

4R Nutrient Stewardship Grower Adoption across Canada

A summary of the fertilizer use survey conducted from 2014 to 2021.



MANITOBA
CROP
ALLIANCE



About the survey

The Fertilizer Use Survey assists in understanding the current state of fertilizer management in Canadian crop production and how growers use and make decisions about fertilizer applications.

Conducted between the 2014 and 2021 growing seasons, the survey gathers data on fertilizer management practices and current knowledge of 4R Nutrient Stewardship (Right Source @ Right Rate, Right Time, Right Place®) from growers across the country. The survey also captures baseline data about corn, soybean, winter wheat, spring wheat, flax, sunflower and canola crops in Canada. This information is essential for developing sustainability metrics and sound 4R Nutrient Stewardship strategies.

The 2021 Fertilizer Use Survey was funded by: Alberta Wheat Commission, Canadian Canola Growers Association, Christian Farmers Federation of Ontario, Fertilizer Canada, Grain Farmers of Ontario, Ontario Agri-Business Association, Ontario Federation of Agriculture, Manitoba Crop Alliance, and Saskatchewan Wheat Development Commission



Sustainability

The agriculture industry is a leader in sustainable nutrient management — promoting profitable, healthy and responsible food production.

Fertilizer Canada is guided by its sustainability principles:

- **Decisions and actions** based on sound science
- **Promote best practice** on-farm nutrient 4R Nutrient Stewardship (Right Source @ Right Rate, Right Time, Right Place®)
- **Ensure** products are safe, environmentally responsible, and effective
- **Set standards** for the safe, secure, and environmentally responsive and responsible production, distribution, handling and transportation of fertilizer
- **Communicate openly** and work in partnership with our stakeholders
- **Encourage transparency** and performance reporting
- **Act with integrity**

What is 4R Nutrient Stewardship?

4R Nutrient (Right Source @ Right Rate, Right Time, Right Place®) balances farmer, industry, and government goals to improve on-farm economics, crop productivity, and fertilizer efficiency while benefiting the environment.



Right Source

Select the correct source of nutrient for your soil to ensure a balanced supply of essential plant nutrients.



Right Rate

Apply nutrients to meet crop requirements while accounting for the nutrients already in soil.



Right Time

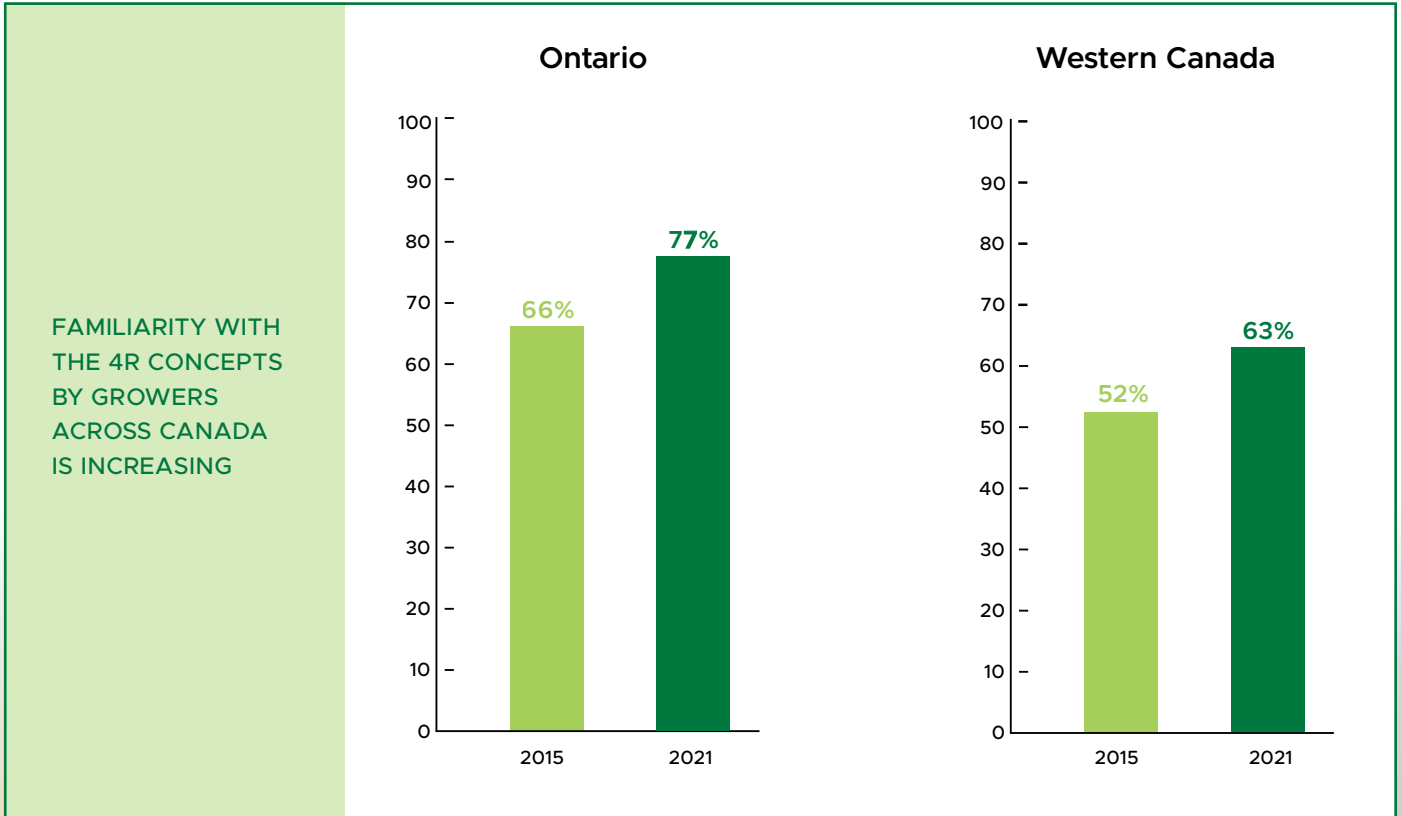
Carry out nutrient management planning on an annual basis and apply during the correct season.



