns among organic producers.

Producers also rated farming practices as a high priority. In particular, they rated using crop rotations and cover crops/green manure as high priorities. Farmers believe that by implementing a good crop rotation and incorporating cover crops/green manure they can increase organic carbon in the soil and enhance soil microbial activity, and nutrient supply can be balanced, thereby restoring soil quality and health. In addition, good crop rotations, with appropriate incorporation of cover crops/green manure, will effectively suppress weed growth and reduce pests and disease.

Rating for pest and disease controls averaged at 7.3, represented a relatively high level of concern.

The environmental, social and economic area, as a general topic was rated at 7.2. There are specific subjects that were rated as high research priorities, for example, the impacts of GMOs on organic farming, nutritional quality of the grain and health benefits, and the integrity of organic food.

The organic livestock research priority is rated relatively low at 5.6. This result is not surprising given that most organic farmers in the province produce field crops and do not have a livestock operation on their farm. Participants either felt that the research topic on organic livestock was beyond their knowledge/experience or they showed little interest. Therefore, some of the participants did not answer these livestock questions.
The participants were also asked to list their most pressing production issues at present time. A total of 38 farmers participated in this section and filled in the challenges they are facing on their farm. Depending on their specific circumstances, some listed all three pressing challenges they had experienced, others listed two or just one of their most concerned production issue(s).

**The first** most impressive production issue: From the 38 responses, 45% of responses (17 participants) are related to the challenges of weed control on the farm. The concerns range from general weed management issues to control of specific weed species, such as Canada thistle, wild oats, wild mustard, quack grass, etc., and to the increased weed pressure caused by excessive soil moisture as happened in the past several years. Twenty five percent (25%) responses (9 participants) expressed their concern about soil nutrient deficiencies - particularly the lack of accessible phosphorus in their soils that affected their crop yields. Another 11% (4 participants) indicated that year after years of excessive moisture/flood and hail damage to their crops, too much moisture reduced crop ability to compete with the weeds, wet climatic conditions also delayed getting the crops off the field, and the need to develop new crop varieties that better adapt to weather conditions. Five percent (2 participants) had concerns of possible cross contamination of GMO crops, particularly in the light of recent approval of GMO alfalfa in Canada. Other individual concerns included crop rotation and grain drying after harvest.

**The second** most impressive production issue: There were 34 responses and the most listed pressing issue is soil fertility followed by weed control. Thirty five percent of responses (12 participants) wrote that the nutrient depletion including both the N and P, were their major concerns. About 18% of responses (6 participants) expressed that weed control is their challenge, followed by 9% of responses (3 participants) stated on the climate change concerns and adaptation to new weather. There were 6% of responses (2 participants) equally concerned on the following 5 topics: crop rotations, pest and disease, maximizing crop yields, developing markets and farm financial difficulties, particularly during the transitioning period. The other individuals had concerns on GMO contamination and pesticide drift.

**The third** most impressive production issues: Of the 27 responses, 6 participants (22%) stated weed control as their third most pressing issue, 5 (19%) specified weather challenges, 3 (11%) identified the lack of new crop varieties that fit organic production system and meet the needs of market, 2 (7%) mentioned that marketing is their challenge, and other 2 listed integrating reduced tillage in their organic cropping system. The other concerns include growing green manure, lack of soil nutrients, finding better crop rotations, use and managing trap crops, difficulties in transport and cleaning of harvested crops, lack of seeding tools and concern about pesticide drift.
Based on the survey results, the SaskOrganics Research Committee identified the following topics as our research priorities and recommends that funding agencies support applications that address these research subjects:

- **Soil health as the basis of organic production**
  - Develop organic methods to restore soil carbon reserves and continuous improvement of the soil quality;
  - Research the interactions between soil health and the needs for holistic crop production that focus on weed challenges, crop diseases, soil biological activities, climate stress and costs of maintaining soil fertility;
  - Develop strategies to manage soil nutrients to increase their availability to meet needs of organic production;
  - Investigate soil biological communities to understand nutrient cycling and biologically-based soil fertility;
  - Research the needs of soil microbes and their role in soil health and crop growth;
  - Develop tools to measure soil nutrient availability in organic crop production systems.

