



Potential Over-Formulation of N [Nitrogen] and P [Phosphorus] in Fertilizers sold or imported into Canada

May 18th, 2021

Invitation for industry members to engage in discussions on the potential over-formulation of fertilizers sold and imported into Canada. Industry's input will inform the Canadian Food Inspection Agency's (CFIA) environmental safety assessment and any ensuing risk management options that are deemed necessary.

Issue

Fertilizers and supplements that are imported and sold in Canada must be safe for the environment when used as directed. To this end, it is critically important that nutrient guarantees are accurate. Significant exceedances (higher nutrient content than what is represented on the label) may lead to unintentional over-application and ensuing nutrient losses to the environment through volatilization and leaching.

This in turn, undermines the Agency's environmental protection mandate and the Government of Canada's climate change mitigation efforts. It further puts on-farm nutrient management plans at risk and runs contrary to the principles of the industry's international 4R nutrient sustainability framework.

4R Nutrient Stewardship:
***Right source** at the
***Right rate**, at the
***Right time** and in the
***Right place**¹

While the risks of nutrient over-application to soils are well known and documented (Appendix A), marketplace monitoring data on nutrient variability in commercial products is lacking. Additional data and information will help design appropriate regulatory controls that are commensurate with the risks. It can also be used to establish upper tolerances to guide proponents on permissible levels of over-formulation.

In order to obtain a better understanding of the Canadian marketplace (specifically occurrence and magnitude of over-formulation), the CFIA is seeking industry engagement.

Objectives of the initiative

Information on the Canadian marketplace will inform the risk assessment and risk management options considered. There are numerous approaches to risk management available, from publishing standards for industry to adopt, to active marketplace monitoring programs that target areas of the market associated with the highest risk of nutrient over-formulation. Any risk management approach selected in the end will be a result of collaboration between the industry and the CFIA.

¹Fertilizer Canada "Stewardship" <https://fertilizercanada.ca/our-focus/stewardship/>



Role of Industry

The CFIA appreciates that rapid advances in technology, manufacturing methods and quality control measures used by industry are fundamentally changing the landscape of the entire agricultural sector. We also recognize that regulatory measures must remain agile to account for these shifts in marketplace realities. To that effect, the CFIA is seeking industry's input and assistance in compiling the critical input parameters that will inform an environmental risk assessment and the development of appropriate control measures to minimize any potential risks of product over-formulation. These parameters include but are not limited to:

- Information on the modern manufacturing practices and quality control systems used by industry
- The percentage of companies that use these “state of the art” technologies relative to the rest of the fertilizer sector
- Analytical variances or confidence intervals of sampling and testing methodologies employed by companies
- Nutrient variability in commercial fertilizers across various subsectors as evidenced by results of analysis – these may differ substantively between sources such as primary N, P and K materials, customer blends, home and garden prepackaged products, organically derived waste materials etc.
- The probability, frequency and magnitude of over formulation in the Canadian marketplace (if and when it occurs).
- Main drivers of consumer/producer choices – label guarantees, past experience with products, testimonials and anecdotal evidence, soil testing, precision agriculture, advice of agricultural crop advisors etc.

Logistics and organization

One of the stakeholder engagement models used repeatedly by the Canadian Fertilizer Products Forum (CFPF) was the “industry-working group model”. This approach has proven very effective in the past in harnessing the collective expertise on an issue and consolidating perspectives from various sectors into one consensus-based recommendation. Typically the membership of the working group was open to all interested parties and run on voluntary basis under the leadership of a self identified chair. The CFIA staff participated in industry deliberations (if and when invited) providing advice from a regulatory perspective.

Other models can be explored to allow interested parties to identify and select the most suitable and cost effective ways for their organization to participate.

NOTE: Confidential Business Information or company data provided to the Agency in support of this initiative will be protected under the *Access to Information Act* and *Privacy Act*.



Inaugural meeting to launch the initiative

The CFIA will be hosting an inaugural meeting at the end of June to launch the initiative and seek preliminary industry feedback on the issue, merit and approach (draft agenda attached). Discussion on the logistics and organization of an industry working group have been included in the agenda.

When: June 30th, 2021

Time: 11:00 am – 1:00 pm EST

Format: Virtual - MS Teams

Link: [Click here to join the meeting](#)

We thank you in advance for your ongoing support and commitment to improving the regulatory framework for fertilizers and supplements in Canada and the administration of the Fertilizer Program.