Right Place

Place nutrients below the soil surface where they can be taken up by roots and are far enough back from waterways.

Awareness of 4Rs is growing



The long term benefits include increased yields, economic return, and a healthier, safer environment.

Barriers to Adopting 4Rs



Top 3 Ontario

1. Lack of incentive
2. Lack of information/knowledge
3. Not a service provided by your agri-retailer



Top 3 Western Canada

1. Lack of proven benefit
2. Lack of incentive
3. Cost/Expense

Reasons for Having a 4R Plan



Top 3 Ontario

1. Using the best environmental stewardship practices
2. Increase in economic return
3. Using the most up-to-date, science-based fertilizer practices



Top 3 Western Canada

1. Improved soil quality and nutrient availability
2. Using the best environmental stewardship practices
3. Increase in economic return




4R Climate-Smart Protocol

4R Climate-Smart Protocol, also known as Nitrous Oxide Emission Reduction Protocol (NERP), is a framework which works with growers to implement Nitrous oxide reducing practices on their farm.


The aim of the program is for a grower to receive carbon credits for the practices they implement, which could provide an opportunity to remove the lack of incentive barrier identified in the 2021 Fertilizer Use Survey.

4R Consistency in Canada


Through the Fertilizer Use Survey, we can assess grower's implementation of basic 4R principles. In 2021, across all crops surveyed there was an estimate of 25.4 million acres that are implementing basic 4R principles— that is approximately 58% of acres following 4Rs across the surveyed crops and regions.



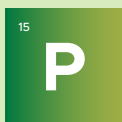
54% of Canola acres in Western Canada were following Basic 4R Principles in 2021, an increase of 10% from 2020.



68% of Corn acres in Ontario were following Basic 4R Principles in 2021, an increase of 3.5% from 2020.



58% of Spring Wheat acres in Western Canada were following Basic 4R principals in 2021- this represents approximately 9.3 million acres.



Phosphorus: Fueling plant growth

Phosphorus fertilizer is an essential nutrient for early plant health and root growth. It helps with seed germination to ensure plants use water efficiently and provides the energy a plant needs to grow.

Keeping it in the soil

Agriculture is an important socio-economic contributor to many regions in Canada, but also contributes to environmental issues, including phosphorus runoff. As Canada has one of the world's largest sources of renewable freshwater, it's essential growers utilize 4R Nutrients Stewardship during application to ensure crops receive the right nutrients that stay in the soil and out of waterways.



