

**RESOLUTION 9-23**  
**SYNTHETIC FERTILIZER EMISSIONS**

**WHEREAS** the federal Ministry of Environment and Climate Change is seeking to reduce greenhouse gas (GHG) emissions associated with synthetic fertilizer by 30% below 2020 levels by 2030; and

**WHEREAS** the federal government has set a goal for 2025 to achieve \$75 billion in agricultural exports; and

**WHEREAS** instituting a reduction of synthetic fertilizer emissions will inevitably place a cap on synthetic fertilizer use and limit crop production for Canadian farmers; and

**WHEREAS** limiting crop yield by limiting fertilizer usage will inevitably reduce production and food security; and

**WHEREAS** regional research and development is necessary to eliminate the uncertainty resulting from incomplete data for measuring fertilizer emission levels in different crop types, geographical regions, and growing conditions; and

**WHEREAS** the 4R Climate-Smart Protocol is designed to promote sustainable use of fertilizer in crop production and can reduce GHG emissions by focusing on the “4 Rs” of fertilizer application: Right Source, Right Rate, Right Time, and Right Place; and

**WHEREAS** the 4R Climate-Smart Protocol optimizes plant nutrient uptake, increases yield, maximizes profitability, and minimizes nitrous oxide emissions.

**THEREFORE BE IT RESOLVED**  
**THAT ALBERTA’S AGRICULTURAL SERVICE BOARDS REQUEST**

That the Federal Government of Canada adopt the 4R Climate- Smart Protocol approach developed by The Fertilizer Institute (TFI) of Fertilizer Canada and provide sustainable funding into research and development regarding fertilizer use efficiency.

**FURTHER THEREFORE BE IT RESOLVED**  
**THAT ALBERTA’S AGRICULTURAL SERVICE BOARDS REQUEST**

That the federal Ministry of Environment and Climate Change suspend the 30% synthetic fertilizer emission reduction targets until the proper tools to measure emissions for producers are available.

**SPONSORED BY:** Northern Sunrise County  
**MOVED BY:** \_\_\_\_\_  
**SECONDED BY:** \_\_\_\_\_  
**CARRIED:** \_\_\_\_\_  
**DEFEATED:** \_\_\_\_\_  
**STATUS:** Federal  
**DEPARTMENT:** Agriculture and Agri-Food Canada  
Environment and Climate Change Canada

**Preface:**

Sustainable high-yielding agricultural production is essential for Canada to remain economically competitive in the world market, especially with increasing demands for food, feed, and biofuel products, both domestic and abroad. To achieve production demands, the use of fertilizer is essential to produce increasingly high crop yields.

The Federal Government has set a goal to grow agricultural exports to \$75 billion by 2025, yet they are inevitably stifling this target by indirectly capping synthetic fertilizer use with their emission target to reduce GHG emissions associated with fertilizer by 30% below 2020 levels by 2030. Canadian agricultural producers currently utilize fertilizer efficiently and even marginal reductions in fertilizer use will hinder crop production, threatening the well-being of Canadians, as well as the global food supply. This restriction on fertilizer may result in soil nutrients being underapplied, which would threaten agricultural sustainability by reducing soil fertility and soil nutrient reserves.

Greenhouse gases including carbon dioxide and nitrous oxide are generated from fertilizer use. A reported 60% increase in direct emissions associated with synthetic nitrogen fertilizer since 2005 highlights the need for more research on fertilizer use, the development of higher efficiency products, and a stewardship program that focuses on targeted application. These environmental concerns will not be effectively stifled by restricting fertilizer use to meet the goals proposed in the Government of Canada's 2020 Strengthened Climate Plan. Instead, as a more agronomically viable approach to meet the fertilizer emission target, we propose an increase in funding for regional research and development for innovative technologies that can improve both the monitoring and use of synthetic crop fertilizer products. In addition, stewardship of fertilizer use needs to be improved by implementing Fertilizer Canada's 4R Nutrient Stewardship approach. This approach is science-based and involves applying the Right Source of fertilizer at the Right Rate, Right Time, and in the Right Place. The use of the 4R Nutrient Stewardship optimizes plant nutrient uptake, increases yield, and maximizes profitability, while also minimizing nitrous oxide emissions.

The development of more efficient fertilizer products or application methods, paired with more accurate monitoring techniques and environmentally conscious targeted fertilizer application programs, will allow Canada to meet the fertilizer emission target without hindering crop production, sustainability, and the economy.