- **Weed control in organic crop production systems**
  - Research the role of cover crops/green manure, crop rotation and intercrops in improving weed control;
  - Develop approaches to weed prevention management to reduce weed seed populations in soils and prevent their long-term growth;
  - Developing cultural controls, including examining optimal seeding rates and best matching crop species for intercropping;
  - Examine practical and efficient mechanical weed control for different weed species;
  - Specific weeds species: Canada thistle, bindweed, quack grass, wild barley, wild mustard and other perennial weeds;
  - Develop cost effective methods for controlling weeds by combining several techniques to achieve the optimal results;
  - Explore biological approaches for controlling noxious perennial weeds;
  - Weed control in reduced-till and non-till organic farming system;
  - Control weeds in wet/flood conditions.
Organic agronomic practices to manage the soils and crops

- Conduct research on organic production practices that increase carbon sequestration, build soil carbon reserves and restore soil biodiversity;
- Conduct research on crop rotation and intercropping systems that balance plant nutrient needs, water availability, soil quality, pest and disease control mechanisms;
- Determine impacts of green manure/cover crops on soil tillage and farm financial incentive;
- Identify methods of cover crop termination and nutrient release from green manure to meet the needs of subsequent crops;
- Identify how green manure options to fit into crop rotation and develop cover crop cocktails that fit into various soils and moisture conditions;
- Breed new crop varieties under organic production methods, creating strong competitive ability, adaptability to new climatic conditions, and meeting the market needs;
- Determine economic benefits of the integration of livestock in grain production;
- Develop more efficient and effective techniques for post-harvest grain handling, grain drying, cleaning and related value-added processing.

Pests and diseases concerns

- Conduct research on identifying the interaction between pests and disease and crops and environment to develop integrated pest management tools;
- Determine the role of intercropping and crop rotations to address disease and pests concerns, and identify effective crop combinations for intercropping and crop sequencing;
- Conduct research on specific crop diseases: fusarium in wheat crops, ascochyta blight in pulse crops, wilts (verticillium and bacterial), crown and root rots, and foliar diseases in forage legumes.
- Evaluate organic crop diseases in comparison to conventional cropping systems;
- Develop organic pest control products, including the use of beneficial insects for pest control.

Environment, social and economic aspects of organic farming

- Monitor the economic and social impacts of GMO contamination on organic farmers;
- Develop management practices for organic farming to prevent GMO contamination;
- Developing multiple-function farming systems that balance economic and environmental outcomes;
- Study the nutrient quality and health benefits of organic foods;
- Study impacts of organic farming on the environment and climate change;
o Develop organic farming practices that are energy-efficient to reduce greenhouse gas emissions;

o Research climate change adaptation strategies for organic farmers;

o Identify long-term economic analysis of organic farming systems.

❖ **Organic livestock production**

  o On-farm livestock grazing and its environmental and economic impacts;
  
  o Research on sustaining soil phosphorus availability with manure and compost;
  
  o Roles of a livestock operation in the grain production nutrient cycle;
  
  o On-farm compost technologies and BMPs.
Detailed Survey Results

The bar graphs below summarize the data collected from this survey. The x-axis lists priority ratings. The ratings are grouped as very high priority with rating numbers of 9 and 10, high priority with rating numbers of 7 and 8, medium priority with rating numbers of 5 and 6, low priority with rating numbers of 3 and 4, and very low priority with rating numbers of 1 and 2 as indicated previously. The Y-axis represents the percentage of responders in the category. For example, if 24 of the 48 participants rated a research subject as 8 or 7, on the graph, it will appear as 50% on y-axis vs. high priority category on x-axis.

Soil health and quality

Ninety two percent and 88% of survey participants rated soil nutrient availability and management, and soil biology in the category of high priority (7+8) and very high priority (9+10), respectively. Seventy nine percent participants rated both soil conservation and restoration and effects of farming practices on soil health and quality as high and very high priorities. In comparison, relatively fewer producers included soil nutrient testing methods for organic systems (with 60%) and effectiveness of various soil amendments on the high priority list. Soil health represents an overall quality of soils. In general, soils with abundant organic matter, vigorous mycorrhizal activities are viewed as healthy soils, which support healthy plant growth and produce high quality food. In addition, these soils are able to resist pests and diseases. Research needs to be prioritized on the relationships between agronomic practices and soil quality, soil biodiversity, nutrient management, plant health, systemic pest resistance and crop quality.
3. Soil microbiology

