



# GROW MORE CROPS & PROTECT MORE WATER



**FERTILIZER CANADA**



Learn about 4R Nutrient Stewardship at  
**[fertilizercanada.ca](http://fertilizercanada.ca)**

**How 4R Nutrient Stewardship can Improve Water Quality  
While Increasing Farmer Competitiveness**





## Conserving Canada's Fresh Water

Fertilizer Canada represents manufacturers, wholesale and retail distributors of nitrogen, phosphate, potash and sulphur fertilizers – the backbone of Canada's agri-food economy. Responsible for half of the world's current food production, fertilizer is fundamental to the future of agriculture and farmers' ability to feed a growing global population.

As the world seeks to sustainably grow food from a decreasing land base, farmers will rely on fertilizer to increase production efficiency while conserving our soil, water, and air. To meet the challenge, farmers will require more than just new and innovative technologies; they will require a framework for responsible management of crop nutrients within sustainable agriculture.

4R Nutrient Stewardship has been designed for this purpose. For more than a decade, Fertilizer Canada has worked with Canadian farmers and the fertilizer industry to promote 4R Nutrient Stewardship - a science-based approach to nutrient management that involves applying the Right Source @ Right Rate, Right Time, Right Place®. Use of 4R Nutrient Stewardship optimizes plant nutrient uptake, yield and farmer profitability while also minimizing nutrient runoff, leaching and nitrous oxide emissions.

### **4R Nutrient Stewardship Improves and Conserves Water Quality**

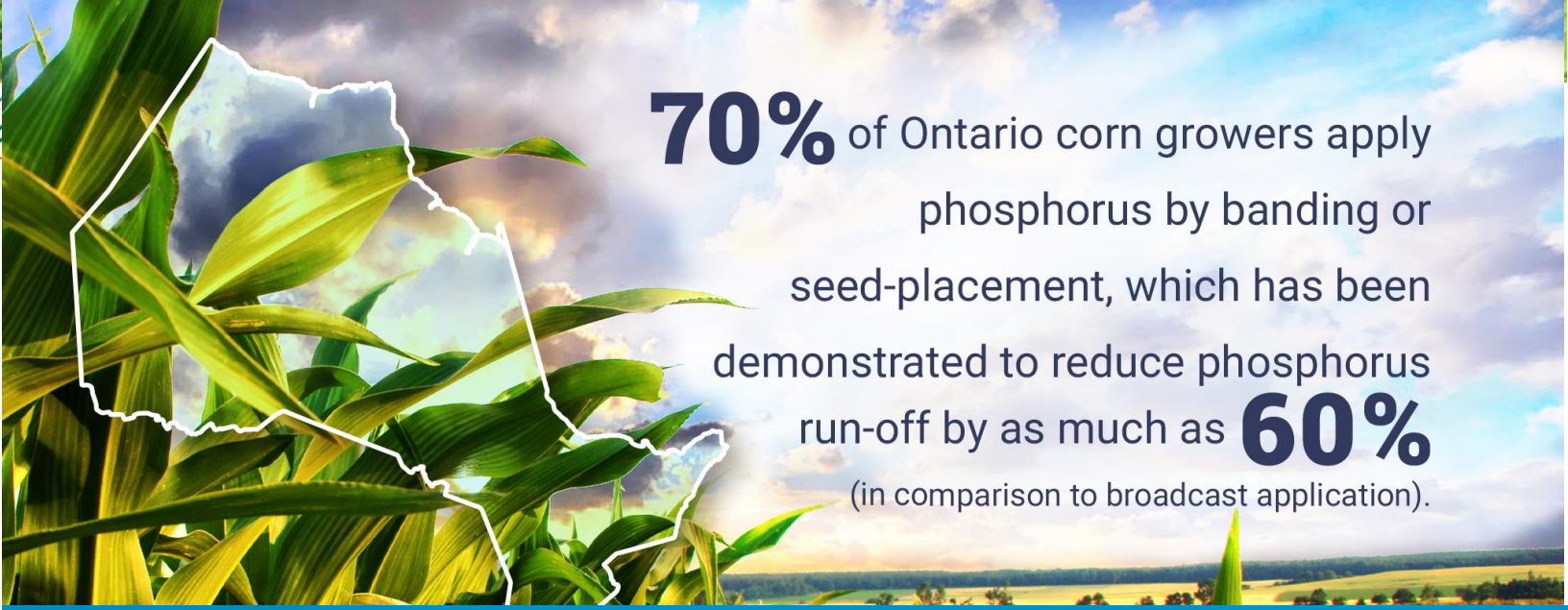
Implementing 4R Nutrient Stewardship best management practices (BMPs) plays a key role in improving water quality across Canada. 4R Nutrient Stewardship research has demonstrated the following benefits for water quality in Canada.

