FERTILIZER INDUSTRY POSITION ON BIODIVERSITY

The fertilizer industry recognizes that biodiversity[1] is fundamental to the well-being, nutrition and health of people, and the future of our planet. Global efforts and concrete actions are required to halt its continuous decline.

The industry fully supports the principles of the ***Global Biodiversity Framework*** (GBF) of the United Nations Convention on Biological Diversity (CBD) and is committed to help implementing its goals and targets.

The industry's approach includes expanding the adoption of existing science-based solutions, based on good agronomic principles[2], while developing and driving the implementation of new solutions. This includes, but is not limited to, a deeper and comprehensive understanding of the multiple impacts, dependencies, risks and opportunities to biodiversity stemming from the production to the management of nutrients in farming, with a view to better address current and future challenges, and build suitable partnerships across the agriculture value chain.

The industry has chosen a step-wise approach:

1. **Identifying pressures on nature and biodiversity from across the fertilizer value chain and key levers of change,**
2. **Examining the targets of the Global Biodiversity Framework and their implications for the fertilizer industry,**
3. **Beginning to prioritize potential industry and corporate actions to move towards improving biodiversity outcomes and contributing to reversing the negative impacts.**

WHAT HAS THE FERTILIZER INDUSTRY DONE SO FAR?

➢ ACHIEVING NATURE-POSITIVE PLANT NUTRITION

On farm and land-use level, the industry has been taken actions to achieve nature-positive plant nutrition for many years already by promoting and contributing to implement the science-based 4R Nutrient Stewardship principles: using the Right source, at the Right rate, at the Right time, in the Right place. These fertilizer best management practices have proven to match nutrient supply with crop requirements, minimize nutrient losses from fields and reduce eutrophication and greenhouse gas emissions. Depending on regional conditions, implementation has been driven by multi-stakeholder partnerships, capacity and extension services, and certification programs. It has been strengthened by local efforts to:

- combine the 4Rs with conservation farming practices,
- ensure that the 4Rs are an integral part of soil fertility management, adapted to and in response to the local soil conditions,
- develop digital farming and precision agriculture solutions that integrate the 4Rs.

[1] As defined by the UN Convention on Biological Diversity: "Biological diversity means the variability among living organisms from all sources including, inter alia, terrestrial, marine and other aquatic ecosystems and the ecological complexes of which they are part; this includes diversity within species, between species and of ecosystems."

[2] Detailed by the independent Scientific Panel on Responsible Plant Nutrition in the Issue Brief "Achieving Nature-Positive Plant Nutrition" (2021)

A comprehensive global overview of the outcomes and regional experiences with implementation of the 4Rs can be found here: ***Furthering 4R Nutrient Stewardship*** by the Scientific Panel on Responsible Plant Nutrition.

➢ DEVELOPING SOLUTIONS TO REDUCE FERTILIZER PRODUCTION'S ENVIRONMENTAL IMPACT

The production of Ammonia fertilizer alone accounts for approximately 3% of global energy consumption and 1.3% of global CO_2 emissions[3]. This can be attributed to the conventional use of carbon-intensive feedstocks like natural gas and coal. The fertilizer industry partnered with the International Energy Agency to develop a roadmap for decarbonizing ammonia production, and the industry is already investing in low-carbon ammonia production. In addition, the ammonia industry has started to take measures to make low-carbon ammonia available beyond the fertilizer industry (e.g. shipping), which has the potential to significantly reduce GHG emissions globally.

Turning to mining operations, the extraction and processing of potash ore and phosphate rock have historically placed high demands on water resources, and poor land reclamation practices may have led to loss of biodiversity in the past.

The fertilizer industry implements a range of sustainable solutions to significantly reduce its environmental impact including:

- the adoption of established best practices, such as the integration of renewable energy sources in ammonia production, installation of emissions abatement technologies, and the use of carbon capture and permanent sequestration technologies,
- the implementation of innovative water recycling methods,
- the repurposing of the by-product phosphogypsum for phosphate mine reclamation.