4. Soil nutrient availability and management

5. Soil nutrient testing methods for organic systems

6. Effectiveness of various soil amendments
Farming practices research topic

Two of the research subjects in farming practices are rated very high in this research topic, i.e. green manure and cover crops and crop rotation, i.e. which crops follow other crops. Ninety six percent (96%) of producers rated the green manure and cover crops as high and very high priorities, with only 4% rated as medium priority, and 94% of producers rated Crop rotation, i.e. which crops follow other crops as high and very high priorities. This finding indicates that organic producers have great interest in cover crops and green manure, in particular, cover crops in restoring soil health, building organic matter and soil fertility, re-establishing soil biology, suppressing weeds and controlling pests and diseases. Organic farmers also want to see a better crop rotation plan that can fit into their farm crop production plans to achieve balance of soil quality weed/pest/disease control, and reduce their environmental footprints.

Increased research in this area is extremely important for supporting organic producers to effectively grow green manure and cover crops to improve their soil to meet the nutrient needs for cash crop production. The research could include identifying specific legume crops and their agronomic details or identifying species mixes in a cover crop cocktail that work most effectively in organic production. The research should also address crop rotation plans that farmers can adopt to reduce weed pressure, improve pet and disease and increase grain quality.

Breeding and testing of new crop varieties suitable for organic production (73%) and reduced tillage and non-till practices (63%) were rated relatively high in the survey and should be considered research priorities in the near future. Just over 50% of farmers rated as high priority on-farm research on specific crop production, such as hemp and quinoa, and use of manure, compost and on-field livestock grazing. However fewer farmers have indicated that they are interested in research topics like integration of crop production with livestock operation (46%), irrigation, water use and flood/drought management (27%) and post-harvest handling (cleaning, drying and transporting) (46%).
2. Crop rotation, i.e. which crops best follow other crops

3. Green manure and cover crops

4. Reduced tillage and non-till practices

5. On-farm research of specific crop production, such as hemp and quinoa
6. Use of manure, compost and on-field livestock grazing

7. Integration of crop production with livestock grazing

8. Irrigation, water use and flooding/drought management

9. Post-harvest handling (cleaning, drying and transporting)
**Weed research topics**

Survey results show that weed control is another research topic of high importance in organic production systems. Among the five research subjects listed, weed management with cover crop, rotation and intercrops is rated as high and very high priorities by 94% of respondents. Weed prevention management is rated as high and very high priorities by 92% of respondents followed by the control of Canada thistle, bindweed, quack grass and other perennial weeds, which is rated by 90% of respondents as a high and very high research priority. The survey results also indicate that Mechanical weed control methods are of interest to organic farmers.

Most organic farmers already understand that weed control strategies for organic systems are cultural and mechanical with a focus on prevention, crop rotation, crop competition, and cultivation. In general, they handle annual weeds effectively. However, for the extremely noxious weeds, such as Canada thistle, bindweed, quack grass and other perennial weeds, more research and demonstration projects are needed to show what types of crop rotation systems, cover crop species and intercrop varieties effectively suppress perennial weeds or how cultural practices can be combined with mechanical methods to efficiently reduce the weed pressure. Recently, the CombCut has become of interest to organic producers. It was developed in Sweden by an organic farmer to weed coarse weeds in crops like cereals, corn, native prairie and seeded grassland and it can be used both above the crop and in crops.
Pest and disease research topics

Under this research topic, seventy nine percent (79%) of respondents rated the impact of intercropping/rotation on pest and disease as high and very high priorities. 67% of the respondents also put a high and very high priority to evaluating organic crop diseases in comparison to conventional systems. When compared to weed control, a relatively low percentage of respondents rated pest and disease controls as high and very high priorities. This finding indicates that research in this area is a less urgent concern at this time. Organic producers do not encounter the same level of pest and disease damage in their crops as a result of adopting crop rotations and the incorporation of green manure and cover crops. However, it is important to keep in mind that when climate conditions become favorable for disease and pests development, this can change quickly. For example, a rainy, highly humid and hot
weather during a crop flowering period could cause the quick spreading of fusarium in the cereal crops. Research in this area should be focused on preventive measures, such as plant breeding for disease and pest resistance, soil disease and pest control, crop management to encourage beneficial insects, influence of climate change on insect and pest and fostering and introducing natural enemies to control crop pests.

