2023

4R in Canada: A National Overview

2023 Fertilizer Use Survey

FERTILIZER CANADA

Background

The Fertilizer Use Survey is a long-standing initiative that Fertilizer Canada and its stakeholders have completed since 2014 to determine fertilizer application practices of growers across Canada and 4R awareness.

Collecting and tracking fertilizer best management practices (BMPs) is vital to developing sustainability metrics and understanding potential adoption across Canada. The survey creates a baseline to measure year-over-year data and provides valuable insights into the motivations and understanding of growers when considering 4R Nutrient Stewardship strategies. Improving sustainable farming in Canada can't be successfully accomplished if we don't understand the situation and existing barriers to adoption.

The 2023 Fertilizer Use Survey was funded by the 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, Saskatchewan Wheat Development Commission, the Canola Council of Canada and Réseau Végétal Québec.

Data is collected through an online survey from an unbiased database of Canadian farmers. The data is self-reported and not validated by a third party.

What is 4R?

4R Nutrient Stewardship is a science-based suite of best management practices for farmers that optimize nutrient uptake by using the right source of nutrients at the right rate, at the right time, in the right place.

Right Source

Select the right blend of nutrients specific to the crop's needs, soil properties, and regional conditions.

Right Time

Apply fertilizer at the right time for optimal crop uptake/absorption, which may include multiple applications. Avoid applying on frozen, snow-covered, or saturated soils to reduce the risk of nutrient loss to the environment.

Right Rate

Apply nutrients to meet the crops' needs, considering nutrients already in the soil and all sources (e.g., livestock manures, commercial fertilizers and atmospheric nitrogen fixed by legumes). Complete annual soil testing to determine what nutrients the soil needs.

Right Place

Apply nutrients in the right place for optimal crop uptake below the soil surface. Respect recommended setback distances for nutrient application near waterways.

Categories of 4R Nutrient Stewardship

4R Nutrient Stewardship practices are categorized into three levels – basic, intermediate and advanced – for each of the four Rs (Right Source @ the Right Rate, Right Time, Right Place®). The practice's level will depend on the region, crop and soil. The more advanced the 4R practices, the greater the reduction in greenhouse gas (GHG) emissions. Practices are not stand-alone and should be considered as suites of practices that work together toward the goal of improving nutrient use efficiency and reducing nutrient losses from the cropping system. The general progression is based on the following concepts:

- **Basic** – Practices are generally consistent with 4R principles. A significant proportion of growers already have these in place or are willing to move to them in the short term (1-2 years).
- **Intermediate** – Practices are fully consistent with 4R principles and may be transitional to advanced practices. Adoption of intermediate-level practices may occur over the medium term (1-3 years), particularly when they involve investment in new technology.
- **Advanced** – Practices are fully consistent with 4R principles and may be considered aspirational and/or best in class. Adoption of a full suite of advanced level practices may occur over a longer time frame (3-6 years), particularly when they involve investment in new technology.

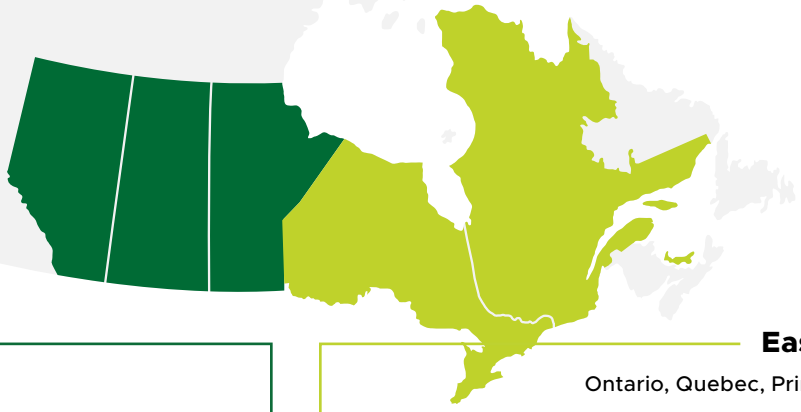
Survey Methodology

About the survey

The surveys were conducted between October 30, 2023, and March 11, 2024. The average length for survey completion was between 25-28 minutes, and a $20 to $50 incentive was offered to farmers for their participation. The online survey was programmed and tested by Stratus Ag Research with questionnaire development modified by Stratus Ag Research with input from Fertilizer Canada. A total of 1,405 farmers responded to the 2023 survey. The data is self-reported and not validated by a third party.

The 2023 survey included canola and spring wheat growers in Western Canada (Alberta, Saskatchewan and Manitoba), barley growers in Manitoba, grain corn and soybean growers in Ontario, grain corn growers in Quebec, and potato producers in P.E.I.

An Overview of Survey Respondents



Western Canada

Alberta, Saskatchewan, Manitoba

ALBERTA, SASKATCHEWAN, MANITOBA

Canola (n=578) and **spring wheat** (n=635)

MANITOBA

Malt barley (n=37) and **feed barley** (n=74)

ALBERTA, SASKATCHEWAN, MANITOBA

Cow/calf (21.9%), **poultry** (8.4%), **hogs** (6.6%)

Age Breakout of Respondents

Western Canada (n=718)
- Alberta
- Saskatchewan
- Manitoba

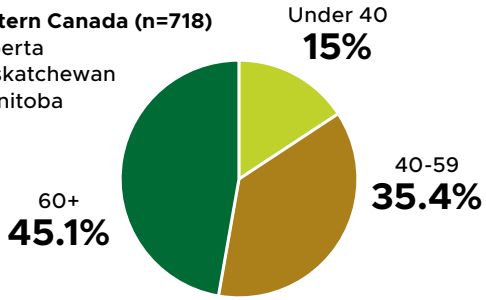


Figure 1: Age breakout of total western Canadian survey respondents in percentages (n=718).