## **4R Nutrient Stewardship**

The 4R Nutrient Stewardship approach is a concept developed through a long history of cooperation between the fertilizer industry and the scientific community. Since at least 1988, application of the right nutrient source or product at the right rate, right time and in the right place has been closely associated with agricultural sustainability. It has been developed, modified, and built upon since then, and likely has roots from the 1988 Thorup and Stewart research paper. At this point the 4Rs include:

- **Right source** matches the fertilizer type to crop needs. This encompasses the use of synthetic versus organic fertilizers, as well as fertilizers with different nutrient compositions and different formats (liquid, granular, seed-banded, slow release, manure, etc.) and products that include additives such as nitrification and urease inhibitors;
- **Right rate** matches the amount of fertilizer to crop needs. This entails only applying what can be taken up by the crop over the course of the growing season. This recommendation can include precision application technologies (including those that address in-field variability), and the use of soil tests to make nutrient management decisions accounting for existing soil nutrient levels;
- **Right time** means nutrients are available when crops need them. This could include practices such as split application (applying at seeding as well as later at critical crop growth stages) or avoiding applying fertilizer in the fall when there is a higher risk of loss through spring runoff and volatilization;
- **Right place** means nutrients are placed where crops can use them. This recommendation includes practices such as banding, whereby the fertilizer is applied in concentrated strips; side dressing, whereby fertilizers are placed in a row adjacent to the crop, or seed-placed, where fertilizers are placed in the same furrow as the seed. This includes practices such as broadcasting where possible, whereby nutrients are spread on the surface of the soil (or growing crop) and which can lead to inefficiencies and losses to the broader environment.

## **Importance of Implementing These Strategies:**

### *4R Nutrient Stewardship:*

While adoption of at least some 4R practices exists in most regions across the country, to maximize emissions reductions, more widespread adoption at higher performance levels is necessary. Despite high levels of awareness, surveys indicate that only around 25% of farmers have worked with a 4R designated or certified Agronomist, and that less than 10% of farmers indicated that they have a formal 4R plan of any kind in place

(Fertilizer Canada Fertilizer Use Survey, 2019). Existing data from Fertilizer Canada and the 4R Research Network indicate that the implementation of a 4R program can reduce fertilizer related emissions while maintaining and/or improving crop yields. They further suggest that the widespread adoption of 4R in Western Canada could reduce emissions by 2 to 3 megatonnes – or 50 to 75% of the Government's emission reduction target. The 4R Nutrient Stewardship procedure reduces GHG emissions more than the practice of replacing synthetic fertilizer with manures, compost, or digestate, which has only seen to reduce emissions by 10-20%.

There is widespread recognition that the principles underlying the 4R practices can reduce emissions from N fertilizer. However, more training and resources, for both producers and production advisors are needed to improve the adoption of this strategy to ensure that it is properly implemented.

#### Research and Development:

It is important to note that fertilizer uptake and efficiency varies across the country as the emissions reduction potential is impacted by agronomic and biophysical factors (soil type, soil humidity, climate). There is no single universally applicable path for reducing emissions from fertilizer. The 4R Nutrient Stewardship strategy allows for an environmentally conscious tailored approach. However, there remains a high degree of uncertainty and complexity resulting from incomplete scientific data on how exactly different environments, crops, and conditions affect fertilizer activity. This information is vital for the efficacy of the 4R approach. Data will need to be more comprehensively developed as part of ongoing and future research and development efforts to meet the emissions reduction target. To achieve this, more funding is needed to power this research in many regions across the nation. It is crucial that many different climactic conditions, regions, and crop types are evaluated through this research to better inform fertilizer application decision making in all areas of Canada. To improve uptake of this information, this research should be published in a publicly accessible format.

Additionally, the development of more precise and higher functioning fertilizer products is necessary to reduce the emissions from synthetic fertilizer. For instance, the precision of fertilizer rates could be improved by manufacturers introducing a maximum guarantee for nitrogen content in synthetic fertilizer, in conjunction with the current minimum guarantee, to produce a range of nitrogen. This introduction of the maximum guarantee would prevent the over-application of nitrogen fertilizer since the highest guaranteed nitrogen content is listed. The introduction of this labelling would better inform the Right Rate component of 4R Nutrient Stewardship. Innovation around fertilizer production including the use of green ammonia to reduce life-cycle emissions would help with creating cleaner fertilizer sources which would reinforce the Right Source component of the 4R strategy. Research into more precise equipment and machinery to apply fertilizer would help the 4R strategy by improving the Right Place aspect of the technique. Research into more rapid fertilizer application technology would help with the Right Time aspect of the 4Rs and avoid the need for fall fertilizer applications which are primarily done to save time during the spring but have more environmental risks such as runoff and denitrification.

The implementation of these strategies will ensure the maintenance of the agricultural sector's competitiveness in the country, as well as Canada's reputation as a top producer and exporter of quality crops.

