

# Nitrogen Fertiliser

## WHAT IS IT ABOUT?

**Fertilisers provide plants with vital nutrients so that they grow better.** As such, fertilisers are integral to today's intensive agricultural systems<sup>1</sup> and arguably one of the most important inventions of the 20th century.<sup>2</sup> Fertilisers ensure the food security for a growing global population<sup>1</sup> as they have enabled societies to double the number of people that one acre of land can support.<sup>4</sup>

However, nitrogen fertilisers significantly contribute to climate change.<sup>5</sup> Hence, philanthropists need to support swift and scalable solutions that balance the need for increased agricultural productivity with the imperative to mitigate climate change.

### 3 FAST FACTS

## 13-20x

The factor by which the per capita use of nitrogen fertiliser in North America (40 kg) exceeds that in Africa (2 to 3 kg).<sup>6</sup>

## ~ € 500 billion

The potential societal benefits globally from reducing nitrogen losses.<sup>7</sup>

## 23 %

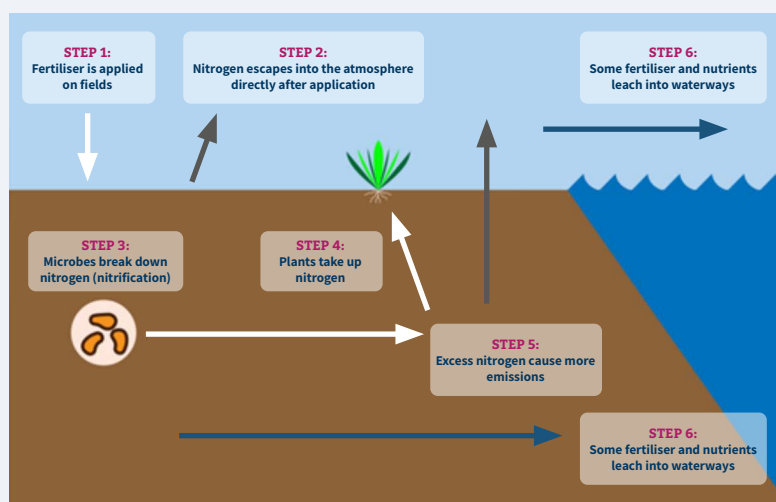
The share of all global fertiliser used to produce food that ultimately ends up wasted.<sup>8</sup>

## WHY ARE NITROGEN FERTILISERS IMPORTANT FOR OUR CLIMATE?

Nitrogen fertilisers are estimated to account for 5% of global greenhouse gases, which is more than all emissions from the plastic industry. Approximately one-third of these emissions derive from fertiliser production, with a notable contribution from the energy-intensive production of ammonia, a crucial element of nitrogen fertilisers.<sup>9</sup>

However, the bulk of greenhouse gases (two-thirds) are emitted when fertiliser is applied to agricultural fields.<sup>9</sup> Half of the nitrogen contained in fertilisers is not taken up by plants but escapes into the atmosphere directly after application, leaches into waterways or gets broken down by soil microbes in a process called nitrification.<sup>10</sup> This process releases nitrous oxide (N<sub>2</sub>O), a greenhouse gas 265 times more climate damaging than CO<sub>2</sub>.<sup>11</sup>

A core problem is that nitrogen fertilisers is often excessively applied, unnecessarily adding to run-off and soil deterioration.<sup>12</sup> As soil degrades, more fertiliser is needed to maintain yields, creating a vicious cycle that reinforces climate challenges.



How fertiliser produces emissions from soil

adapted from Heimsroth 2023

## WHAT FUNDERS CAN DO



### Efforts on the demand side

**Shifting diets and reducing food waste:** Fertilisers have enabled diets characterised by high consumption of animal products and significant food waste. Likewise, these practices drive demand for nitrogen fertilisers. Funders can help by targeting the overconsumption of animal products in many parts of the world, thereby reducing the need for nitrogen in feed production. At the same time, tackling food waste can minimise the amount of fertiliser unnecessarily applied to land.

Implementing these strategies will effectively reduce greenhouse gas emissions from both production and use of nitrogen fertilisers without compromising food security.



### Efforts on the supply side

**Optimising nitrogen use:** To safeguard against crop losses, many farmers use more nitrogen fertiliser than necessary.<sup>13</sup> Funders can stimulate more efficient use by supporting awareness and knowledge building initiatives that promote the '4 Rs' of precision agriculture: right rate, right type, right placement, and right timing. This involves on-field demonstrations, training, and advisory services that showcase solutions like slow-release fertilisers, sensors for nutrient monitoring, or reduced tillage practices. All of these solutions increase fertiliser uptake by crops and ultimately reduce N<sub>2</sub>O emissions. In addition, a system-wide adoption of these practices will require funders to support policy campaigns that create a change in subsidies so that farmers are compensated for reducing emissions while discouraging excessive fertiliser use.

There are many different strategies to engage in climate philanthropy. See our [Spotlight on Climate Funding Strategies](#) to learn more.

## THINGS TO CONSIDER WHEN FOCUSING ON NITROGEN FERTILISERS

### ► Changing the narrative

Despite persistent beliefs, the idea that less nitrogen fertiliser jeopardises food security is false.<sup>14</sup> Demonstration projects show that using less fertiliser does not compromise food security<sup>15</sup> and funders behind such projects should further leverage this evidence. By prioritising impactful communication, funders can disrupt the prevailing narrative, tackle farmers' uncertainty, and exert pressure on policymakers and industry to embrace sustainable fertiliser practices. Moreover, by highlighting co-benefits like mitigating ozone depletion, water pollution or soil degradation, funders can increase the relevance of their work to a wider audience.



### ► Consider region-specific needs

It is crucial to acknowledge the stark geographical contrast in nitrogen use and availability between high- and low-income countries. Funders should prioritise tailored interventions for each region. In high-income countries the emphasis should be on using less nitrogen more efficiently. In other regions like Sub-Saharan Africa, where there is a shortage of nitrogen, the focus should be on agroecological practices that minimise losses and on promoting the recycling of already available biomass like crop residues and animal manure.<sup>13</sup>



### ► Understand economic realities

Many farmers face economic challenges and thus require financial incentives to adopt climate-friendly practices. In contrast, major fertiliser companies are making increasing profits while passing the societal cost of excessive fertiliser production to the public. By highlighting this disparity, funders can spark discourse and push governments to shift subsidies from fertiliser companies to farmers in order to incentivise the adoption of climate-friendly practices.



Looking for funding opportunities?  
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