Eastern Canada

Ontario, Quebec, Prince Edward Island

ONTARIO

- **Grain corn** (n=421) and **soybeans** (n=469)
- **Dairy** (13.9%), **cow/calf** (9.7%), **hogs** (6.8%), **poultry** (6.8%)

QUEBEC

- **Grain corn** (n=144)
- **Dairy** (33.3%), **hogs** (7.6%), **feedlot** (2.8%), **cow/calf** (2.8%)

P.E.I.

- **Potatoes** (n=40)
- **Feedlot** (12.5%), **cow/calf** (12.5%), **dairy** (5%)

Age Breakout of Respondents

Eastern Canada (n=687)
- Ontario (n=503)
- Quebec (n=144)
- P.E.I. (n=40)

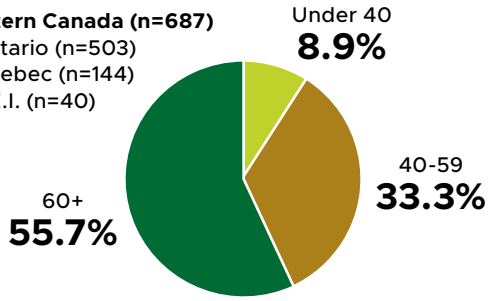
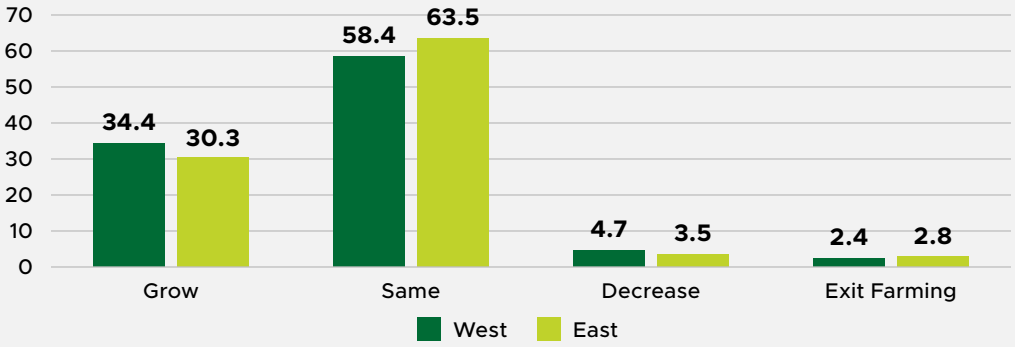


Figure 2: Age breakout of total eastern Canadian survey respondents in percentages (n=687).

Future Plans for the Operation

Figure 3: Future plans for the operations of total Canadian producer survey respondents. The data is represented at the percentage of survey respondents in the East (n=687) and West (n=718).



Awareness and Adoption of 4Rs

Familiarity of 4Rs

Familiarity with 4R concepts has seen an overall increase since 2015. 74% of surveyed Canadian producers are familiar with the concept of 4R Nutrient Stewardship and the value it could provide to their operation (n=1405) (Figure 4).

Familiarity with 4R concepts is quite similar across the country with only a 1.9% difference in familiarity between surveyed Eastern (n=687) and Western (n=718) producers, demonstrating a fairly high level of awareness across Canada.

Overall, familiarity with 4R concepts has seen little change in the last year among surveyed provinces. However, overall familiarity has continued to increase across both Eastern and Western Canada since 2015 and is suspected to continue to rise as producers uncover the value of 4R concepts.

4R Concept Familiarity

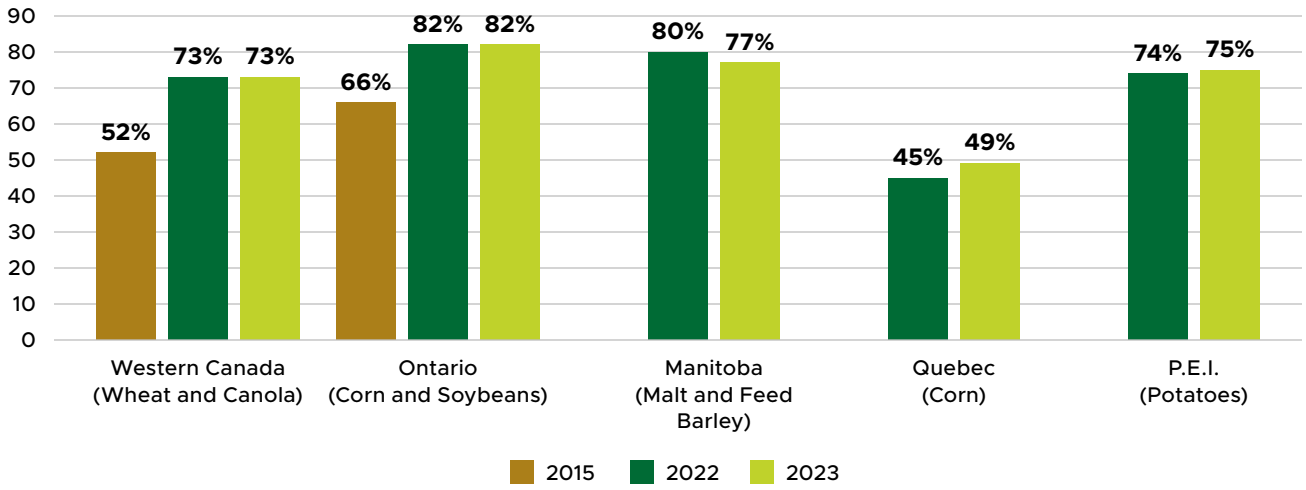


Figure 4: Familiarity with 4R concepts among surveyed producers from 2022 to 2023. 4R concept familiarity is pulled from producers who indicated that they were "very familiar" and "somewhat familiar" with 4R concepts. In 2015, only Western Canadian and Eastern Canadian producers were presented with questions surrounding 4R concept familiarity (2022 was the first year Manitoba, Quebec and P.E.I. were surveyed).

Growers Who Believe They Are 4R Compliant

66.5% of surveyed Canadian producers believe their current practices are compliant with 4R Nutrient Stewardship practices (n=1405) (Figure 5).

