What best describes you?

- Farmer: 28
- Non-farming stakeholder (everyone else!): 173
4R Fertilizer Management is Right Source at the Right Rate, Right Time, Right Place
What’s the first word or short phrase that comes to mind when you think of 4R?
Do you think 4R is a valuable initiative?

- Yes: 186 (85%)
- No: 3 (15%)

What best describes you?
- Farmer
- Non-farming stakeholder (everyone else)
What is the biggest barrier to 4R adoption?

- **Cost (can't see a return on time or investment)**: 46, 24%
- **Education (benefits are clear, but need to show them)**: 69, 90%
- **Logistics (too complicated)**: 42, 95%
- **Philosophy (don't see this as important)**: 7, 86%
- **Trust (who benefits?)**: 16, 75%
- **Other**: 9, 67%

What best describes you?
- **Farmer**
- **Non-farming stakeholder (everyone else!)**
How often SHOULD a person soil test each field?

- Every year: 122 (88%)
- Every two years: 29 (90%)
- Every three years: 29 (69%)
- Every four years or more: 4
- Rarely or never: 1

What best describes you?
- Farmer
- Non-farming stakeholder (everyone else)
In reality, how often does each field get a soil test?

What best describes you?

- Farmer
- Non-farming stakeholder (everyone else)

- Every year: 85%
- Every two years: 15%
- Every three years: 20%
- Every four years or more: 86%
- Rarely or never: 96%
Is there enough soil testing capacity if everyone chooses to test fields in 2021?

Yes: 80
No: 102
What is your preferred way(s) to apply nitrogen for canola?

- Fall broadcast: 91% (Farmer: 91%, Non-farming stakeholder: 12%)
- Fall broadcast/ incorporated: 87% (Farmer: 87%, Non-farming stakeholder: 13%)
- Late fall band: 57% (Farmer: 57%, Non-farming stakeholder: 43%)
- Spring broadcast: 100% (Farmer: 100%, Non-farming stakeholder: 0%)
- Spring broadcast/ incorporated: 91% (Farmer: 91%, Non-farming stakeholder: 9%)
- Spring band (pre-seed): 90% (Farmer: 90%, Non-farming stakeholder: 10%)
- Time of seeding: 17% (Farmer: 17%, Non-farming stakeholder: 83%)
- In-crop top up: 86% (Farmer: 86%, Non-farming stakeholder: 14%)
Where do you see variable-rate fertilizer adoption in five years time?

What best describes you?
- Farmer
- Non-farming stakeholder (everyone else)
What practice(s) do you think will make the biggest difference in terms of improving fertilizer (nutrient use) efficiency?

- Right placement and timing
- Placement
- fertilizer rates
- Spring banding, time-of-planting application consistently shows the highest efficiency in Canadian fertilizer application. Specifically N.
- testing
- Industry research
- site based programs
- cost
- Placement of fertilizer
What practice(s) do you think will make the biggest difference in terms of improving fertilizer (nutrient use) efficiency?

<table>
<thead>
<tr>
<th>Stop broadcasting!!</th>
<th>Right hybrids, 4R, education, economics and logistics</th>
<th>Education</th>
</tr>
</thead>
<tbody>
<tr>
<td>slow release products</td>
<td>availability of supply</td>
<td>The timing of applications</td>
</tr>
<tr>
<td>Variable Rate</td>
<td>split applications</td>
<td>Yearly field-based soil sampling</td>
</tr>
</tbody>
</table>
What practice(s) do you think will make the biggest difference in terms of improving fertilizer (nutrient use) efficiency?

- Right variety, 4R and education and logistics
- Education
- Soil testing
- Less cost to use higher efficiency products. Often cost of these products outweighs the benefits. Can often just add more fertilizer to compensate for losses.
- I don't know
- Further research into soil health and how fertilizer can be better utilized by plants and soils
- Irrigation strategy.
- Genetic diversity and crop rotation
What practice(s) do you think will make the biggest difference in terms of improving fertilizer (nutrient use) efficiency?

- provide crops with the appropriate N rate with the appropriate placement, timing and source of N application
- variable management within fields
- refining nitrogen rates
- The rate combined with the right place at the right time.
- Fall/winter broadcast
- Variable rate technology
- precision agriculture
- ROI
- proper rates and timing
- ROI
What practice(s) do you think will make the biggest difference in terms of improving fertilizer (nutrient use) efficiency?

- Genetics
- Further education on the long term benefits of 4R
- zero till
- consistent testing
- Plant Genetics, Microrhizome research
- Adding clear incentives and cost offsets for small producers
- appropriate rate and timing
- Getting soil phosphate levels to where they should be
- variable management within fields
What practice(s) do you think will make the biggest difference in terms of improving fertilizer (nutrient use) efficiency?

- Showing a consistence performance with newer methods versus traditional methods.
- slow release better hybrids
- Precision farming
- cost of variable rate equipment
- Education at all levels, and accessibility to soil testing and good agronomic advice.
- A better understanding of nitrogen uptake in response to soil water availability.
- Direct seeding with double shoot
- Spring banding.
- Genetics
What practice(s) do you think will make the biggest difference in terms of improving fertilizer (nutrient use) efficiency?

- Unsure
- Irrigation
- Maintain soil fertility
- Soil testing
- Crop rotations
- Rapid soil testing
- Variable rate options
- GHG emissions regulations
- Slow release nitrogen
What practice(s) do you think will make the biggest difference in terms of improving fertilizer (nutrient use) efficiency?