➢ GATHERING KNOWLEDGE & SCIENCE

Taking the lead in understanding the key biodiversity issues associated with nutrients and fertilizer use, IFA supported a comprehensive review of "***Achieving Nature-Positive Plant Nutrition: Fertilizers and Biodiversity***" led by the independent ***Scientific Panel on Responsible Plant Nutrition*** in 2021.

Climate change is one of the most critical disruptors and threats to biodiversity. Therefore, decarbonization efforts in fertilizer production will impact biodiversity protection on several levels:

The International Energy Agency (IEA) has issued an ***Ammonia Technology Roadmap,*** with IFA's contribution, which shows several pathways for long-term CO_2 reductions in Scope 1 and 2. It was jointly presented at the UN COP 26 in Glasgow in 2021.

A Systemiq report ***Reducing Emissions from Fertilizer Use with a focus on Scope 3*** was commissioned by IFA and jointly presented at the UN COP 27 in Sharm el-Sheikh in 2022.

IFA's Scope 1, 2, and 3 reports are an integral part of the fertilizer industry's biodiversity roadmap.

[3] International Energy Agency (IEA), 2021. Ammonia Technology Roadmap CC BY-NC 3.0 IGO.

FERTILIZER AFFECTS BIODIVERSITY IN MANY WAYS: UNTANGLING THE COMPLEXITIES

The relationship between sustainable food production, plant nutrients and biodiversity is not straightforward and varies from one region to another.

Plant nutrients are essential for life on Earth. They are critical for the health of soils, plants and animals, help maintain ecosystems and contribute to the production of nutritious food for a fast-growing world population. It is estimated that, on a global scale, about half of these contributions come from mineral fertilizers alone.

Fertilizers affect biodiversity in various ways, depending on the type of environment and location of their application: Nutrient Use Efficiency, the scale of application, the organic and mineral composition of the fertilizer source and the synchronization of the application with the plant's needs are just a few of their direct effects. These are positively complemented or negatively impacted by other land-use practices, weather, and climate repercussions, micro-and macro-economic and social factors, such as war and conflicts, consumer preferences or labor shortages… - just to name a few.

When responsibly managed, fertilizers contribute to the biodiversity of soils, because they increase soil organic matter, soil fertility, and the life of soil microorganisms. Additionally, they offer numerous advantages, including the growth of nutritious plants and food crops, benefiting both humans and animals. In areas where arable land soils are depleted, fertilizers play a crucial role in restoring equilibrium to these ecosystems.

Optimized, efficient and site-specific fertilizer use leads to greatly increased productivity on arable land and to the implementation of sustainable intensification. **This also contributes to forestalling deforestation – a key element of the Global Biodiversity Framework and its Target 10**, which recognizes sustainable intensification as a biodiversity-friendly practice to protect more natural land from conversion to farming.

Both excess and insufficient fertilizer use have negative effects on ecosystems and the balance of natural habitats, as they put some form of pressure on the agriculture and food systems.

- **Underuse of fertilizers has many negative implications for biodiversity, climate and food preservation**: Nutrient-depleted soils trigger a degradation process, marked by accelerated erosion and lack of water retention, depletion of soil organic carbon, poor root and plant development and reduced crop production, which drives important biodiversity loss and leads to more land conversion for agricultural purposes.

- **Overuse-use or inefficient use of mineral and organic fertilizers** (above all nitrogen and phosphate) can have severe environmental implications for adjacent waterways, groundwater and the pollution of marine systems through eutrophication, aggravated through high temperatures and climate change. It can also lead to higher losses of nutrients such as nitrogen to the atmosphere, and greater re-deposition on natural ecosystems, which may reduce biodiversity there.