While a majority of surveyed Canadian producers are familiar with the concept of 4R Nutrient Stewardship and believe they are 4R compliant (Figure 5 and 6), survey results found that 27.3% of surveyed producers were unsure of their compliance. Both familiarity and compliance tell a compelling story and present a unique opportunity – the strength in the understanding of 4R concepts should be shared among growers in the field to underscore their experiences and the opportunity to demonstrate the value that 4R can provide to producers should be utilized. These compliance insights can help determine where additional education or incentives may be needed to demonstrate value.

Percentage of Farmers Who Believe They Comply with 4R

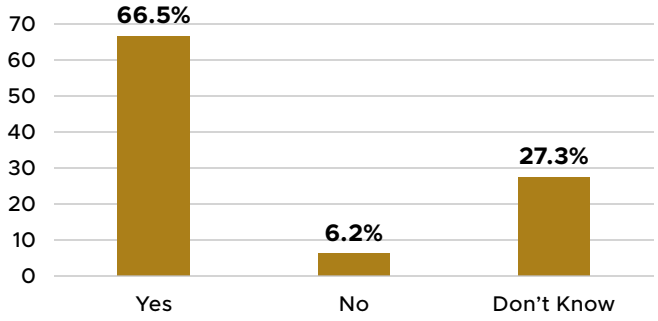


Figure 5: Percentage of surveyed Canadian producers who believe they comply with 4R Nutrient Stewardship practices (n=1405).

Percentage of Farmers Who Are Familiar With the 4R Concept

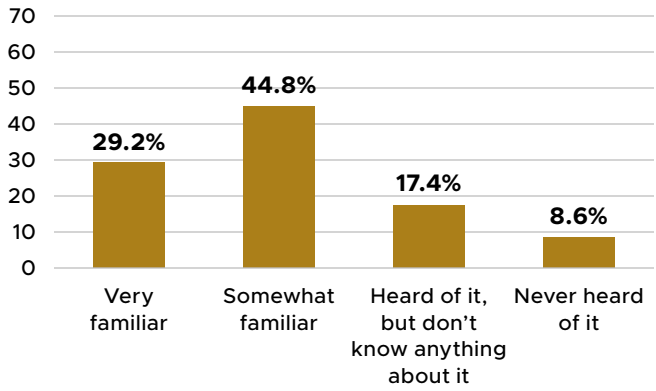


Figure 6: Percentage of surveyed Canadian producers who are familiar with the 4R concept (n=1405).

Growers Who Have a Formal 4R Plan in Place

16.4% of surveyed Canadian producers currently have a 4R plan in place (n=1405). The use of formal 4R plans is similar across Eastern and Western Canada, with only a 2.1% difference across the country.

While more than 50% of surveyed Canadian producers believe they are compliant with the 4Rs, 80.5% do not have a formal 4R plan in place (n=1405). This sentiment is shared among both surveyed Eastern and Western Canadian producers. There is still room for improvement and working with a trusted advisor like a 4R Designated Agronomist or 4R Certified Retailer help farmers better understand implementation, compliance, and overall usage, encouraging growers to put a formal 4R plan in place.

Growers Who Work With a 4R Retailer/Agronomist

32.8% of surveyed Canadian growers are currently working with a 4R Designated (or Certified) retailer or agronomist (n=1405). Working with 4R Designated agronomists and advisors allows producers to confirm their practices and receive agronomic support. While 16.4% of surveyed Canadian producers have a formal 4R plan in place (Figure 7), there is a clear opportunity for retailers and agronomists to work together with growers to establish formal 4R plans. As more than 50% of surveyed producers believe they are compliant with 4R practices, working with a retailer or agronomist will give them the best route to ensuring they are making the most of their practices and plans.

Canadian Producers Who Have a Formal 4R Plan in Place and Work With a 4R Certified Retailer/Agronomist

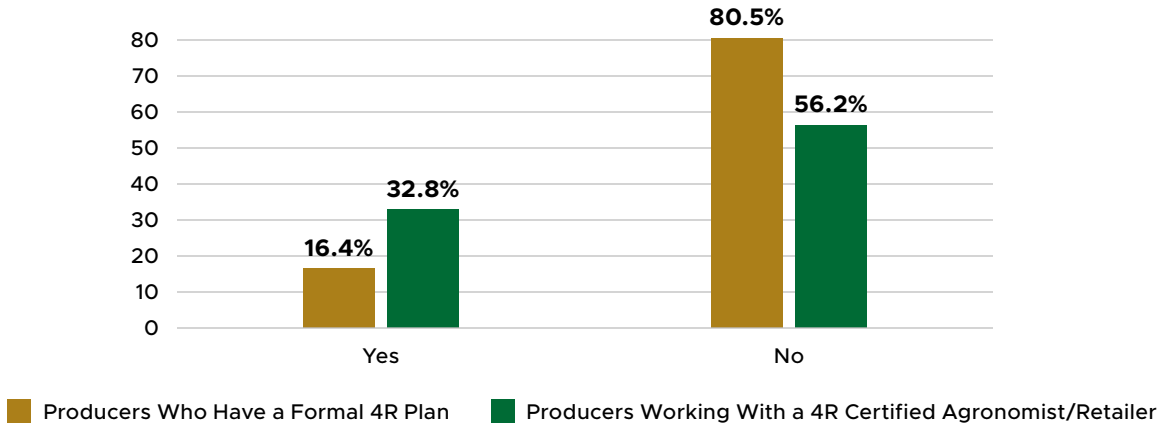


Figure 7: Representation of both the percentage of surveyed Canadian producers who have a formal 4R plan in place (brown) as well as the percentage of surveyed Canadian producers who are working with a 4R Certified agronomist/retailer (green) (n=1405). 11% of growers claimed they "didn't know" whether they worked with a 4R Certified retailer/agronomist.

