Sustainability practices on farm

By Canadian Federation of Agriculture (CFA)

Description

As the frequency of events like droughts increases under climate change, crop yields would decrease. This would increase the vulnerability of producers to climate change, particularly in semi-arid regions of Canada.

Warmer summers could also cause problems for livestock producers related to heat-wave deaths. This is especially true in poultry operations. Other impacts could be reduced milk production and reduced reproduction in the dairy industry, as well as, reduced weight gain in beef cattle.

In addition, droughts and floods could reduce pasture availability and the production of forage, forcing producers to find alternative feed sources or reduce their herd size.

There are several possible effects climate change could also have on crop pests and disease. These would include increased weed growth due to higher levels of atmospheric Carbon Dioxide (CO2) and an increased prevalence of pests and pathogens in livestock and crops. The increased range, frequency and severity of insect and disease infestations are also potential impacts.

While these changes will not have large effects on greenhouse gas (GHG) emissions from crop production systems; they could cause an increase in energy use associated with the manufacture, transportation and application of pesticides.
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STORIES FROM THE FIELD

Agricultural Nitrous Oxide Emission Reductions:
Manages applied nitrogen (N) sources in a more comprehensive and sophisticated way to reduce nitrous oxide (N2O) emissions associated with nitrogen fertilizer application. These BMPs are integrated into a new technology called a Comprehensive 4R (Right Source at the Right Rate, the Right Time and the Right Place) Nitrogen Stewardship Plan.

Conservation Cropping:
Conservation cropping, also known as conservation tillage and zero tillage, reduces or eliminates use of tillage machinery, such as combines. Three benefits associated with conservation cropping include: new carbon stored annually in agricultural soil; lower nitrous oxide emissions from soils, and associated emission reductions from reduced fossil fuel use from fewer passes per farm field.

Intercropping:
The process of growing crops (e.g. cereals and legumes) in close proximity to increase soil organic carbon and soil organic matter and thus, carbon sequestration. The Ontario Government lists the per hectare (per ha) carbon sequestration potential of this method as medium.

Winter Cover Crop:
The process of growing crops post-harvest to ensure that croplands are not bare throughout the winter. Winter crop cover reduces soil erosion and maintains soil organic matter, increasing the cropland's ability to sequester and store carbon.

Biofuel Production and Usage:
Feedstock for biofuel may produce from a number of agri-food processes, such as crushing of oilseeds and refining of vegetable oils. This creates emission reductions from the avoidance of fossil fuel consumption when the fossil fuel is replaced by biofuels

Energy Generation from the Combustion of Biomass Waste:
The use of biomass to generate thermal energy and/or power can reduce greenhouse gas (GHG) emissions from a when the biomass energy is used to displace energy derived from fossil fuel combustion. Agricultural residues from manure and animal bedding can serve as biomass sources.

Reduced Age at Harvest of Beef Cattle:
Reduces emissions associated with the raising of beef cattle by reducing the number of days required to get a feeder calf from birth to harvest.

Reducing Greenhouse Gas Emissions from Fed Cattle:
This protocol for reducing greenhouse gas emissions in fed cattle addresses digestion and manure storage/handling sources of livestock greenhouse gas emissions.

Selection for Low Residual Feed Intake Markers in Beef Cattle:
Selective breeding of cattle using a genetic marker for low residual feed intake (RFI) can result in cattle that are more efficient in their feed utilization compared to other cattle. This increased efficiency of feed utilization results in reduced enteric fermentation emissions being released by the cattle to other cattle.

Woodland Conservation & Reforestation:
Listed as having a high carbon sequestration potential by the Ontario Government, woodland and reforested areas serve as carbon sinks. Added benefits include soil erosion reduction.

Riparian Buffer Strips, Windbreaks & Shelterbelts:
Involve use of wooded areas to protect farmlands from the erosive effects of waterbodies and winds. This erosion control prevents loss of soil organic matter needed to ensure carbon sequestration.

STORIES FROM THE FIELD

Results

From 1981-2011, agricultural best management practices helped reduce Canada's annual biological farm emissions from 1.1 million tonnes to -11 million tonnes, effectively making agriculture a carbon sink. Canada's crop sector alone has sequestered the equivalent of 61.4 million tonnes of carbon since 1986 – for a total value of just under $1 billion when priced at $15 per tonne under Canada's federal carbon pricing regime. Agricultural landscapes can also provide Ecological Goods and Services (EG&S) when it comes to building landscape scale resiliency. Agriculture can support Canadians and municipalities in adaptation through water management in times of both drought and flooding, and water quality improvements. Furthermore, agriculture supports landscape scale adaptation through soil conservation, air quality and localized cooling during heat events. Agricultural adaption is critical for predictable yields that support food security, to support rural livelihoods and to grow a strong Canadian economy.

Climate smartness

The different practices promoted in the project, contribute significantly to the three CSA pillars, as they are focused on mitigation and adaptation to climate change and mainly the cost-effectiveness of crops. Most of the practices promoted in the project are identified within a global CSA evaluation carried out by Sova et. al., 2018.

It is worth mentioning that those practices are more focused on nitrous oxide emissions, production and use of biofuels. Changes in the management of cattle and forest systems are mostly related to mitigation, understood as the reduction of emissions and the capture of greenhouse gases.

The practices focused on crop management and the use and conservation of water sources, are more related to the increase of the adaptive capacity of productive systems.

It is necessary to consider the incorporation of additional practices that are currently working in the region, which can improve the yields and climate resilience of the farmers. Similar, it is essential for the optimal implementation of climate smart agriculture practices the strengthening of the climate information flow to the producers, as well as the empowerment regarding to the use of climate information, to ensure better decisions in the future, adjusted to their socioeconomic and environmental conditions