- In a Saskatchewan cereal-oilseed-pulse rotation, using in-soil placement to apply phosphorus fertilizer at appropriate rates, farmers can significantly lower phosphorus runoff by as much as 75% into surface and subsurface water bodies.
- In Prince Edward Island, applying 4R BMPs in potato production can reduce nitrate leaching into the soil by as much as 32%.
- In Ontario corn production, implementing 4R BMPs of subsurface banding of phosphorus fertilizer as opposed to broadcasting enables farmers to reduce losses of dissolved phosphorus in runoff up to 60%.

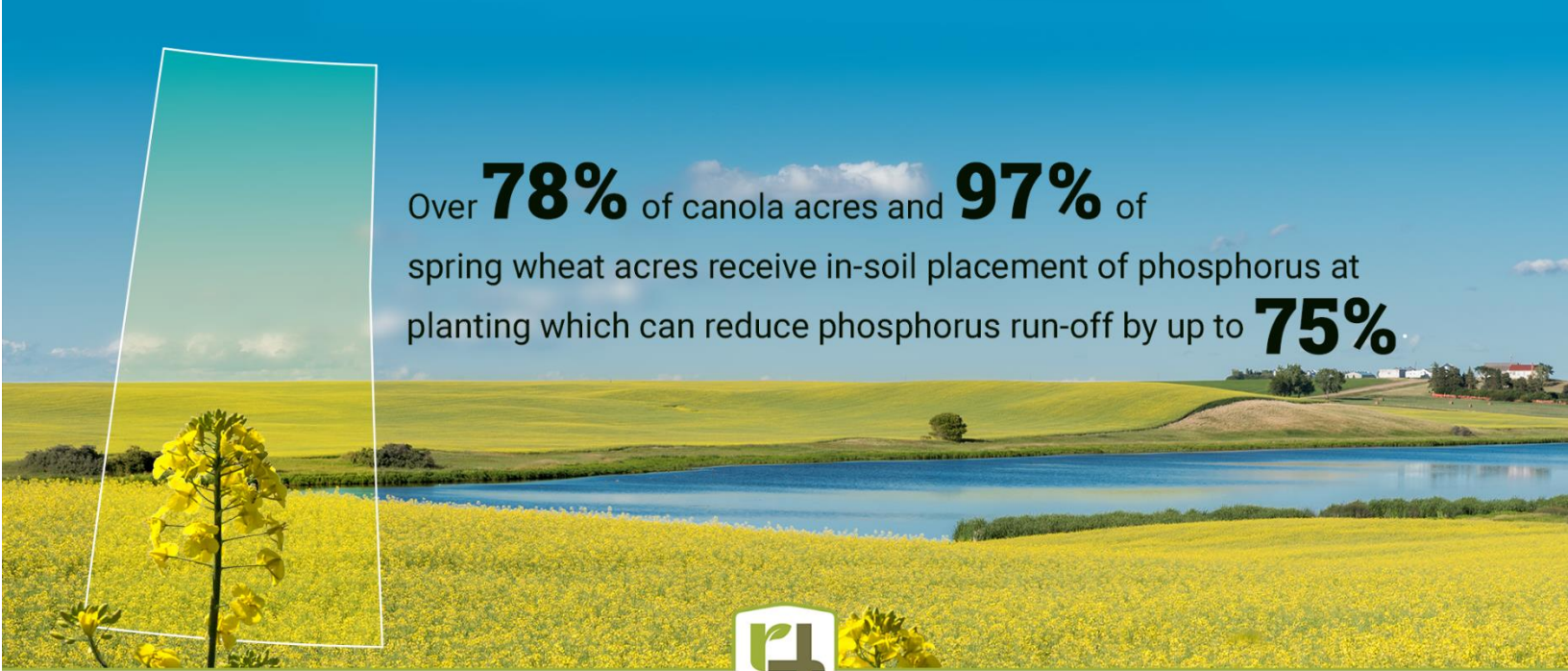


In side-by-side trials conducted in grower's fields, 4R BMPs were shown to result in as much as a **32%** reduction in nitrate leaching. Which is essential as PEI receives **100%** of its drinking water from groundwater sources.