Reasons Why Some Farmers Have Not Adopted 4R Practices

Today, 6.2% of surveyed Canadian farmers believe their practices are not currently compliant with the 4Rs (n=87). The most common reasons that surveyed Canadian growers have not adopted 4R practices include:

1. Lack of the right equipment — **26.4%**
2. Cost/too expensive to implement a 4R plan — **12.6%**
3. Lack of information/ knowledge — **10.3%**
4. Timing doesn't fit with crop priorities — **9.2%**
5. Lack of time, lack of manpower — **8%**

Results from across the country show that lack of equipment, cost, education and time are the main reasons why farmers are not currently adopting or implementing 4R practices.

However, there are subtle differences regionally. Lack of time and manpower was the second most important barrier to adoption among surveyed Eastern Canadian producers (13.9%, n=36). In Western Canada, a lack of proven benefits was also stated as a barrier to adoption (7.8%, n=51). These regional variations demonstrate how motivations and barriers can vary, potentially requiring a regional approach to education and grower messaging.

Barriers and Benefits to Adopting 4R Plans

Benefits of Having a 4R Plan in Place
(n=203)

1. You know you are using the best environmental stewardship practices in place **65.7%**
2. Improved soil quality and nutrient availability **61.3%**
3. You know you are using the most up-to-date, science-based fertilizer practices **58.3%**

Barriers for Putting a 4R Plan in Place
(n=910)

1. Lack of incentive **14.4%**
2. Not a service provided by your agri-retailer **13.4%**
3. Lack of proven benefits **11.5%**

The benefits of having a 4R plan in place are rooted in supporting the goals of the operation, such as increasing profitability, sustainability and environmental stewardship. Barriers, on the other hand, tend to be rooted in uncertainty about return on investment and a lack of awareness around incentives. There is a unique opportunity to help growers better understand the barriers they face, how they can overcome them, and the long-term value that 4R Nutrient Stewardship can provide in the field and to their farm operation.

4Rs in Practice

Key Takeaways:

1. Enhanced efficiency fertilizers (EEFs) can help producers enhance fertilizer efficiency and reduce greenhouse gas emissions without sacrificing crop yields.[1] Common EEFs include polymer coated urea (PCU), urease inhibitors (UIs), nitrification inhibitors (NIs) and dual action inhibitors (UINIs). These enhanced efficiency fertilizer products can help producers provide more efficient levels of nutrition over extended periods of time.[1] In 2023, about 20% of the total nitrogen volume applied to surveyed spring wheat and canola acres was applied using an EEF (Figure 8). Their usage in these widely grown crops speaks to how growers are continuing to uncover and take advantage of their value in the field.

% of Total Nitrogen Volume Applied Utilizing an EEF

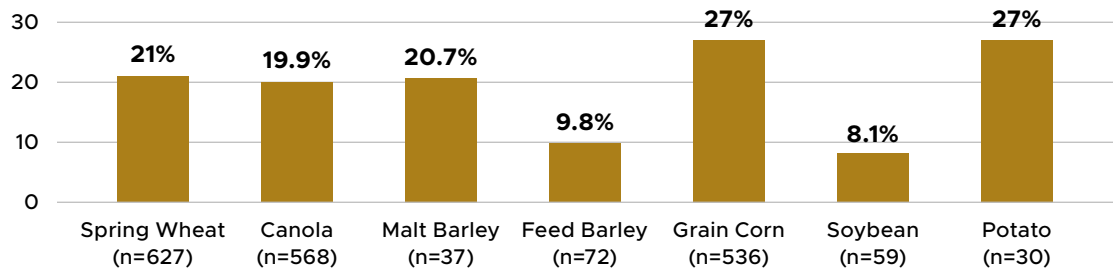


Figure 8: Percentage of nitrogen volume applied utilizing an EEF by crop type.

2. Soil testing plays a critical role in nutrient management planning. It helps producers determine what nutrients are needed, and in what quantity, in order to support the growth of various crops. It also plays a key role in helping to implement best management practices rooted in the 4Rs. Soil testing for nitrogen and phosphorus typically occurs every three years or every year according to surveyed Canadian producers. In general, surveyed growers are more likely to soil test for nitrogen every single year than they are for phosphorus, as nitrogen is the most limiting nutrient to crops. (Figure 9).

3. The majority of surveyed canola and spring wheat acres applied both nitrogen (86.2% for canola, 85.6% for spring wheat) and phosphorus (90.9% for canola, 82.8% for spring wheat) in the spring at planting – a best management practice for placing nutrients at the right time for crop uptake.

4. Among all crop types, grain corn producers surveyed saw the highest percentage of acres treated with a primary nitrogen fertilizer and nitrogen stabilizer. The use of nitrogen stabilizers helps producers reduce nitrogen loss by slowing down the conversion of nitrogen fertilizers to products such as nitrate and ammonia gas.

5. More than 40% of surveyed canola acres applied nitrogen through side-banding in the spring at planting – a best management practice to place nitrogen at the right time (seeding/planting) and in the right place (near the seed) in order to maximize fertilizer efficiency.

6. An increasing number of producers are taking a closer look at applying fertilizer nutrients at the right time. Surveyed grain corn producers most commonly placed nitrogen in the field after planting or in-crop through sub-surface banding near the root zone. As grain corn requires more nitrogen than other crops in season, surveyed growers are taking a closer look at supplying the nitrogen their crops need, when they need it, to support both growth and development.

Frequency of Soil Testing Nitrogen and Phosphorous

Soil testing for nitrogen and phosphorus typically occurs every three years among surveyed Canadian producers (n=1405) (Figure 9). A significant portion of surveyed growers also test for these macronutrients every two years.

