DOI: 10.5203/pmuser.201842663

Editorial

Agriculture Production and Quality of the Environment

Nicholson N. Jeke[1]

[1]Dept. of Soil Science, Faculty of Agricultural & Food Sciences, University of Manitoba, Winnipeg, MB, R3T 2N2
Corresponding Author: N. Jeke (jeken@myumanitoba.ca)

Increasing intensity of agriculture production while minimizing the environmental footprint is one of the challenges facing the agricultural sector. Canada is one of the largest agriculture producers and exporters in the world. As the global population increases, it is essential to provide more food, fuel, and fiber for the increasing demand, while maintaining the quality of the environment.

Farmers are increasingly aware of the impacts that agriculture production can have on the quality of soils, water, air, and biodiversity. Information systems to help decision making, policies, and programs have been put in place to achieve environmental sustainability of Canadian agriculture. How has Canadian agriculture performed in achieving environmental sustainability?

Agri-environmental indicators have been developed to measure the agriculture and agri-food sector's environmental performance for soil, water, and air quality and farmland management. According to the Environmental Sustainability of Canadian Agriculture: Agri-Environmental Indicator Report Series — Report #4 (2016), soil quality, as indicated by soil erosion, organic matter, and salinization indicators, has improved considerably over the last 30 years. This was attributed to improvements in land management practices such as reduced tillage, no-till practices, and a reduction of the area under summerfallow. On the other hand, indicators of water quality showed a trend of increasing risk of water contamination as shown by the deteriorating nitrogen, phosphorus, pesticides, and coliforms indicators.

Risk of water contamination was attributed to the increased application of nitrogen and phosphorus as fertilizer and manure, and the increased use of pesticides. Considering various agricultural emissions together (agricultural greenhouse gas, agricultural ammonia, and particulate matter indicators), agricultural performances in air quality have been relatively stable between 1981 and 2006, and significantly improved to 2011. In general, these findings indicate that the Canadian agriculture sector is progressing towards environmental sustainability.

Farmers are good environmentalists and are doing their part in taking care of the land. While further efforts are needed to maintain the quality of the environment, it appears that more effort is needed in nutrient management to reduce water quality issues. Is there room left for nutrient management within the existing agricultural production systems?

The flow of nutrients such nitrogen and phosphorus into lakes and rivers can increase algal blooms and reduce water quality. In Manitoba, nutrient loading is a huge problem on Lake Winnipeg, and many waterbodies throughout its drainage basin. Agriculture has a role to play in nutrient management and agriculture's share of nutrient loading comes from commercial fertilizers, livestock manure, vegetative residues and the soil. Researchers are developing practices to increase nitrogen and phosphorus use efficiency, reduce runoff, and retain these valuable nutrients on farmland.

Manitoba has some of the most stringent nutrient management regulations in Canada which aim to maximize agronomic benefits while minimizing environmental risks. Regulation of phosphorus application, restriction of winter application of fertilizer, manure and biosolids, and encouraging manure injection and incorporation are some of the several paths that aim to reduce nutrient loses from farmland in Manitoba.

Current scientific knowledge of nutrient management and water quality supports the importance of using the right rates, timings and placements of all sources of agriculture nutrients. Continuing investing in research will help to monitor and refine nutrient management practices. Researchers have opportunities to contribute to developing public policy on the issues affecting water quality while serving on various committees and task forces.

Studies in Manitoba have shown that managing phosphorus loss with traditional soil and water conservation beneficial management practices (BMPs) which reduce soil erosion may increase loss of dissolved phosphorus loss to surface waters, where erosion is not the main cause of phosphorus loss. For example, keeping crop residue on the soil surface or having vegetation buffers may reduce soil erosion, but vegetative phosphorus loss can occur during snowmelt as phosphorus dissolves from plant matter into the water.

Therefore, BMPs used to address water quality problems will differ with different environments e.g. rainfall dominated systems with soil erosion issues vs snowmelt runoff on prairies. No beneficial management practice will be a solution for all issues associated with water quality problems. Scientific knowledge to maximize benefits and minimize trade-offs of BMPs is crucial. This may require the evaluation of each problem and potential management practices need to be evaluated to consider all the benefits and side effects.

Agri-environmental indicators suggest that at the national level, the Canadian agriculture sector is progressing towards environmental sustainability. However, objective and useful information will continue to be required to help inform decision making on the farm and for policy and program development. Development of appropriate BMPs that are suited for local environments will be important.