Sincerely,

Ewa Madey PhD.

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Canadian Food Inspection Agency/Government of Canada
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Appendix A: Background and context

Amendments to the *Fertilizers Regulations*

The *Fertilizers Regulations* were recently amended (October 26, 2020). One of the key objectives of fertilizer regulatory modernization initiative was to strengthen the Agency's environmental protection mandate and, by doing so, support safe and sustainable use of fertilizers and supplements imported or sold in Canada. The initial proposal, published in *Canada Gazette* part I (December 8, 2018 to February 21, 2019) required that all nutrients be guaranteed on actual basis

This aspect of the regulatory proposal generated strong opposition from regulated parties which viewed it as unattainable in light of current manufacturing practices and inherent variability in nutrient content. Industry members also felt that this requirement would introduce a disparity between the Canadian regulatory regime and foreign jurisdictions that use minimum guarantees as the international norm. The fertilizer and supplement stakeholders unanimously advocated to continue to guarantee macronutrients (nitrogen, phosphorus and potassium) and secondary nutrients (calcium, magnesium and sulphur) on minimum basis. They further recommended that the CFIA use its environmental protection mandate to ensure that regulated products do not present a risk of harm to the environment when used as directed.

In response to these comments and other feedback, the CFIA adjusted the proposal to require that macronutrients and secondary nutrients continue to be guaranteed on minimum basis with the understanding that upper tolerances were to be developed to enable implementation and compliance verification.

Broad GoC goals

The Government of Canada's current priorities include climate change, a healthy environment and a strong economy. The agriculture and the agri-food sector is fundamental to the global food production continuum and both domestic and export markets; the latter being targeted to grow to \$80 billion annually by 2025.

The Canadian Agricultural Partnership (Partnership) framework, launched in 2018, is a five year commitment by the federal, provincial, and territorial governments to help the sector enhance its competitiveness through research, science and innovation, with an emphasis on environmental sustainability and clean growth. Another important goal is to raise producers' awareness of environmental risks, and accelerate the adoption of improved on-farm nutrient management practices and precision farming. Further to the Partnership, departments and agencies have been tasked under the Federal Sustainable Development Strategy and the Greening Government Strategy to take action to improve understanding of the risks posed by the impacts of climate change to federal assets, services and operations across the country, and to integrate climate change measures into national policies, strategies and planning. Those actions are also identified as targets under the United Nations' Agenda 2030.



Regulatory landscape in Canada

Agriculture is a shared responsibility between federal and provincial partners and the fertilizer industry. While the provinces and territories regulate manufacture, transport, land use and disposal, the federal fertilizer framework administered by the CFIA ensures commercial product safety and truthful representation (labelling) of fertilizers in Canada. The CFIA's mandate focusses on safety including environmental risk mitigation. To that effect, the *Fertilizers Regulations* require that products are properly labelled and do not pose risk of harm to humans, plants, animals and the environment when used as directed.

Climate change mitigation

Greenhouse gas emissions and fertilizer use

The linkage between agriculture and climate change is undeniable and has been both extensively investigated and debated on various domestic and international fora. As an example, the percentage of nitrogen that is absorbed by crops is known to be less than half, with the rest running off into ground or surface waters (eutrophication) or escaping into the air as nitrous oxide (N₂O), an extremely potent greenhouse gas (GHG). In fact, emissions associated with synthetic nitrogen fertilizer application have increased by almost 60% between 2005 and 2018, from 7 to 11 Mt, and these emissions are projected to keep increasing toward 2030. In addition, extreme weather conditions (drought, flooding fluctuations in seasonal temperatures, crop performance and land coverage etc.) associated with climate change appear to significantly exacerbate nutrient losses from agricultural operations.

Emission reduction targets cannot be achieved simply by limiting commercial fertilizer use without jeopardizing soil fertility and diminishing crop yields. Hence, the focus is being placed on farmer/grower awareness, sustainable on-farm nutrient management practices, precision agriculture and innovative technologies designed to minimize nutrient losses to the environment while maximizing the crop's yield potential. Similar concerns surround the use of organically derived waste materials on agricultural land. These, however are compounded by highly variable nutrient content and limited plant uptake availability.

Eutrophication

A major concern for surface waters is eutrophication, primarily due to nitrogen and phosphorus; the largest groundwater quality issue is contamination from nitrates. The causes of nutrient pollution of surface waters include air pollution, urban and rural wastewater discharges, and the flushing of agricultural fertilizers and manures into receiving waters; nitrate contamination of groundwater largely comes from leaching of fertilizers and manures applied to agricultural lands.