Did you know?

Subsurface placement, a 4R best management practice, which ensures that phosphorus stays in the field, can reduce runoff into water ways by up to 60%?



Nitrogen: Meeting demand for nutrition and reducing emissions

Of the 17 essential nutrients, nitrogen is the one plants demand the most. Nitrogen fertilizer ensures high yields, high quality, better disease resistance, and higher nutritional value of crops.

Applying Nitrogen the smarter way

Research shows implementation of advanced practices under the **4R Climate-Smart Protocol** can reduce nitrous oxide emissions by 35%¹

Studies show that 30% emission reduction below 2020 nitrous oxide emission levels could be possible in the Canadian prairies with 80–90% adoption of intermediate 4R practices under the **4R Climate Smart Protocol**²

15% of nitrogen volume applied in Canada is utilizing an **Enhanced Efficiency Fertilizer** Product.

Nitrogen use in Canada



Canada is the world's largest exporter of Canola, on average we account for **60% of the world's Canola exports**.³



In Canada, corn production has increased **64% since 2005**.⁴



Nitrogen enhanced efficiency fertilizers have been shown to consistently reduce emissions by **10–35%**⁵



13% of growers across Canada are electing to utilize variable rate technology on their farm, an **advanced 4R practice**.



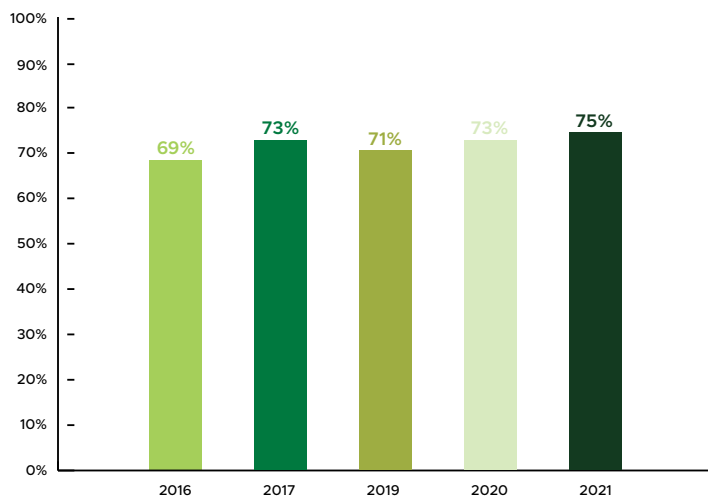
In this report, an **Enhanced Efficiency Fertilizer** is considered the following products: Urease Inhibitor, Nitrification inhibitor, a Dual inhibitor or a Polymer coated urea product.*

*Note, In the AAPFCO definition, enhanced efficiency fertilizers reference products that are defined as “soluble fertilizer products (before treatment by reaction, coating, encapsulation, addition of inhibitors, compaction, occlusion, or by other means) or the corresponding product used for comparison to substantiate enhanced efficiency claims.”⁶

Canola

Canola growers are already choosing to implement 4R Nutrient stewardship practices on their farm.

FIGURE 1: % OF N APPLIED IN THE SPRING AT PLANTING



Consistently, **75% of nitrogen applied in Canola** was applied during the spring at planting time in 2021, (Figure 1) implementing the right time 4R Best Management Practices (BMP). This has been shown to reduce emissions upwards of 20% relative to an early fall application with no inhibitor⁵.

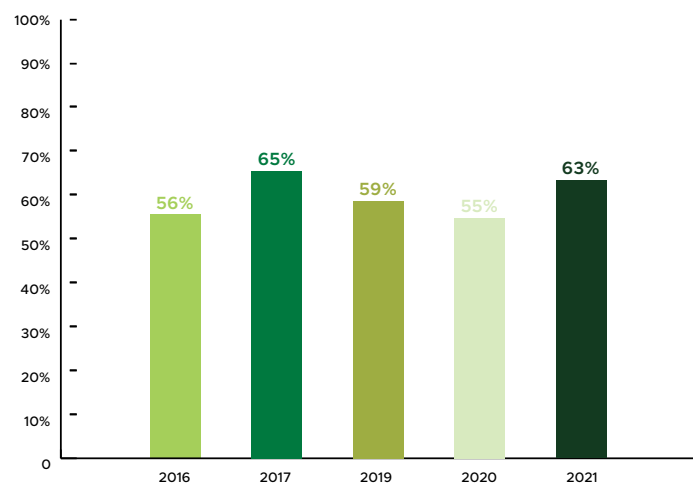
90% of Canola acres in Western Canada are banding, mid-row banding or seed placing their P_2O_5 fertilizer, a practice shown to reduce phosphorous losses by up to 60% in Western Canada.