Soil testing gives producers a comprehensive snapshot of the nutrients that are available in the soil.[2] **This allows producers to optimize their nutrient application rates and, in turn, not only reduce cost on inputs, but also reduce the potential for nutrients to be lost to the environment.**

Frequency of Soil Testing – Nitrogen and Phosphorous

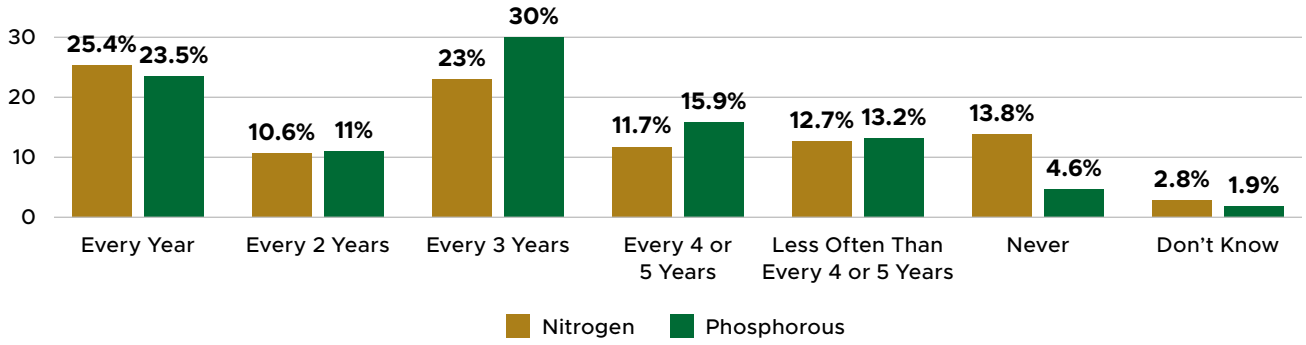


Figure 9: Frequency of soil testing for nitrogen and phosphorous by surveyed Canadian producers represented as the percentage of respondents (n=1405).

Results from Across Canada

Potatoes

TIMING

Nitrogen: 106.5% of surveyed potato acres applied nitrogen in the spring at planting (the total number is over 100%, as there were multiple nitrogen applications on various acres at planting in 2023) (n=40).

Phosphorous: 86.5% of surveyed potato acres applied phosphorous in the spring at planting (n=40).

In Season Fertilizer Applications

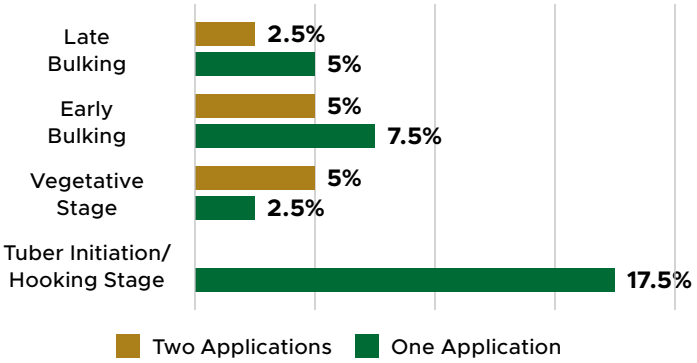


Figure 10: Representation of the in-season applications among surveyed potato producers based on potato growth stages. The values represent the percentage of total respondents that are making in-season fertilizer applications at each stage of potato growth (n=40).

SOURCE

Nitrogen: Of the total nitrogen volume applied to surveyed potatoes acres, 25.1% used calcium ammonium nitrate and 24.5% utilized ammonium nitrate (n=36). When applying nitrogen in the spring before planting, 53.3% of the nitrogen volume applied to surveyed potato acres utilized urea and 38.7% utilized SUPERU (n=10).

Phosphorous: 41.8% of the phosphorous volume applied to surveyed potato acres in the spring at planting utilized monoammonium phosphate (MAP) (n=28).

PLACEMENT

Nitrogen: 74.8% of surveyed potato acres applied nitrogen in-furrow in the spring at planting (n=37).

Phosphorous: 83% of surveyed potato acres applied phosphorous in-furrow in the spring at planting (n=30).

RATE

- 55% of the total nitrogen volume applied in surveyed potatoes was applied at a rate of more than 170 pounds per acre (n=37). The average nitrogen application rate in the spring at planting was 116 pounds per acre in 2023 (n=36).
- Almost 40% of the total phosphorous volume applied to surveyed potato acres was applied at a rate of 140 to 179.9 pounds per acre (n=30). The average phosphorous application rate in the spring at planting on surveyed potatoes was 107.5 pounds per acre (n=28).

NITROGEN STABILIZER

- 13.7% of surveyed potato producers utilized a nitrogen stabilizer to prevent nitrogen loss and increase nitrogen-use efficiency (n=34).

ENHANCED EFFICIENCY FERTILIZERS

- 27% of the total nitrogen volume was applied utilizing an EEF among surveyed potato producers (n=34).
- Of this group, 18.6% of the nitrogen volume utilized an EEF with their nitrogen applications in the spring at planting (n=30).

Spring Wheat

TIMING

Nitrogen: 85.6% of surveyed spring wheat acres applied nitrogen in the spring at planting (n=635).

Phosphorous: 82.8% of surveyed spring wheat acres applied phosphorus in the spring at planting (n=635).

SOURCE

Nitrogen: 63.8% of the total nitrogen applied to surveyed spring wheat acres in the spring at planting utilized urea (n=538).

Phosphorous: 79.2% of the total phosphorous applied to surveyed spring wheat acres in the spring at planting utilized MAP (n=513).

PLACEMENT

Nitrogen: 39.6% of surveyed spring wheat acres applied nitrogen in a mid-row band in the spring at planting (n=629). 38.7% of surveyed spring wheat acres applied nitrogen through side-banding in the spring at planting (n=629).

Phosphorous: 33.9% of surveyed spring wheat acres seed placed phosphorus in the spring at planting (n=571). 31.8% of surveyed spring wheat acres side-banded phosphorus in the spring at planting (n=571).

RATE

- 70% of the total nitrogen volume applied on surveyed spring wheat acres was applied at a rate between 75 and 134.9 pounds per acre (n=629). In the spring at planting, nitrogen application rates were 81.9 pounds per acre on average (n=538).
- 81% of the total phosphorous volume applied was applied at a rate between 25 to 54.9 pounds per acre (n=571). The average application rate on surveyed spring wheat acres in the spring at planting was 33.7 pounds per acre (n=513).

