

A Changing Climate for Agriculture - How Can We Prepare?

Significant evidence suggests global warming will change the way we live in the 21-century. The research indicates that climate change will affect weather patterns, resulting in more extreme events, and annual mean temperatures and precipitation. Agriculture can decrease the size its impact or “footprint” on the environment and adapt to the changing climate. If we assume that global warming will affect agriculture in Alberta, including the following considerations in future plans can help producers benefit from the opportunities.

Opportunities

- Longer growing season due to higher average temperatures (more frost free days, more growing degree days).
- Opportunity for growing longer season, diversified crops, i.e. cover crops, winter wheat, corn, switch grass.
- More diversity in crop rotations, will give more options for disease, insect, weed controls
- Shorter and milder winters (may lower heating requirements, reduce winter feeding, easier winter grazing, less winter kill and risk to crops).
- Opportunities for new industries (bioproducts and the bioeconomy).
- New arctic shipping routes may become available, i.e. Churchill.
- New revenue streams in carbon offset sales (when market standards are implemented).
- New opportunities for the production of biofuels and bioenergy (both for the business and the commodities that feed it).

Risks

- Increased occurrences of extreme weather (drought, flooding, heat waves, etc.).
- Decreased soil moisture and water shortage and availability (shrinking glaciers and less snow pack since less snow and more rain will be the norm; longer and warmer summers, lower summer flow).
- Water will become more valuable, irrigation will cost more (due to limited water resources and increased energy cost); pressures to price water at its market value will increase.
- New management challenges to overcome, i.e. rangeland stocking rates will lessen.
- Changed land use and impacts, i.e. cultivated land planted into trees.
- Accelerated wet and dry summer cycles from more extreme weather events.
- Input costs will increase – increased energy costs (extraction and processing) and taxation, higher fertilizer and chemical prices (pass-on costs from regulated carbon economy).
- Extreme weather events may increase the risk of soil erosion and crop damage (impact crop insurance).
- Increased occurrence of forest fire and possibly grass fires.
- Increased pest infestations due to milder winters and longer growing seasons (which may increase the need for pesticides).
- Decreased biodiversity and extinction of some species.
- Crop price increases due to shortages and competition (market demand) for climate - policy driven biofuel initiatives, animal feed costs may also increase.
- Monoculture pressures for bioenergy feed stocks may reduce crop rotation practices.
- Areas of soils at risk of degradation may increase due to pressures from the biofuel industry to remove residue and the cropping of marginal land.

How Can You Adapt?

- ✓ Adopt soil conservation practices to conserve soil moisture and protect from degradation - “Beneficial Management Practices” (BMPs).
- ✓ Explore crop diversification and new opportunity crops. Eliminate summer fallow and incorporate an economical crop rotation better suited to the climate (winter crops, forages).
- ✓ Move to a no till system to enhance carbon sequestration and increase moisture efficiency and nutrient cycling benefits.
- ✓ Prepare a sustainable environmental farm plan.
- ✓ Reduce methane emissions through - manure treatments such as solid-liquid separation, anaerobic digestion, changing feeding practices to reduce energy loss in cattle (oils, distiller grains), selecting cattle breeds with more efficient digestive systems.
- ✓ Restore and preserve wetlands (hydrology). Wetlands provide: habitat for wildlife, watershed protection, groundwater recharge, carbon sinks, etc.
- ✓ Develop a nutrient management plan for your farm to remove limitations and improve nutrient efficiency. Soil test to monitor soil nutrients.
- ✓ Apply fertilizers and manure to crop requirements; apply close to time of crop uptake. Applying beneath the soil surface decreases chances of loss to the atmosphere and improves the efficiency of nutrient use.
- ✓ Include nitrogen-fixing legumes in rotation to improve nutrient supplying capacity of soil and to reduce the need of fertilizer application.
- ✓ Increase crop residue to enhance moisture retention and reduce crop stress.
- ✓ Incorporate perennial forages for semi-permanent cover. Perennial crops have the highest water use efficiency followed by winter crops. Annual crops are the least efficient.
- ✓ Reduce fuel usage.
- ✓ Implement an energy efficiency audit on your farm.
- ✓ Make irrigation system more efficient
- ✓ Assess whether water supplies are adequate for a drier climate (and therefore water quality).
- ✓ Follow and track research on production efficiencies, new management strategies, livestock systems, etc.
- ✓ Be cognizant of conditions influencing nutrient cycling (carbon and nitrogen) on your farm.
- ✓ Monitor climate and weather data (daily/monthly/annual means). Prepare and plan for the changing climatic conditions.

Resources

1. Agricultural Region of Alberta Soil Inventory Database (AGRAISID)
[http://www1.agric.gov.ab.ca/\\$department/deptdocs.nsf/all/sag3249?opendocument](http://www1.agric.gov.ab.ca/$department/deptdocs.nsf/all/sag3249?opendocument)
2. Agriculture and Climate Information Service (ACIS)
[http://www1.agric.gov.ab.ca/\\$department/deptdocs.nsf/All/acis10819](http://www1.agric.gov.ab.ca/$department/deptdocs.nsf/All/acis10819)
3. Alberta Agro-climatic Atlas - contains 29 generalized maps compiled using 1971-2000 normals (revised 2005). Toll-free in Alberta at 310-FARM (3276) or visit
[http://www1.agric.gov.ab.ca/\\$department/deptdocs.nsf/all/sag6278](http://www1.agric.gov.ab.ca/$department/deptdocs.nsf/all/sag6278)
4. The Alberta Environmental Farm Plan Company (AEFP). 1-866-844-2337 or visit
<http://www.albertaefp.com/>
5. Climate Change – Greenhouse gas page: <http://www.agric.gov.ab.ca/ghg>

For more information or other climate change bulletins call (780) 422-4385 or go to <http://www.agric.gov.ab.ca> (Alberta Agriculture and Food) and click on “Weather and Climate” and follow the links.