(Nitrate ( $\text{NO}_3^-$ ) leaching is when Nitrate leaves the soil in drainage water)



**70%** of Ontario corn growers apply phosphorus by banding or seed-placement, which has been demonstrated to reduce phosphorus run-off by as much as **60%** (in comparison to broadcast application).



Over **78%** of canola acres and **97%** of spring wheat acres receive in-soil placement of phosphorus at planting which can reduce phosphorus run-off by up to **75%**



## **Stakeholder Partnerships & Recognition**

Fertilizer Canada is proud of our provincial partnerships in Manitoba, Saskatchewan, Prince Edward Island, Quebec, and Ontario. Our industry continues to work collaboratively with provincial governments, farmer organizations and conversation groups to promote increased awareness and adoption of 4R Nutrient Stewardship. Recently, through our voluntary 4R programs, Fertilizer Canada has verified approximately 4 million acres across Canada – showcasing our industry's commitment to sustainable nutrient management and environmental stewardship.

4R Nutrient Stewardship is seen as an international standard for nutrient management and is referenced in the following provincial, national, and international environment plans:

- The Canada-Ontario Lake Erie Action Plan references 4R Nutrient Stewardship as the recommended approach when developing watershed management plans in order to achieve meaningful nutrient load reductions in Lake Erie.
- The Manitoba Climate and Green Plan notes 4R Nutrient Stewardship as a method to reduce nutrient loading.
- The Prairie Resilience Plan references 4R Nutrient Stewardship as a way to enhance fertilizer efficiency and has set a target of having 25% of Saskatchewan cropland acres under 4R Designation by 2025.
- The United Nations Food and Agriculture Organization (FAO) references 4R Nutrient Stewardship as a framework the fertilizer industry should follow in The International Code of Conduct for the Sustainable Use and Management of Fertilizers.

## **Increasing Uptake of 4R Nutrient Stewardship Through Voluntary Programming and Incentives**

Canada's fertilizer industry believes that voluntary, industry-led initiatives are the best approach towards reducing nutrient runoff and environmental impacts. Fertilizer Canada has been a part of introducing voluntary 4R Nutrient Stewardship programming across Canada. We have worked with farmer organizations, provincial governments, and environmental groups to advance both the 4R Certification program in Ontario and the 4R Designation program in Western and Atlantic Canada.

The Ontario agriculture industry is committed to working towards the long-term improvement of the Great Lakes water quality and in 2018, launched the 4R Certification Program in Ontario. The Certification program works to verify Nutrient Service Providers as following 4R Nutrient Stewardship in their farmer's nutrient recommendations, applications, and training through a third-party audit. Since the launch, 40 sites have gone through their pre-audit and 24 sites have completed a full audit making them 4R Certified.



The 4R Designation program first begun in 2018 in Western Canada and is focused on the training of Certified Crop Advisors (CCAs) in the writing of a 4R Nutrient Management plan. The trained CCAs are able to become a 4R Designated Agronomist attesting to recommend under the framework of 4R Nutrient Stewardship to their farmer customers when making nutrient recommendations. Throughout Western Canada, we have designated 163 CCAs who are ready to provide farmers with a 4R Nutrient Management plan.

Nutrient Service Providers and agronomist are a key link to the farmer community as trusted advisors. They are able to work alongside farmers to implement management frameworks like the 4Rs that are key to reducing nutrient losses into the air and waterways while also maintaining economic goals. With these programs now functional in Canada, they are able act as the framework for farmers and agronomist to access knowledge and implement 4R Nutrient Stewardship Best Management Practices (BMPs).

There are socioeconomic and technological barriers to implementing the technologies that underpin 4R Nutrient Stewardship BMPs, such as:

- (1) farm income; and (previous) low crop prices;
- (2) lack of expertise in interpreting the data and valuing the advanced technologies;
- (3) farmer perception of the cost being greater than the benefit (this is also a function of the average age of a farmer); and
- (4) time.

Our Fertilizer Use Survey also showed that cost was the number one barrier to adoption of 4R practices. In the 2020 survey, 44% of corn farmers in Ontario and 45% of canola farmers in western Canada believe they are voluntarily implementing a *basic* level 4R Nutrient Stewardship - meaning they are self-identifying through the survey as following the basic level of 4Rs based on the [4R guidance tables](#). However, the survey found that less than 5% of farmers are developing a 4R plan through a 4R Designated/Certified Nutrient Service Provider and verifying their practices as 4R.