The increasing risk of nitrogen loss from Canadian farms to the aquatic environments a significant issue for agricultural water management that calls for implementation of improved management techniques. For instance, the occurrence of elevated nitrate concentrations in groundwater within the agricultural environment is widespread and represents a significant threat to both private and municipal drinking water wells in Canada.



Phosphorus has been associated with severe algal blooms in large lakes in the Prairie provinces and Ontario; though risk assessments show that roughly one quarter of Canada is at moderate or high risk for phosphorus contamination, it is insufficiently monitored to adequately assess the problem or how it can be better managed. Agricultural intensification in Canada has greatly increased the risk of contamination of surface water and groundwater by nutrients. Evidence suggests, however, that the off-farm costs of mitigating soil and groundwater contamination by far exceed the costs of on-farm nutrient management practices

Air quality

Ammonia (NH₃), nitrous oxide (N₂O), and sulphur oxide (SO₂) emissions from fertilizer applications are also known to contribute to the formation of secondary aerial pollutants, such as particulate matter and ground level ozone. Agriculture has been reported to account for 95% of Canada's ammonia (NH₃) emissions with 75% coming from manure and 20% from inorganic fertilizers. When ammonia in the atmosphere reaches industrial areas, the pollutants from combustion such as nitrogen oxides produced by diesel vehicles and sulphur compounds from power plants combine to create very small particles, about 2.5 micrometres across.

While urea only provides only 20% of nitrogen required by crops it contributes about 50% of total NH₃ emissions from mineral fertilizer applications. The concentrations of ammonia released are not high enough to cause direct environmental or human health concerns outdoors, and most of the ammonia is re-deposited within a few hundred metres of where it was released. However, there are concerns that some of this ammonia could contribute to the production of fine particulates, causing a decline in air quality.

Waste-derived materials

Land application of organic fertilizers such as compost, manure, biosolids, and anaerobic digestates are strongly promoted by provincial and municipal authorities as means of waste diversion. Some provinces go as far as banning landfilling of all organics. While benefits of using these materials in agriculture are clear (return of nutrients and organic matter to the soil) so are the challenges. Storage sites need to be properly managed due to odour, combustion potential, release of gaseous nitrogen compounds and run-off into surface and groundwater.

The sheer volume of the material tends to restrict the area of its application to under a 100 km radius from the source resulting in higher and more frequent applications. The timing (application window) for organic fertilizers is also limited by soil conditions, weather, the plant's growth stage and nutritional needs. Generally, organic fertilizers can only be applied prior to planting or after harvest. Fall applications tend to lead to high nutrient losses, as the material is broken down over winter and leaches with fall rains or spring melts. In addition, the need to incorporate the material into the soil opens it to erosion and progressive deterioration. Lastly, waste-derived fertilizers are highly heterogeneous in nature. Consequently, their nutrient content can vary by as much as 50% which can result in the over-loading of nitrogen and phosphorous.

Potential over-formulation of N [Nitrogen] and P [Phosphorous] in Commercial Fertilizers

Inaugural Meeting

When: June 30th, 2021

Time: 11:00 am – 1:00 pm EST

Format: Virtual - MS Teams

MS Teams Link: [Click here to join the meeting](#)

Call in (audio only): [1 613-800-7011](tel:16138007011)

Phone Conference ID: 130 318 215#



DRAFT Agenda

TIME	SESSION	SPEAKER
11:00-11:05	Welcome and logistics of the meeting	Ewa Madey, CFIA
11:05-11:15	Opening remarks	Linda Webster, CFIA
11:15-11:35	Impacts of over-formulation of Nitrogen and Phosphorous in commercial fertilizers	Doug Sasaki, CFIA
11:35-12:00	Project outline <ul style="list-style-type: none"> • Issue definition • Scope and desired outcomes • How can Industry help? 	Ewa Madey, CFIA
12:00-12:15	Feedback and preliminary perspectives	All
12:15-12:30	Industry Input – logistics and organization <ul style="list-style-type: none"> • Working group model • Sector-specific feedback • Bilateral interactions – stakeholder survey • Other? 	All
12:30-12:45	Proposed milestones	Glenn Murray, CFIA

All materials provided at the meeting will be available in both official languages and distributed to participants after the event

The session will not be recorded

Simultaneous translation will not be provided – however all participants are welcome to speak in their language of choice.