### **Supporting Information:**

#### Modifying Monitoring Techniques:

Stakeholders from Fertilizer Canada's 2019 Survey were concerned that the current National Inventory Report (NIR) methodology may not fully account for emission reductions achieved as part of the target. This is due in part to the current methodology's approach to measurement of emissions, and challenges with obtaining and measuring data at the individual farm level. While improvements in NIR reporting on nitrous oxide (N<sub>2</sub>O) are underway and expected to be implemented in time for publication in 2022, these improvements do not yet capture on-farm activity related to fertilizer application practices due to a lack of data at this scale. Additional Federal funding into ongoing research to address will help to ease the concerns of these stakeholders.

#### Sulvaris Agricultural Technology

Innovative technologies will be key to improving fertilizer usage. Investments into this type of research are imperative for creating more environmentally friendly fertilizers. In July of 2022, the Minister of Agriculture and Agri-Food, the Honourable Marie-Claude Bibeau, showed a quintessential example of this type of investment when she announced an investment of up to \$1,685,858 for Sulvaris, a crop input research company in Calgary, Alberta. This funding will aid to further develop new technology to produce high-efficiency fertilizers made with organic carbon. Their carbon control technology converts various forms of organic waste into high-efficiency fertilizers that are rich in nutrients and soil-building carbon. These products are economical to use in large-scale agriculture, as well as for lawn and plants in commercial and home use. These fertilizers improve on conventional chemical fertilizers by releasing nutrients more slowly. This gives plants the ability to absorb the nutrients as they need them to develop and grow. The more efficient uptake means less unabsorbed nutrients are left in the soil, reducing the risk of them releasing harmful GHG or contaminating waterways.

#### Food Shortage Concerns

Imposing an indirect cap upon the amount of fertilizer applied to Canadian fields will stifle the ability of our nation to continue to produce and export high quality crops that are crucial for feeding the world. The conflict in Ukraine, a major agricultural producer, has created even more demand for Canadian agricultural products, both as exports and contributions to the World Food Bank. Even before the war in February 2022, many countries around the world were struggling to get access to adequate food supplies

following the economic downturn triggered by Covid-19. Between 720 and 811 million people went hungry in 2020, and this number is expected to go up in 2022 spiking around the world. While post-pandemic global demand, extreme weather, tightening food stocks, high energy prices, supply chain bottlenecks, and export restrictions and taxes have been straining the food market for two years, the recent convergence of all these factors following Russia's invasion is unprecedented and has sent food prices into an undetermined inflation rate. This situation, where many hands are pursuing very scarce and expensive food resources, could incite civil conflict – as witnessed during the Arab spring, an event partly a reaction to high cereal prices. The president of the World Bank, David Malpass, stated that “countries should make concerted efforts to increase the supply of energy and fertilizer, help farmers increase plantings and crop yields, and remove policies that block exports and imports, divert food to biofuel, or encourage unnecessary storage.” The fertilizer section of the Federal Government's Strengthened Climate Plan will directly interfere with the ability of Canada to follow this directive and hinder the ability of the world to recover from these recent global catastrophes.

Fertilizer is needed to feed the growing global population, which is predicted to grow to 10 billion by 2025, according to the United Nations. Up until this threat to production, synthetic nitrogen fertilizer has played a key role in enhancing global food production and keeping half of the world's population adequately fed. Fertilizer Canada estimates that without fertilizer, food production would be cut in half. This further demonstrates how the limit on fertilizer use will be detrimental for the well-being of many people.

### **Current Government Fertilizer Stewardship Resources:**

Federal and provincial governments already have several programs available to support producers in adopting more efficient nutrient management practices. For example:

- Under the Agriculture Climate Solutions On-Farm Climate Action Fund, the federal government has made \$200 million available to support adoption of beneficial management practices on-farm, including a focus on nutrient management;
- Under the Agriculture Climate Solutions Living Labs Program, a national network of living laboratories is being established to support demonstration and knowledge transfer regarding beneficial practices that are tailored to regional realities; and
- Under the Canadian Agriculture Partnership, federal and provincial governments invest in key priorities, including supporting provincial programs to offer access to Environmental Farm Plans and financial support to adopt new beneficial management practices

**Additional Resources:**

Further background for this resolution can be referenced in the following discussion paper and news release, posted on the Government of Canada website, under Agriculture and Agri-Food Canada, on May 10, 2022, and July 4, 2022, respectively.

May 10, 2022 Discussion Document: <https://agriculture.canada.ca/en/about-our-department/transparency-and-corporate-reporting/public-opinion-research-and-consultations/share-ideas-fertilizer-emissions-reduction-target/discussion-document-reducing-emissions-arising-application-fertilizer-canadas-agriculture-sector>

July 4, 2022 News Release: <https://www.canada.ca/en/agriculture-agri-food/news/2022/07/government-of-canada-invests-over-16-million-in-new-technology-for-high-efficiency-fertilizers.html>