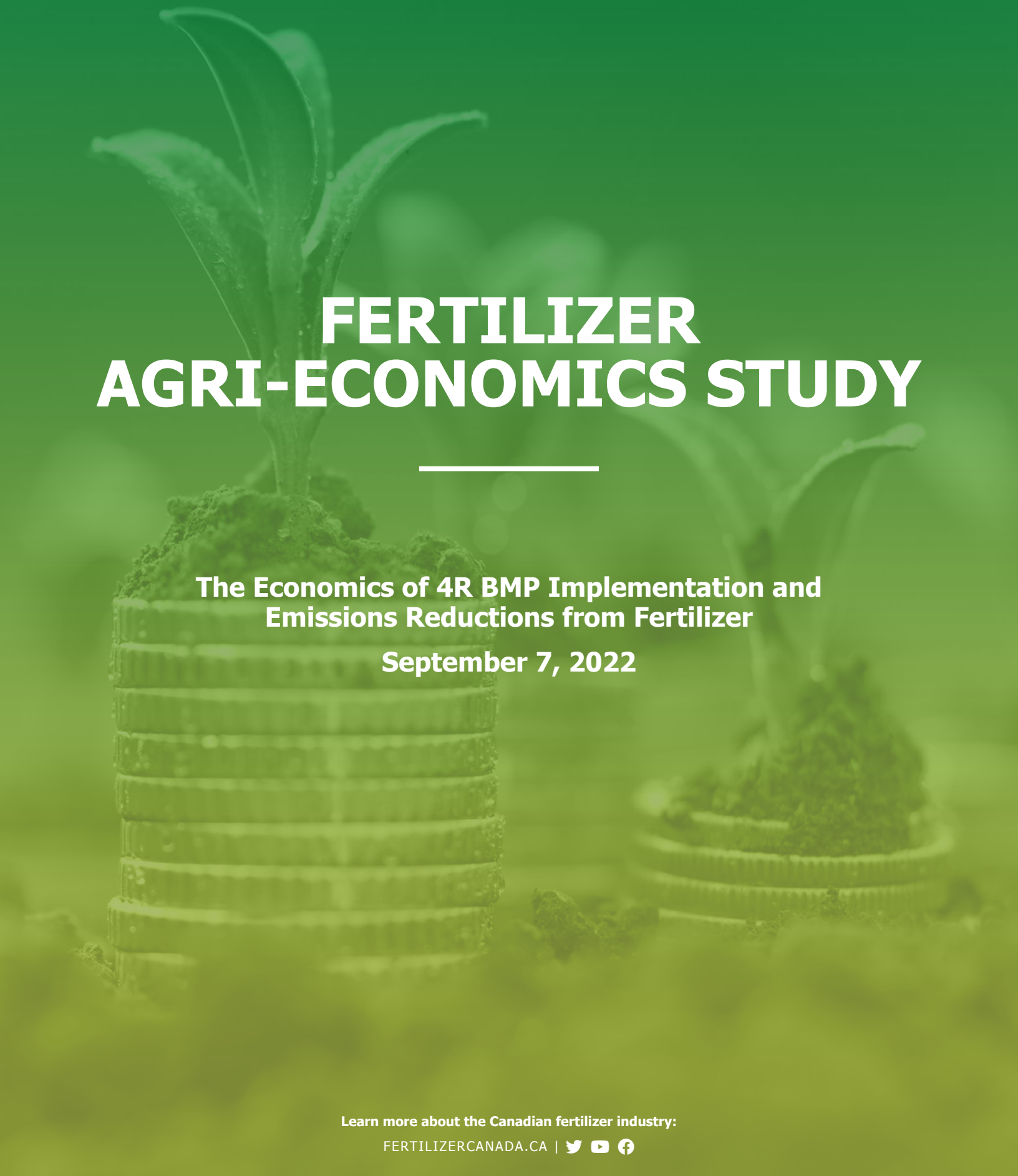
FERTILIZER CANADA



FERTILIZER AGRI-ECONOMICS STUDY

The Economics of 4R BMP Implementation and Emissions Reductions from Fertilizer

September 7, 2022

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Fertilizer Canada and Canola Council of Canada undertook a study that found Canada can reduce GHG emissions by 14 per cent from 2020 levels while still protecting our contribution to global food security through the adoption of aggressive, but reasonable levels of 4R Nutrient Stewardship (4R) Best Management Practices (BMP). This would result in a 1.6 MtCO2e reduction by 2030.