NITROGEN STABILIZERS

- 8.1% of surveyed spring wheat acres applied urea in combination with a nitrogen stabilizer (n=386).
- 29.3% of surveyed spring wheat acres applied UAN 28% in combination with a nitrogen stabilizer (n=54).
- 6.5% of surveyed canola acres that applied nitrogen in the spring at planting paired their nitrogen fertilizer with a stabilizer (n=437).

ENHANCED EFFICIENCY FERTILIZERS

- 21% of the total nitrogen volume applied to surveyed spring wheat was applied utilizing an EEF (n=627), with 17% applied in the spring at planting (n=469).

Nitrogen and Phosphorous Placement

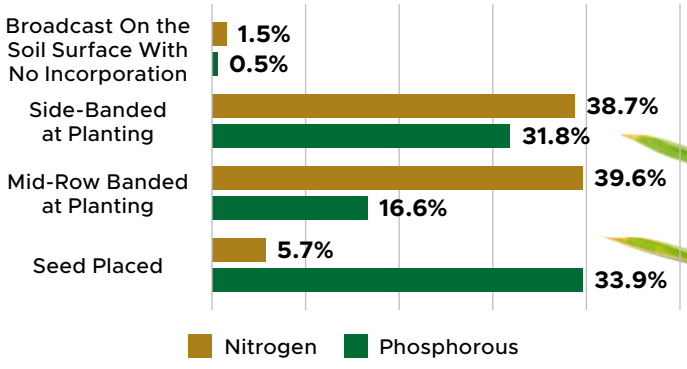


Figure 11: Representation of nitrogen and phosphorous placement in the **spring at planting**. The numbers represent the percentage of wheat acres treated using nitrogen (n=629) and phosphorous (n=571).

Canola

TIMING

Nitrogen: 86.2% of surveyed canola acres were treated with nitrogen in the spring at planting (n=578).

Phosphorous: 90.9% of surveyed canola acres were treated with phosphorous in the spring at planting (n=578).

SOURCE

Nitrogen: 61.6% of the total nitrogen volume applied to surveyed canola acres in the spring at planting used urea (n=507).

Phosphorous: 70.9% of the total phosphorous volume applied to surveyed canola acres in the spring at planting used MAP (n=486).

PLACEMENT

Nitrogen: 42.7% of surveyed canola acres side-banded nitrogen in the spring at planting (n=575).

Phosphorous: 36.4% of surveyed canola acres seed placed phosphorous in the spring at planting, and 35.6% of surveyed canola acres side-banded phosphorous in the spring at planting (n=537).

RATE

- 71% of the total nitrogen volume applied to surveyed canola acres was applied at a rate between 80 and 155 pounds per acre (n=575). Applications that took place in the spring at planting applied an average rate of 94.7 pounds per acre (n=507).
- 75% of the total phosphorous volume applied to surveyed canola acres was applied at a rate between 20 and 55 pounds per acre (n=537). Applications that took place in the spring at planting applied an average rate of 36.3 pounds per acre (n=486).

Fertilizer Applications in Canola

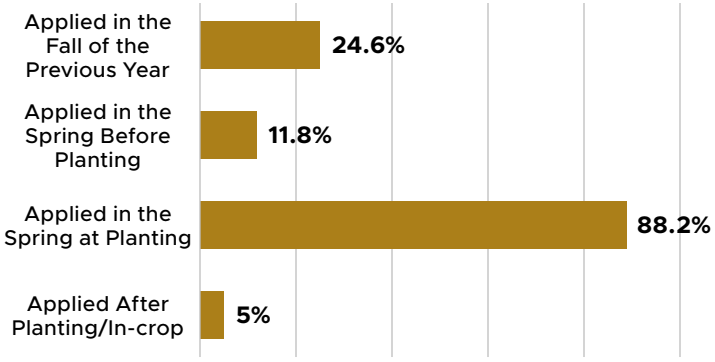


Figure 12: Representation of fertilizer applications in canola (nitrogen, phosphorus, potassium and sulphur) by the timing of application. The numbers represent the percentage of surveyed canola growers applying fertilizer at each timing (n=578).

NITROGEN STABILIZERS

- 10.2% of surveyed canola acres that were treated with urea utilized a nitrogen stabilizer (n=370).
- 28.4% of surveyed canola acres treats with 28% UAN had a nitrogen stabilizer (n=46).
- 10.2% of surveyed canola acres treated with nitrogen fertilizer (of all types) utilized a nitrogen stabilizer (n=546).

ENHANCED EFFICIENCY FERTILIZERS

- 19.9% of the total nitrogen volume applied to surveyed canola crops was applied utilizing an EEF (n=568), with 16.3% applied in the spring at planting (n=439).

Soybeans

TIMING

Nitrogen: 7.5% of surveyed Canadian soybean acres applied nitrogen in the spring before planting (n=469).

Phosphorous: 23.9% of surveyed Canadian soybean acres applied phosphorous in the spring before planting (n=469).

SOURCE

Nitrogen: The percentage of the total surveyed nitrogen volume applied in the spring before planting saw a close split between utilizing urea (37.6%) and MAP (40%) (n=133).

Phosphorous: 83% of the total phosphorus volume applied in the spring before planting was applied as MAP (n=126). Among all application timings, MAP was the most utilized among all forms of phosphorus (Figure 8).