IDENTIFICATION OF KEY LEVERS FOR CHANGE:

While acknowledging that the multitude of pressures on nature still requires further analysis, IFA members have already identified **priority areas that contribute to minimize the industry's impact on nature and that will determine a portfolio of strategies and actions**:

1. **Improve the adoption of existing solutions**
2. **Sustain innovation and new solutions**
3. **Drive cross-sectoral & partnerships**

The following solutions and development areas are being prioritized as nature-protective pathways, destined to be integrated into the industry's biodiversity agenda:

1. PRIORITIZATION OF NATURE-POSITIVE ACTIONS DOWNSTREAM ON THE FARMLAND:

Priority actions and their contribution to the global biodiversity framework targets

IMPROVE THE ADVANCEMENT OF PRECISION AGRICULTURE:

This includes soil fertility, water impacts, site-specific crop and fertilizer's best management practices, according to the 4R principles of nutrient stewardship (using the Right source, at the Right rate, at the Right time, in the Right place – see corresponding issue brief of the Scientific Panel on Responsible Plant Nutrition).

Precision agriculture considers the soil type, the weather, plant growth, etc. and is now increasingly accessible to smallholder farmers through mobile apps and regional soil mapping projects.

TARGET 10

Ensure that areas under agriculture, aquaculture, fisheries and forestry are managed sustainably, in particular through the sustainable use of biodiversity, including through a substantial increase of the application of biodiversity-friendly practices, such as sustainable intensification, agroecological and other innovative approaches, contributing to the resilience and long-term efficiency and productivity of these production systems, and to food security, conserving and restoring biodiversity and maintaining nature's contributions to people, including ecosystem functions and services.

TARGET 7

Reduce pollution risks and the negative impact of pollution from all sources by 2030, to levels that are not harmful to biodiversity and ecosystem functions and services, considering cumulative effects, including: (a) by reducing excess nutrients lost to the environment by at least half, including through more efficient nutrient cycling and use […]

INCREASE FERTIGATION (APPLICATION OF NUTRIENTS WITH IRRIGATION WATER):

This priority area contributes to support water productivity in the soils and plants, addresses water scarcity, and can improve the recycling of wastewater through application of partially treated wastewater.

TARGET 10 **TARGET 7**

See above

FOSTER REGENERATIVE AGRICULTURE PRACTICES:

The fertilizer industry recognizes regenerative agriculture as an outcome-based approach that can reverse biodiversity loss by restoring soil health and improving nutrient use efficiency. This includes conservation farming approaches (cover cropping, crop rotation, composting, minimal or no tillage) depending on the location.

The industry acknowledges, however, that there are other approaches with high food security, soil health, biodiversity and climate mitigation potential within the range of land management and restoration activities, and that regenerative practices are complementary or an integral part of them.

TARGET 10

See above

DEVELOP INNOVATIVE TECHNOLOGIES:

Further development of enhanced-efficiency fertilizers, such as slow-release fertilizers, controlled-release fertilizers with biodegradable coatings and stabilized fertilizers with inhibitors, as well as water-soluble fertilizers, biologicals and biostimulants were identified as additional crop nutrition solutions that contribute to the biodiversity framework.

Additional financing will be required to make these technologies more broadly available.

TARGET 10

See above

TARGET 8

Minimize the impact of climate change and ocean acidification on biodiversity and increase its resilience through mitigation, adaptation, and disaster risk reduction actions, including through nature-based solutions and/or ecosystem-based approaches, while minimizing negative and fostering positive impacts of climate action on biodiversity.

PARTNER FOR MORE IMPACT:

The effect of nutrient management on biodiversity is inter-linked with numerous other dimensions of agricultural development and land management, which calls for joint, coordinated, multi-stakeholder approaches and integrated roadmaps and engagement with the whole agricultural value chain.

The industry partners for the development and implementation of regionally customized nutrient load reduction targets and roadmaps. These roadmaps will be targeted and adapted to each watershed, airshed or other ecological area that may be at risk. They provide the basis for coordinated, multi-stakeholder actions to reduce nutrient loads from multiple sources, including fertilizer use on agricultural land.