Background

The Government of Canada announced their industry reduction targets for greenhouse gas emissions in late 2020. These targets included a 30 per cent absolute reduction in the greenhouse gas nitrous oxide from field applications of nitrogen fertilizer by 2030. Estimated emissions in the 2020 crop year were used to set the baseline for reductions. As part of their discussion paper released in March 2022, Agriculture and Agrifood Canada (AAFC) suggested 4R Nutrient Stewardship as an approach for achieving the required reductions.

With the release of the 2022 National Inventory Report (NIR), total emissions from fertilizer N were 11.8 MtCO2e in 2020. A 30 per cent emission reduction target in absolute terms is 3.54 MtCO2e, setting the emission target at 8.3 MtCO2e per year in 2030.

Goal

The study looked at a series of scenarios for major Canadian cropping systems across Canada and built a path forward to 2030 based on broader implementation of 4R practices. The study looked at the impact of 4R BMPs on GHG emissions and the economic impact to growers.

Study Methodology

This study developed economic and nitrous oxide emission models for major cropping systems in five regions (Ontario, Quebec, and the Prairies broken into three regions based on soil zone, climate, and cropping system difference) and compared the effects of different 4R BMP adoption rates on the regional crop production economy and nitrous oxide emissions from fertilizer.

Three scenarios were explored:

1. Yields were held constant at 2022 levels (no yield increase) and aggressive, but realistic 4R BMP adoption out to 2030.

    a. Results: The total cost to implement the BMPs reached $495 million per year and resulted in a 21%, or 2.5 MtCO2e, reduction in GHG emissions. While the cost of the additional BMPs were offset by savings in fertilizer and seed cost by $248 million above what they were saving from their current BMPs, most regions experienced a negative net income by 2030. Without an increase in yield contribution margins, in 2030 they would fall by $109 million below 2020 levels due to the net cost of implementing the BMPs. Adoption rate of advanced 4R BMPs ranged from 26-45 per cent in Ontario and Quebec and 28-50 per cent in the prairies.

2. Yields were increased, including a moderate increase in N rate to support this, and aggressive, but realistic increases in 4R BMP adoption out to 2030.

    a. Results: The total cost to implement the BMPs was $495 million in 2030, the same as first scenario, and the increase in yield resulted in a 14%, 1.6 MtCO2e, reduction in GHG emissions. The cost to reduce N2O increased from $44 to $113 per tCO2e from the no yield increase to increased yield scenario. Due to the increased yields contribution margins increased to $4.3 billion by 2030. Adoption rate of advanced 4R BMPs ranged from 26-45 per cent in Ontario and Quebec and 28-50 per cent in the prairies.

3. Yields were increased, including a moderate increase in N rate to support this, and 4R BMP adoption rates were increased until the 30 per cent reduction target was reached.

    a. Results: To reach the 30 per cent reduction target, adoption of multiple advanced 4R BMPs was required on nearly every acre of N fertilized crops. Ontario and Quebec would require an adoption rate of 100 per cent and Western regions would require adoption rates between 60-70 per cent (adoption rates in Ontario and Quebec are higher than Western Canada, but magnitude of change needed in each region is similar). The cost to achieve these higher adoption rates would be an investment of $4.6 billion for BMPs over the 10-year timeframe. This is $3.1 billion above the 2020 baseline and would be an additional $1.2 billion more than the costs for adoption in the first two scenarios. This scenario resulted in a $4.4 billion increase in contribution margins and net income.

    b. While there is potential for savings in this scenario that are significant individual farmers will have to weigh the risk of increased spending on BMPs with the potential of experiencing below average yields or prices due to weather or markets in some years. There is also the concern that reducing fertilizer may impact yield in general and this added risk may make BMP adoption less attractive.