1. New and invesive insect species

2. Impacts of intercropping/rotation on pest and disease

3. Use of trap crops for insect control
Organic livestock research topics

Due to the small numbers of participants (17%) that indicated they have livestock operations on their farms, field crop producers may not share an understanding of the challenges that organic livestock operators experience. Overall ratings from farmers with livestock operation are higher to all the livestock research subjects than the grain-only producers.

Generally, the ratings are higher for those research subjects related to the grain farming, i.e. integrated livestock/crop system (70%) and environmental and economic impact of farming grazing (54%). The other two subjects directly related to livestock operation are rated lower by the participants. Livestock farmers experience specific concerns related to issues of food safety standards and animal health and
welfare. Research needs regarding livestock farmers’ requirements have been assessed in other jurisdictions, where the livestock operations are significant. In Saskatchewan, our organic farming is heavily focused on field crop production, therefore, the research priorities relating to livestock should emphasize the benefits of integrating livestock into field crop production (e.g. on-farm grazing), improves soil P supply, and supplementing farm income.

1. Livestock health management

2. Environmental and economic impact of farm grazing

3. Integrated livestock/crop systems
Environmental, social and economic research topics

Marketing certified organic products faces the challenges of the consumer’s misunderstanding of the differences between the many food labels (e.g. natural and non-GMO) in the marketplace, which may lead to consumer confusion about the certified organic label. Eighty five percent (85%) of the participants rated both GMO impact on organic farming and integrity of organic food as high to very high priorities, while 81% rated nutritional quality and health benefits as high to very high priorities. Recent approval of GMO alfalfa in Canada has caused tremendous concerns in the organic sector about the impact of cross-contaminations which may lead to significant financial loss, in addition to a range of ecological impacts. Increased research in this area is critically important for assisting organic producers market their products. The research focus that would be most beneficial is around the quality, health benefits and the integrity of organic food, including the environmental and social impacts of organic production.

In addition, eighty one percent (81%) of producers also rated developing climate-friendly organic farming, i.e. energy efficient and less greenhouse gas release as high to very high priorities. Many organic farmers have expressed their desires to proactively take advantage of climate benefits, identify potential barriers and take steps to adapt to the changing climate. The research under this subject can be focused on soil and water management to cope with potential flooding/drought caused by the extreme weather events.
2. Environmental impacts of organic farming

3. Farming economics and environmental markets

4. Value added production and processing

5. Nutrient quality and health benefits
Participant Specific Comments

In each of research topic areas, the survey questionnaire offered opportunities for participants to provide written comments about research priorities listed or add other research subjects to the research topic to reflect their particular research interests. Thirteen participants provided comments. A summary of their comments follows:

**Soil health and quality**
- Organic methods to build soil carbon reserves and continuous improvement of soil quality;
- Long-term impacts of crop rotations and tillage on soil microorganisms;
- Linkage between soil health and productivity;
- On-farm diagnosis of soil health and quality with growth of weeds; crop health and crop yields and research on soil compaction.

**Farming practices**
- Breeding new crops with a focus on strong and competitive roots, not just on yield;
- Impacts of cover crops on weed control;
• Uses of crop rotations and intercrops to build soil biology systems;
• Use new tillage tool, practices and techniques to control weeds;
• Effects of farming practices on shifting weed communities;
• Adaptation of organic farming to changing climate.

Weeds
• Development of long-term weed management strategy that includes cover crops, crop rotation and mechanical tillage;
• Beneficial management practices targeting the noxious weeds in different soils, in particular Canada thistle, bindweed, quack grass and other perennial weeds;
• Impacts of reduced and non-till on weed population;
• Effects of soil mineral balance on weed and crop growth and use of the balance to control weed pressure and promote crop growth;
• Weed contributions to the farm economy.

Pests and disease
• Biodiversity as a strategy to manage pest pressure; assessing impacts of various rotations to minimize pests and diseases;
• Develop and test new crop varieties with better disease and pest resistance;
• Study communication factor between the pests and plants;
• Use elevated natural sugar content in the plants to control diseases and pests. (This was claimed as an experience/result on farm from one of the survey participants: that disease virtually reduced when the natural sugar content was increased to Brix reading 7, and pest control was increasingly effective as plant natural sugar content moves above Brix 10).

Livestock
• Study livestock to complete the organic circle of life;
• Incorporate livestock grazing into the crop rotations to improve soil fertility;
• Develop on-farm manure composting techniques and equipment and related BMPs.