TARGET 7

See above

TARGET 19

Substantially and progressively increase the level of financial resources from all sources, in an effective, timely and easily accessible manner […] to implement national biodiversity strategies and action plans […]

TARGET 20

Strengthen capacity-building and development, access to and transfer of technology, and promote development of and access to innovation and technical and scientific cooperation […]

2. PRIORITIZATION OF NATURE-POSITIVE ACTIONS UPSTREAM IN THE PRODUCTION:

Priority actions and their contribution to the global biodiversity framework targets

DECARBONIZE AMMONIA PRODUCTION:

The carbon emission intensity of nitrogen fertilizer production is expected to decrease over the next decade(s) through the replacement of fossil fuels by renewables like wind and solar (green ammonia) and the increasing use of carbon capture and storage technologies (blue ammonia).

In parallel, current production processes will continuously be improved through the application of Best Available Technologies (BATs).

Low carbon ammonia as an energy source also has a massive potential to significantly reduce global GHG emissions of other industries like shipping and power generation.

TARGET 8

Minimize the impact of climate change and ocean acidification on biodiversity and increase its resilience through mitigation, adaptation, and disaster risk reduction actions, including through nature-based solutions and/or ecosystem-based approaches, while minimizing negative and fostering positive impacts of climate action on biodiversity.

TARGET 20

Strengthen capacity-building and development, access to and transfer of technology, and promote development of and access to innovation and technical and scientific cooperation […]

FURTHER CIRCULAR ECONOMY PRACTICES:

Fertilizer producers continuously work to optimize their use of resources. Waste management and recycling are key to increase the recovery of nutrients from various residual streams.

Examples include incorporating some by-products in the production process (ammonium sulphate), turning them into valuable plant nutrients (phosphates), and using surplus energy (heat) and raw materials (sulfur) that derive from other production processes.

In addition, fertilizer producers have identified water management and, in particular, the re-use of freshwater throughout the whole production process as a priority for their companies. For instance, phosphate producers are increasingly implementing innovative technologies to minimize water loss during transport and processing of ore. In addition, they apply best water treatment practices to recycle used water in plant processes and for uses in local horticulture.

TARGET 8 **TARGET 20**

See above

INCREASE THE REUSE OF PHOSPHOGYPSUM:

The global phosphate industry is increasingly reusing phosphogypsum (PG), a by-product that was previously considered to be "waste" and stacked away on land or dispersed. Based on the recommendation of the International Atomic Energy Agency (IAEA), recent regulatory changes in many countries have removed the main obstacles to the beneficial applications of PG, which has led to the reusing of millions of tons per year.

The fertilizer industry is now pursuing the total reuse of phosphogypsum as a safe resource for which there are many beneficial applications, such as a multi-nutrient sulfur-rich soil improver, as a high-quality plaster or wallboard, for mine reclamation (see point d below), and as a road-bed material.
Two peer-reviewed IFA reports explain in detail the beneficial uses of PG (a third IFA report, focusing on the economics of phosphogypsum use, is scheduled to be published by the end of 2024):

- Phosphogypsum: Sustainable Management and Use
- Phosphogypsum: Leadership, Innovation, Partnership

TARGET 3

Ensure at least 30 per cent of terrestrial, inland water, and of coastal and marine areas are effectively conserved and managed […]

ENHANCE LAND RECLAMATION AND TRANSFORM FORMER MINES INTO PARKS AND WILDLIFE AREAS:

This is already an integral part of IFA's largest phosphorus producers' ESG strategy, and has led to new recreational areas and biotopes. It holds multiple benefits for animals, plants, humans, soil, water and air quality. In many regions worldwide, a new mine is not being built without a nature-protective action plan.

TARGET 11

Restore, maintain and enhance nature's contributions to people, including ecosystem functions and services, such as the regulation of air, water and climate, soil health […]