- Placement
- Adjusting the fertilizer rate for the productivity of different areas of a field.
- Genetic improvement of hybrids. Improving seed safety
- good crop rotation
- Genetic improvements and slow release nitrogen technologies (affordability)
- good weather
- rapid (full spectrum) soil testing
- Refining rate based on environment and yield potential
- no till
What practice(s) do you think will make the biggest difference in terms of improving fertilizer (nutrient use) efficiency?

- Precision farming
- G x E x N-rate
- Improved fertilizer choices - advances in homogenous pellets that have improved seed safety.
- Type of product and timing
- Money
- Innovation in equipment and technology.
- Reducing tillage
- Variable rate
- Enhanced efficiency fertilizers
What practice(s) do you think will make the biggest difference in terms of improving fertilizer (nutrient use) efficiency?

- More education; Annual soil testing
- Variable rate application
- Rotation
- Soil testing
- Better products for broadcast applications. Quicker and fewer fills or seeding but currently less efficient
- Choice of cultivar
- Precision farming
- 4R
- Don't know
What practice(s) do you think will make the biggest difference in terms of improving fertilizer (nutrient use) efficiency?

- Annual soil test
- Limited broadcast application
- Reduced costs in soil testing. Are there any innovations coming that may drop the price?
- What's sustainable for each farming practice on each individual farm.
- A price drop on Slow release or timed release fertilizer (e.g., ESN)
- Soil testing combined with record-keeping to make informed decisions
- Combination of consistent soil testing and following the 4 Rs as needed.
- Application
- Rotation and soil testing
- Know the nitrogen levels of your soils, the efficiency of nitrogen
What practice(s) do you think will make the biggest difference in terms of improving fertilizer (nutrient use) efficiency?

- Technology development - fertilizer blends and hybrids
- Soil Testing
- Better hybrids
- Annual soil N testing
- Rotation based on root structure
- N inhibitor use.
- Precision agriculture by varieties & location
- Rotating crops
- Less broadcast application
What practice(s) do you think will make the biggest difference in terms of improving fertilizer (nutrient use) efficiency?

- Timing
- 34-0-0
- Education
- 4R
- VR
- 4R
- Education
- Using best timing and placement practices
- Banding with seeding
- Education
What practice(s) do you think will make the biggest difference in terms of improving fertilizer (nutrient use) efficiency?

- Increased deep banding of nitrogen
- Broad adoption of regular soil testing, eliminating broadcast on frozen ground and snow.
- Nitrogen and other product stabilizers
- Soil testing or nutrient testing/scanning built into application equipment.
- Placement
- Right application
- 4R application technology
- crop rotation, 4R, soil test, genotype
What practice(s) do you think will make the biggest difference in terms of improving fertilizer (nutrient use) efficiency?

- Fertilize to a realistic goal
- Variable rate stabilizers
- Placement
- Improved soil testing/mapping as well as proper placement/timing
- Soil sampling
- Fertilizer management
- Application choice
- Testing
- Variety improvements
- Placement and timing
What practice(s) do you think will make the biggest difference in terms of improving fertilizer (nutrient use) efficiency?

<table>
<thead>
<tr>
<th>Low price, diversity, leaf application</th>
<th>Recycling</th>
<th>Precision farming</th>
</tr>
</thead>
<tbody>
<tr>
<td>Right placement, timing and amount</td>
<td>Industry Research</td>
<td>Fertilizer rates and placement</td>
</tr>
<tr>
<td>Soil testing</td>
<td>Placement and timing</td>
<td>Research</td>
</tr>
</tbody>
</table>
What practice(s) do you think will make the biggest difference in terms of improving fertilizer (nutrient use) efficiency?

- More and regular testing
- Site specific N split
- Good genetics
- Placement
- Spring and split application
- Education
- Recapture
- Independent research
- Education
What practice(s) do you think will make the biggest difference in terms of improving fertilizer (nutrient use) efficiency?

- Right placement and timing
- Hybrids
- Placement
- Place placement
- Placement and timing
- Prediction
- Educating and continued research
- Placement
- Use of specialized fertilizers applied in necessary proximity to the growing crop
What practice(s) do you think will make the biggest difference in terms of improving fertilizer (nutrient use) efficiency?

- 4R, cost
- Placement of fertilizer, testing
- Availability of on-the-go soil analysis in the field
- The 4R answer
- soil sampling
- Right hybrids education economics and logistics
- dont know
- rotations
- GPS
What practice(s) do you think will make the biggest difference in terms of improving fertilizer (nutrient use) efficiency?

- End use
- Prediction of moisture and temperature in growing season
- Microbiome
- Soil
- Hybrid by nitrogen
- Soil testing every year
- Education
What research/agronomy is missing to help us improve fertilizer (nutrient use) efficiency? (1-3 words)
Who is best equipped to deliver fertilizer tips/advice to Canadian canola farmers?

- 88% of respondents believe canola organizations, including CCC agronomy specialists, are best equipped.
- 18% believe agronomists are best equipped.
- 100% believe fertilizer suppliers are best equipped.
- Researchers account for 7% of responses.
- Media and other stakeholders make up 2% and 1% of responses, respectively.

What best describes you?
- Farmer
- Non-farming stakeholder (everyone else)
What do you think it will take to get 90% of growers using 4R practices? (1-3 words)