Environmental, social and economics
• Benefits of organic farming to the climate and developing climate friendly farming practices;
• Create value-added products on farm to increase the profitability of organic farming;
• Produce healthy and nutritious food in an environmentally friendly and sustainable way;
• Balance between improving grain quality and increasing crop yield.
It appears that the majority of comments further emphasize the importance of the listed research topics. Some of the comments provide additional information that certain sub-topics could be added to the list. For example, a study on organic methods to build soil carbon reserves and to continuous improvement of soil quality is an interesting research subject.

Other suggestions that went beyond the topics presented in the survey included:

- Breed new crops with strong and competitive roots not limiting focus to yield when looking at creating new seed varieties;
- Find soil mineral balances for weeds vs. crops and use of soil mineral balance to promote crop growth and reduce weed pressure.

In addition, suggestions of studying possible communications between the pests and plants, and use of elevated natural sugar content in the plants to control diseases and pests are also new ideas. Assessment of livestock operations as an important component of organic farming and its role in organic grain production to complete an organic farming cycle definitely is at a very critical point in addressing issues of phosphorus deficiencies that many organic farmers are currently facing.
Appendix A - Organic Production Research Priorities Survey

Organic producers face unique challenges, from the availability of organic seeds and crop cultivars, to coping with soil nutrient deficiency, weeds and pests while using approved agronomic practices.

Specific research and extension that integrate scientific knowledge with farmer expertise to develop practical and sustainable solutions are key to meeting the growing demand for organic products and ensuring the future success of organic farming.

In order to meet the growing demand for organic products, research efforts need to provide solutions to production, risk management, marketing and social issues confronting organic producers.

We hope that this research priority survey will be informative to government, university researchers, agricultural specialists and funding agencies, to provide direction on how research and extension activities can be focused to meet the needs of organic producers to support organic agriculture and improve organic production in Saskatchewan.

We thank you for your assistance in developing the needed background information of producer priorities.

Basic information:

I am an:

☐ Organic grain producer with an acreage of ☐ <500 ☐ 500-1000 ☐ 1000-3000 ☐ 3000-5000 ☐ >5000
☐ Organic vegetable grower with an acreage of ☐ <10 ☐ 10-50 ☐ 50-100 ☐ > 100
☐ Organic fruit grower with an acreage of ☐ <10 ☐ 10-50 ☐ 50-100 ☐ > 100
☐ Livestock operator
☐ Transitional producer with an acreage of ☐ <500 ☐ 500-1000 ☐ 1000-3000 ☐ 3000-5000 ☐ > 5000
☐ Conventional farmer with an acreage of ☐ <500 ☐ 500-1000 ☐ 1000-3000 ☐ 3000-5000 ☐ >5000
☐ Other, specify __________________________

Please select the Soil Zone that your farm is located: ☐ Black ☐ Brown ☐ Dark Brown ☐ Gray

We would like to reciprocate by providing you with ongoing information on research results and upcoming events so we would appreciate if you can provide us with your contact information below.

Name: ________________________________  Email: ________________________________

Address: _____________________________  City: _______________________ Postal Code: ______________

Telephone: ___________________________
QUESTION 1 - SOIL HEALTH AND QUALITY RESEARCH TOPIC

How much of a priority is each of the following soil health and quality research topics to you? Please assign a number to each subject below.

Very low 1 2 3 4 5 6 7 8 9 10 Very high

[ ] Effects of agronomic practices such as tillage on soil health and quality
[ ] Soil conservation and restoration
[ ] Soil microbiology
[ ] Soil nutrient availability and management
[ ] Soil nutrient testing methods for organic systems
[ ] Effectiveness of various soil amendments

Other, please specify ____________________________________________________________

Please provide your specific comment related to soil health and quality research

QUESTION 2 – FARMING PRACTICES RESEARCH TOPIC

How much of a priority is each of the following farming practices research topics to you? Please assign a number to each subject below.

Very low 1 2 3 4 5 6 7 8 9 10 Very high

[ ] Breeding and testing of new crops varieties suitable for organic production
[ ] Crop rotation i.e. which crops best follow other crops
[ ] Green manure and cover crops
[ ] Reduced tillage and no-till practices
[ ] On-farm research of specific crop production, such as hemp and quinoa
[ ] Use of manure, compost and on-field livestock grazing
[ ] Integration of crop production with livestock operation
[ ] Irrigation, water use and flooding/drought management
[ ] Post-harvest handling (cleaning, drying and transporting)

Other, please specify ____________________________________________________________

Please provide your specific comment related to farming practices research
QUESTION 3 - WEED RESEARCH TOPICS

How much of a priority is each of the following weed research topics to you? Please assign a number to each subject below.