MAP Applications in Soybeans by Timing

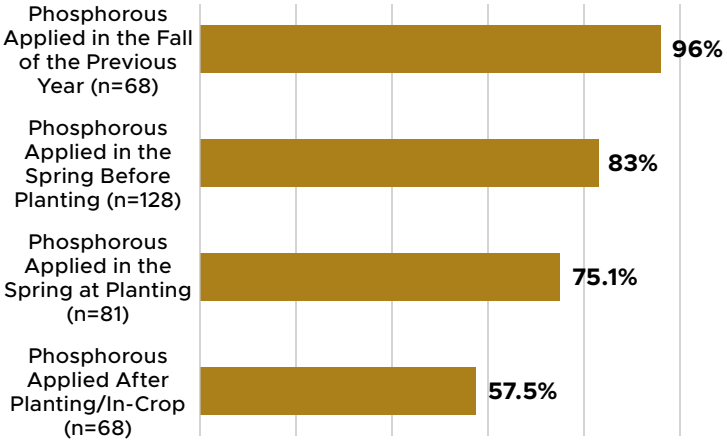


Figure 13: Percentage of phosphorus volume applied as monoammonium phosphate by application timing for surveyed Canadian soybean acres.

PLACEMENT

Nitrogen: 7% of surveyed soybean acres applied nitrogen via broadcasting on the soil surface followed by incorporation in the spring before planting (n=272).

Phosphorous: 19.2% of surveyed soybean acres applied phosphorus via broadcasting on the soil surface followed by incorporation in the spring before planting (n=268).

RATE

- 25% of the total nitrogen volume applied to surveyed soybean acres was applied at a rate of 10 to 14.9 pounds per acre (n=272). Average application rates in the spring before planting are 15.4 pounds per acre (n=133).
- 30% of the total phosphorous volume applied to surveyed soybean acres was applied at a rate of 50 to 54.9 pounds per acre (n=268). In the spring before planting, phosphorous was applied at an average rate of 37 pounds per acre (n=128). On average, where phosphorus was applied, the average rates were 38 pounds per acre in 2023 (n=268).

ENHANCED EFFICIENCY FERTILIZERS

- 8.1% of the total nitrogen volume applied to surveyed Canadian soybeans utilized an EEF (n=59).

Grain Corn

TIMING

Nitrogen: 69.9% of surveyed grain corn acres applied nitrogen when grain corn crops need it most to help reduce losses: post-plant/in-crop (n=565).

Phosphorous: 65.5% of surveyed grain corn acres were treated with phosphorous in the spring at planting (n=565).

SOURCE

Nitrogen: The total nitrogen volume applied to surveyed grain corn acres, post-plant and in-crop, was applied using UAN (31.1%) and urea (26.5%) (n=307).

Phosphorous: The total phosphorus volume applied to surveyed grain corn acres was applied in the form of MAP in the spring at planting (47.9%) (n=351).

PLACEMENT

Nitrogen: Sub-surface banding (also called side dressing) was the most common nitrogen placement method among surveyed grain corn producers who applied post-plant or in-crop (34.2%) (n=565).

Phosphorous: 48.6% of surveyed grain corn acres placed phosphorus through side-banding at planting (n=565).

RATE

Nitrogen: Average application rate across surveyed grain corn acres was 159.4 pounds per acre (n=565).

Phosphorous: The average rate of phosphorous applications at all times throughout the season was 49.6 pounds per acre (n=565).

NITROGEN STABILIZER

- 31% of all primary nitrogen fertilizers utilized a stabilizer (n=522). Nitrogen stabilizers were used most frequently in the fall of the previous year (38.7%, n=536).

ENHANCED EFFICIENCY FERTILIZERS

- 27% of the total nitrogen volume applied to surveyed grain corn acres utilized an EEF (n=536).

Feed Barley

TIMING

Nitrogen: 49.8% of surveyed feed barley acres applied nitrogen in the spring at planting (n=74).

Phosphorous: 67.5% of surveyed feed barley acres applied phosphorous in the spring at planting (n=74).

SOURCE

Nitrogen: 52.5% of the total nitrogen volume applied in the spring at planting in surveyed feed barley acres utilized urea (n=49).

Phosphorous: 75.5% of the total phosphorus volume applied in the spring at planting in surveyed feed barley acres utilized MAP (n=47).

PLACEMENT

Nitrogen: 33.1% of surveyed feed barley acres mid-row banded their nitrogen in the spring at planting (n=73).

Phosphorous: 50.3% of surveyed feed barley acres seed placed their phosphorous in the spring at planting (n=61).

RATE

- 20% of the total nitrogen volume applied to feed barley acres was applied at a rate between 80 and 89.9 pounds per acre (n=73). In the spring at planting, the average rate that nitrogen was applied to surveyed feed barley acres was 64.6 pounds per acre (n=49), demonstrating how the right time can help producers enhance fertilizer efficiency.
- 68% of the total phosphorous volume applied to feed barley acres was applied at a rate between 30 and 44.9 pounds per acre (n=61). In the spring at planting, the average rate of phosphorous applied to surveyed feed barley acres was 32.8 pounds per acre (n=47).

NITROGEN STABILIZER

- 2.5% of surveyed feed barley growers utilized a nitrogen stabilizer (n=70).

ENHANCED EFFICIENCY FERTILIZERS

- 9.8% of the total nitrogen volume applied to surveyed feed barley acres utilized an EEF (n=72). When applied in the spring, 16% of surveyed acres utilized an EEF in combination with nitrogen fertilizer (n=33).

Malt Barley

TIMING

Nitrogen: 56.4% of the surveyed malt barley acres applied nitrogen in the spring at planting (n=37). The frequency of fall applications is also on the rise with 47.2% of surveyed malt barley acres applying nitrogen in the fall of the previous year (an increase from 2022) (n=37).

Phosphorous: 61.2% of surveyed malt barley acres applied phosphorous in the spring at planting (n=37).

SOURCE

Nitrogen: 55% of the total nitrogen volume applied in the spring at planting on surveyed malt barley utilized urea (n=20). When applying in the fall of the previous year (2022), 65.4% of surveyed malt barley producers utilized anhydrous ammonia (n=18).

Phosphorous: 61% of the total phosphorous volume applied in the spring at planting utilized MAP on surveyed malt barley acres (n=37).

PLACEMENT

Nitrogen: 38.9% of surveyed malt barley acres mid-row banded their nitrogen in the spring at planting (n=37).