## **Using the 4R Climate Smart Protocol to Improve Environmental Indicators**

Fertilizer Canada believes that incentive programs for 4R BMPs will help offset the cost of soil testing, variable rate technologies or new equipment and would encourage the continued uptake of 4R practices in Canada. The solution to increasing and formalizing the uptake of more advanced 4R Nutrient Stewardship practices that reduce emissions and help conserve water can be found in programs like the 4R Climate Smart Protocol.

The 4R Climate Smart Protocol incorporates 4R Nutrient Stewardship (Right Source @ Right Rate, Right Time, Right Place®), providing a framework for farmers to reduce on-farm GHG emissions from nitrogen fertilizer in a quantifiable and credible way, and in return allowing farmers to produce saleable carbon credits.



While the 4R Climate Smart Protocol is focused on BMPs for reducing greenhouse gas emissions, tapping into this management framework addresses multiple environmental goals.. Utilizing a well-chosen nutrient management plan with the “right” BMPs selected will have multiple impacts including; optimum yields, reduced GHG emissions, and reduce nutrient loss impacts on water quality.

## **Maintaining Water Quality Throughout the Supply Chain**

In addition to sustainable use of nutrients through 4R Nutrient Stewardship to reduce losses to water bodies, our manufacturing companies use water sustainably and responsibly to produce the world’s more energy efficient potash supplies.

- Environmental stewardship and sustainability are pillars of the mining industry. Potash sites in Canada implement comprehensive environmental stewardship activities, including water management and conservation practices, as part of a mine’s entire lifecycle. Significant human and monetary resources are invested to minimize the environmental impact of mine operations or products.
- All potash mines adhere to a policy of zero discharge to lakes or streams. Potash production operates as a “closed loop” system in which wastewater is recycled back into the production process, preventing any discharge into waterways or wastewater treatment systems. The industry is proud of its ability to reuse and recycle wastewater effluent back into the production process, thus there is no known release of aliphatic amines or other contaminants into the environment from potash production in Canada. The remainder is deep-well injected to comply with applicable environmental standards.
- While the federal government does regulate some aspects of the potash industry, the provincial regulators play a major role. These authorities are extensively engaged to ensure that sites are managing water in compliance with current regulations and site operating permits and complete inspections and audits at each site.
- The operating permits for nitrogen manufacturing and potash sites contain many surface and groundwater monitoring and sampling requirements. The results are shared with the province as part of the site’s annual environmental reporting. Where possible, nitrogen facilities also typical recycle water back to the production process.
- The potash industry proactively collaborates with outside stakeholders as part of their water management activities including rural municipalities, local landowners and watershed associations.



## Recommendations

*Fertilizer Canada recommends that:*

- 1. Agriculture and Agri-Food Canada should help farmers implement 4Rs on farm by providing incentives that offset costs, which will provide support to farmers during the post-COVID period, benefit the environment in improvements to water quality reduced emissions, and increase farmer profitability.** While 4R Nutrient Stewardship represents a win-win for industry, farmers, and the environment, there are both upfront and annual costs to changing agricultural practices in the form of new equipment or agronomic consultations. In addition, farmers are taking on increasing levels of debt and may not have the time or resources to change long-standing practices.
- 2. Environment and Climate Change Canada should immediately prioritize development of the 4R Climate Smart Protocol so that farmers are incentivized to implement practices that reduce emissions and in turn also conserve water quality.** Protocol implementation requires on-farm practice changes that can be made only once per growing season. With only nine growing seasons between now and 2030, it is critical that the Government of Canada prioritize the development of this protocol for Canadian farmers.
- 3. The Government of Canada should use the Canada Water Agency to provide information about freshwater management techniques, like 4R Nutrient Stewardship.** As the central entity for federal water management, the Canada Water Agency will be an important tool in standardizing and centralizing information for stakeholders. Canadian farmers want to play a role in improving water quality, but they need access to information and incentives. The Canada Water Agency should provide farmers access to information on freshwater management, like the 4R Nutrient Stewardship program, which will improve the distribution and implementation of science-based techniques.
- 4. The Government of Canada should ensure alignment of the Canada Water Agency with provincial environment plans.** Particularly as it relates to agriculture, provincial departments play a significant role in building relationships, trust, and expertise. Many provinces have already proactively developed environmental plans that recognized sustainable agricultural practices that benefit water quality. The Government of Canada should ensure they are not duplicating work or making it harder to achieve the goals of improved water quality through overlapping requirements.