Very low 1 2 3 4 5 6 7 8 9 10 Very high

[ ] Weed management prevention
[ ] Mechanical weed control methods
[ ] Weed management with cover crop, rotation and intercrops
[ ] Canada thistle, bindweeds, quack grass and other perennial weeds
[ ] Developing and evaluating organic weed control products

Other, please specify ______________________________________________________________

Please provide your specific comment related to weed research


QUESTION 4 - PEST AND DISEASE RESEARCH TOPICS

How much of a priority is each of the following pest and disease research topics to you? Please assign a number to each subject below.

Very low 1 2 3 4 5 6 7 8 9 10 Very high

[ ] New and invasive insect species
[ ] Impact of intercropping/rotation on pest and disease
[ ] Use of trap crops for insect control
[ ] Integrated pest management strategies
[ ] Evaluating organic crop diseases in comparison to conventional systems
[ ] Development of biocontrol for specific insects

Other, please specify ______________________________________________________________

Please provide your specific comment related to pest and disease research


QUESTION 5 – ORGANIC LIVESTOCK RESEARCH TOPICS

How much of a priority is each of the following organic livestock research topics to you? Please assign a number to each subject below.

Very low 1 2 3 4 5 6 7 8 9 10 Very high

[ ] Livestock health management
[ ] Environmental and economic impact of farm grazing
[ ] Integrated livestock/crop systems
[ ] Waste management and environmental risk evaluation

Other, please specify ______________________________________________________________

Please provide your specific comment related to organic livestock research


QUESTION 6 – ENVIRONMENTAL, SOCIAL AND ECONOMIC RESEARCH TOPICS

How much of a priority is each of the following environmental, social and economic research topics to you? Please assign a number to each subject below.

Very low 1 2 3 4 5 6 7 8 9 10 Very high

[ ] Developing climate-friendly organic farming, i.e. energy efficient and less greenhouse gas release
[ ] Environmental impacts of organic farming
[ ] Farming economics and environmental markets
[ ] Value added production and processing
[ ] Nutritional quality and health benefits
[ ] Integrity of organic food
[ ] GMO impact on organic farming

Other, please specify ______________________________________________________________

Please provide your specific comment related to social and economic research


QUESTION 7 – RESEARCH AREA PRIORITIES

How much of a priority is each of the research areas to you? Please assign a number to each subject below.

Very low 1 2 3 4 5 6 7 8 9 10 Very high

[ ] Soil health and quality
[ ] Farming practices
[ ] Weed control
[ ] Pest and disease
[ ] Organic livestock
[ ] Environmental, social and economic

QUESTION 8 – MOST PRESSING PRODUCTION ISSUES

What are your most pressing production issues at present time? Please describe

First most pressing production issue

Please describe here

Second most pressing production issue

Please describe here

Third most pressing production issue

Please describe here

Please return completed survey by 1st December 2016 to:
SaskOrganics
140 4 Ave East, Regina, SK S4N 4Z4
Appendix B - SaskOrganics’ Research Committee Membership

**Cody Straza**  
Committee Chair/SaskOrganics Vice President/Organic Farmer

**Kim Tomilin**  
Organic Farmer

**Connie Achtymichuk**  
Provincial Specialist, Vegetable Crops, SK Ministry of Agriculture

**Brenda Frick, PhD, PAg**

**Jennifer McCombe, PAg, BSc**  
Agronomist, Manitoba Harvest

**Andrew Pantel, MSc, PAg**

**Sherri Roberts**  
Regional Crops Specialist, SK Ministry of Agriculture

**Scott Shiels**  
Grain Millers

**Dr. Dunling Wang**  
Alternative Cropping Specialist, SK Ministry of Agriculture

**Marla Carlson**  
Executive Director, SaskOrganics

*A special thank you to Dr. Dunling Wang, Alternative Cropping Specialist, Saskatchewan Ministry of Agriculture for his assistance in the survey design and data analysis.*
The industry association for certified organic farmers and processors in Saskatchewan, Canada. SaskOrganics advocates for a sustainable and thriving organic community through leadership in research, market development and communications.