Phosphorous: 26.2% of surveyed malt barley acres seed placed their phosphorous in the spring at planting and 22.5% side-banded (n=37).

RATE

- 55% of the total nitrogen volume applied to surveyed malt barley acres was applied at a rate between 90 to 109.9 pounds per acre (n=37). In the spring at planting, nitrogen was applied at an average rate of 67.2 pounds per acre (n=20). In the fall of the previous year, nitrogen was applied at a higher rate of 88.6 pounds per acre (n=18).
- 65% of the total phosphorous volume applied was applied at a rate between 35 and 44.9 pounds per acre on surveyed malt barley acres (n=26). In the spring at planting, phosphorus was applied at an average rate of 33.9 pounds per acre (n=19), well below the average rate, demonstrating how the right time can help producers enhance fertilizer efficiency.

NITROGEN STABILIZER

- 13.3% of surveyed malt barley growers utilized a nitrogen stabilizer (n=36).

ENHANCED EFFICIENCY FERTILIZERS

- 20.7% of the total nitrogen volume applied on surveyed malt barley acres utilized an EEF (n=37). When applied in the spring at planting, 21.5% utilized an EEF (n=13). When applied in the fall of the previous year, 26.1% of surveyed acres utilized an EEF (n=18).

A New Chapter in Nutrient Management: The Future of the 4Rs

Use of the Survey

The Fertilizer Use Survey provides a high-level understanding of fertilizer use in Canada, with many organizations benefiting from the data. Fertilizer Canada uses it to advocate to all levels of government on policies that impact fertilizer application as well as incentives and support for farmers to increase adoption. Academic institutions use the results in their research, including in meta-analysis research. Agriculture publications also use data for media stories.

Improving Data and Emissions Measurement Tools

Fertilizer Canada has been advocating to update the National Inventory Report (NIR) to include data from the Fertilizer Use Survey to ensure 4R Nutrient Stewardship best management practices are included to capture farm-level improvements, creating a more accurate picture of emissions. The NIR is the international measurement tool used by the Government of Canada to measure emissions.

Enhancing Support for Growers

The Fertilizer Use Survey also provides information to support efforts from the industry to advocate for programs to increase 4R adoption among Canadian growers. Understanding barriers and opportunities to 4R adoption provides useful insights for developing industry and government programs that are effective and user-friendly.

4R Protocol Aspiration

A 4R protocol is a set of requirements farmers follow to improve nitrogen management in a cropping system and estimate GHG emission reduction to earn offsets that can be sold in a carbon market. This provides a financial incentive to farmers to adopt more expensive practices that reduce emissions.

There is not currently a national 4R protocol. Alberta has the Nitrous Oxide Emission Reduction Protocol (NERP), which is approved for use within Alberta's greenhouse gas management framework as a protocol. Fertilizer Canada has been advocating for the development of a national 4R protocol and national carbon market to help incentive emission reduction from the application of fertilizer.

4R Programming in Canada

The **4R Designation program** educates agri-retailers and Certified Crop Advisors (CCAs) on in-depth sustainable fertilizer principles, allowing them to provide tailored advice to farmer customers. The program aims to recognize growers executing 4R plans and demonstrate their sustainability commitment. The 4R Designation program includes four steps:

1. **Education** – Fertilizer Canada offers an online three-part training program. Certified Crop Advisors that complete the program earn 5.5 continuing education credits.
2. **Attestation** – Commitment through an attestation form that agri-retailers and agronomists have met the conditions to be a 4R Designated agri-retailer or 4R agronomist through education, training and experience and can prepare and sign off on 4R Nutrient Stewardship Plans.
3. **Support Growers** – Provide growers with information and guidance to implement the 4Rs.
4. **Submit Acres** – Designated 4R Agronomists submit acres following the principles of 4R Nutrient Stewardship on behalf of their grower customers, which are counted by Fertilizer Canada.

The **4R Certification Program** is a voluntary initiative designed for nutrient service providers, including agri-retailers, agricultural service providers and certified professionals. It evaluates participants' adherence to 4R Nutrient Stewardship practices, focusing on training and education, nutrient recommendations and application, and documentation. Certification requires completing a third-party audit conducted by the Agrichemical Warehouse Standards Association (AWSA), which is repeated every two years. **Presently, the program is exclusively available in Ontario.**

References

1. Agriculture and Agri-Food Canada. (2022). *Living Lab – Atlantic Research Solidifies Enhanced Efficiency Fertilizer as a Win-Win for Farmers and the Environment.* Government of Canada. https://agriculture.canada.ca/en/science/story-agricultural-science/scientific-achievements-agriculture/living-lab-atlantic-research-solidifies-enhanced-efficiency-fertilizer-win-win-farmers-and

2. Government of British Columbia. (2024). *Soil Nutrient Testing.* https://www2.gov.bc.ca/gov/content/industry/agriculture-seafood/agricultural-land-and-environment/soil-nutrients/nutrient-management/what-to-apply/soil-nutrient-testing

Appendix A

Survey Overview by Province

WESTERN CANADA (INCLUDING ALBERTA, SASKATCHEWAN AND MANITOBA)

- Conducted October 30, 2023, to December 26, 2023.
- The average length was 27 minutes.
- Farmers were offered a $25 to $40 incentive for their participation.

MANITOBA

- Conducted October 30, 2023, to December 26, 2023.
- The average length was 27 minutes.
- Farmers paid $24 to $40 as an incentive for participation.

ONTARIO

- Conducted December 1, 2023, to March 4, 2024.
- The average length was 28 minutes.
- Farmers were offered a $20 to $50 incentive for their participation.

QUEBEC

- Conducted December 1, 2023, to March 11, 2024.
- The average length was 28 minutes.
- Farmers were offered a $25 to $50 incentive for their participation.

P.E.I.

- Conducted December 1, 2023, to March 11, 2024.
- The average length was 25 minutes.
- Farmers were offered a $40 incentive for their participation