Areas where Canola growers can increase uptake of 4R BMPs

In 2021, **15%** of the nitrogen volume applied in canola was applied utilizing an enhanced efficiency fertilizers (EEF). EEF's can have a huge impact on protecting N fertilizer and can reduce N_2O emissions by **10–35%**.

Soil sampling allows growers to ensure they are applying the right amount of nutrients to the soil, no more and no less. The per cent of growers soil sampling for P_2O_5 every three years has been consistent over the **past five years** (Figure 2).

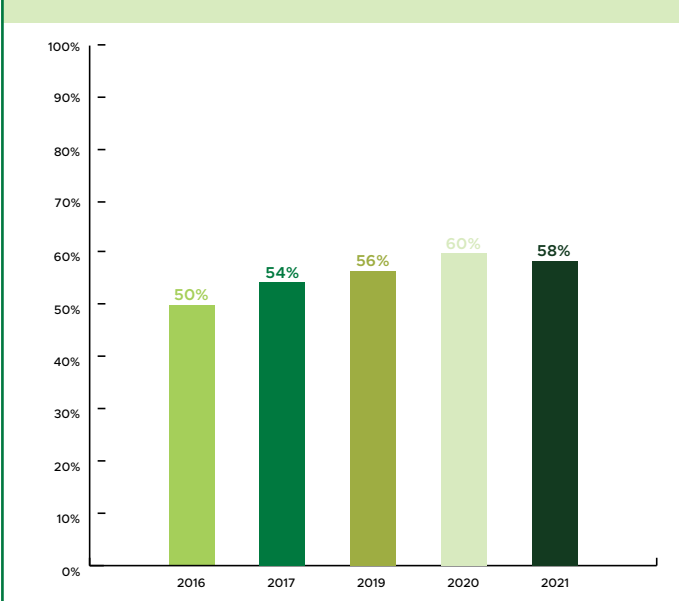
FIGURE 2: % OF WESTERN CANADA GROWERS SOIL SAMPLING FOR P EVERY 1-3 YEARS





Corn Growers in Ontario are already choosing to implement 4R Nutrient Stewardship Practices on their farm

FIGURE 3: % OF CROP ACRES APPLIED N IN CROP



58% of corn acres in Ontario are electing to utilize a split application to apply nitrogen in crop. This practice has shown to help reduce emissions by approximately 15% dependent on the weather conditions (Figure 3).

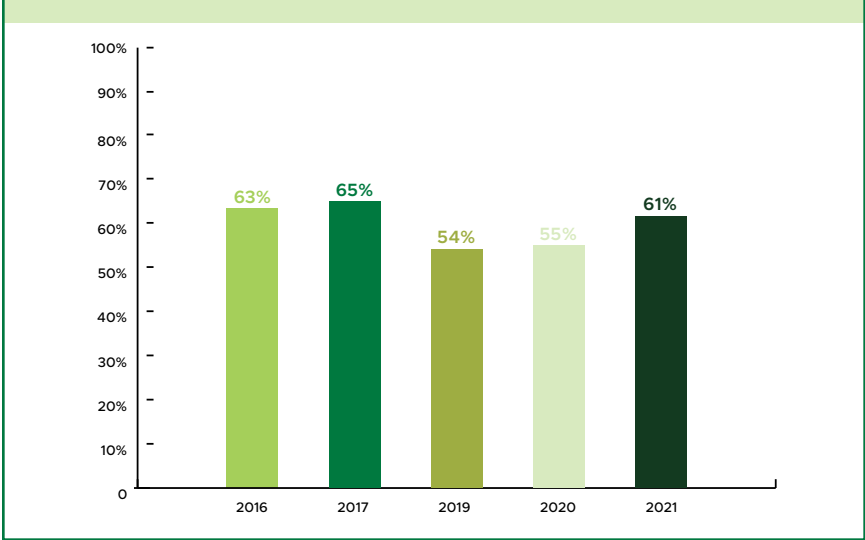
89% of growers are implementing the 4R placement BMP's for P_2O_5 by ensuring their fertilizer is incorporated within one day — even better 44.5% of P_2O_5 applied in corn is being applied utilizing advance practices such as in a side band, mid-row band, or seed placed, a practice shown to reduce losses by up to 60% in Ontario.