Key Findings

- 75 per cent of Canadians agree that Canada plays a critical role in maintaining global food security. To ensure financial viability and meet global demands, Canadian farmers need to continue to increase crop yields. Based on a scenario where crop yields increased and farmers adopted an aggressive, but attainable level of 4R BMPs a reduction of 1.6 MtCO2e or a 14% reduction from 2020 levels could be achieved. GHG emissions need to be reduced, but not at the cost of food production. This is echoed among public opinion with 64 per cent of Canadians saying that Canada should be focusing more on food production, even if it means we can't reach a 30 per cent reduction in fertilizer emissions. The increase in yields also increased contribution margin and net farm income by $4.3 billion dollars by 2030, making this a financially attractive option to farmers.

- To reach a 30 per cent absolute emission reduction without compromising yields requires an unrealistic level of adoption of multiple advanced 4R BMPs on nearly every acre of N fertilizer crop and would cost $4.6 billion, which is $3.1 billion more than currently is spent to implement the 2020 level of BMPs over the 10-year timeframe. This would impose significant costs on Canada's crop producers and potentially damage the financial health of Canada's crop production sector. While this approach could see contribution margin and net farm income increase to $4.4 billion, this must be weighed against the additional implementation cost of $1.2 billion as well as increased risk the farmer must take on without a guarantee of return on investment. Significant emission reductions are possible, but we must be realistic and not jeopardize food security and the financial security of Canadian farmers.

- Large regional differences were estimated in the cost per tonne ($/tCO2e) of emission reductions. Per unit costs were significantly lower in Ontario than in the semi-arid prairies. A wholistic approach must be taken that assess the region, soil, and crop and encourages adoption of regionally appropriate BMPs.

- Without increasing yield and revenue, the cost of implementing emission reduction strategies would, in combination with inflationary pressures, undercut the profitability of Canadian crop production. If yields remain flat with the implementation of BMPs Canadian farmers would make $109 million less in income than they did in 2020. While there is a savings from a reduction in fertilizer and seed costs this does not completely reduce the cost, there is still an investment of $1.4 billion to implement BMPs.

Recommendations

- **Targets must remain voluntary** – Climate change is a serious issue and must be addressed but not at the cost of food production. Emission reductions can be achieved but based on the study results a 30 per cent target is not realistic without jeopardizing food security, which is why the target must remain voluntary. A recent study by the Canadian Federation of Independent Business (CFIB) reaffirmed this with 72 per cent of farmers saying the yield of their crops and overall food production will be reduced if the federal government required them to reduce their use of nitrogen fertilizer.

- **Collaboration with provinces**, farm groups, and the fertilizer industry is necessary – Not all acres are created equal. The level of BMP adoption, and therefore cost, varies by region. Policies and programs to encourage adoption must take this into consideration by working with provinces, farm groups, and the fertilizer industry. Farmers are stewards of the land, with 88 per cent of Canadians saying they believe Canadian farmers are best suited to understand the needs of their crops and their impact on the environment.
- **Intensity-based approach rather than absolute** – Given both the current need to increase food production, and that Canada's food system is already among top in the world for nitrogen management, the government needs to consider an intensity-based approach and ensure that it does not limit the continuation of crop yield improvement and production growth. Focusing on absolute emissions can impact competitiveness for the agriculture sector and create carbon leakage to other countries.
- **Improve data collection** – Accurate, reliable data is crucial to effectively measuring success. A government investment of $5 million over the next 8 years towards 2030 will support continuing and expanding the fertilizer use survey which could inform modeling. As well, emission factors from 4R BMPs and new products need to be integrated into the NIR methodology to ensure emission reductions are being accurately captured.
- **Scale up 4R adoption** – 4R BMPs are scientifically proven to optimize N fertilizer and reduce GHG emissions when used effectively and many farmers are already using these practices. This is the most effective approach we have available. These practices should be integrated into programs, policies, and international climate diplomacy.
- **Incentive programs to reduce emissions** – Support for research, measurement, and farmer adoption need to go well beyond the current OFCAF funds. AAFC needs to expand its future programs to fully explore a wide range of emerging technologies and programs needed to utilize the talent, skills and dedication of Certified Crop Advisors and field agronomists who are the trusted advisors of Canadian farmers. Additional incentives should also be explored, including integrating on-farm measuring and reporting of emission reductions into ECCC's offset program.