Areas where Corn growers can increase uptake of 4R BMPs

Soil sampling allows growers to ensure they are applying the right amount of nutrients to the soil, no more and no less. The percent of growers selecting testing soils for P_2O_5 every 1-3 years has remained consistent over the **past 5 years** (Figure 4).

Utilizing variable rate technologies helps ensure that the right amount of fertilizer is going down in the right place. In 2021, **14% of corn growers** use variable rate application on their corn fields. A practice most commonly used by younger growers.

FIGURE 4: % OF GROWERS SOIL SAMPLING FOR P EVERY 1-3 YEARS



Wheat

Spring wheat growers in Western Canada are already choosing to implement 4R Nutrient stewardship practices on their farm.

90% of wheat acres are banding, mid-row banding, or seed placing their phosphate fertilizer in Western Canada, a practice shown to reduce losses by up to 60% in Western Canada.

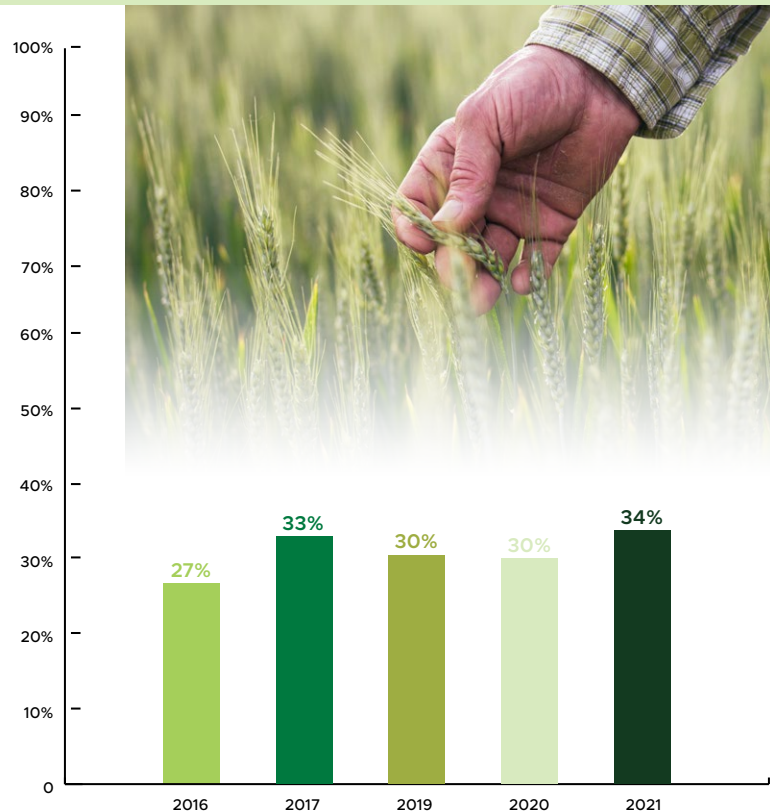
Almost 100% of growers surveyed are following a basic level of 4R right time practices when applying their N Fertilizer in the fall after soils have cooled or in the spring.

Areas where wheat growers can increase uptake of 4R BMPs

Soil sampling allows growers to ensure they are applying the right amount of nutrients to the soil, no more and no less. The per cent of growers soil sampling for N annually has remained consistent over the past **5 years** (Figure 5).

Varying rates on a field-by-field basis or utilizing variable rate technologies helps ensure that the right amount of fertilizer is going down in the right place. In 2021, only 20% of growers were varying their rate on a field-by-field basis with an additional **15% using advanced 4R BMP of variable rate technology**.

FIGURE 5: % OF WESTERN GROWERS SOIL SAMPLING FOR N ANNUALLY



*Note- Wheat in 2021 survey was defined as Spring and Durum wheat.

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