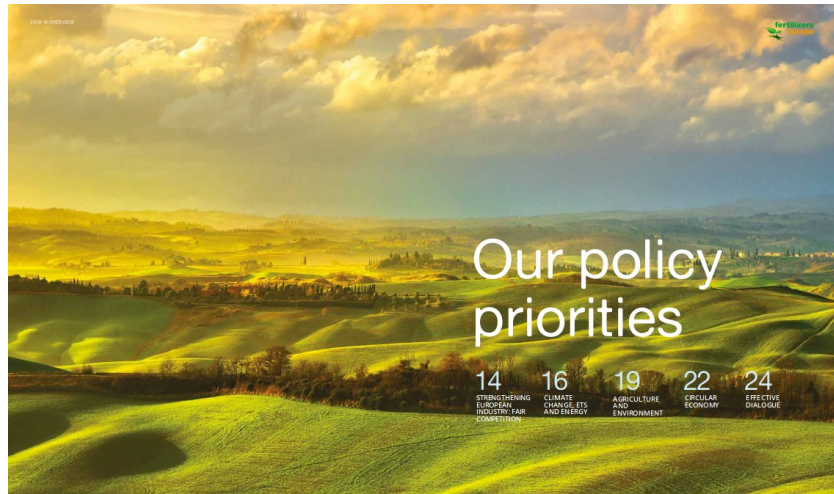


# Disprove the arguments used by the fertilizer industry

**The actors in the fertilizer industry know that they are criticised.** To secure their position and future sales, **they do a lot to improve their image.** And they don't lack money or capacity to do this in a very smart way: it is a huge greenwashing campaign.

To do so, they are careful in their choice of images. Green is the most widely used colour in their brochures, and Photoshop

their favourite tool to make the pictures as lush and ideal as possible. For example, Fertilizer Europe is presenting agriculture as a surrealistic Shire, the land of the hobbits (see picture next to this paragraph).



**In addition to pretty pictures, they also come up with arguments and half-truths on food production that protect and justify their business. In this document, we have selected the favourite tricks and arguments of the industry in order to counter them.**

At the moment, the Free the Soil campaign is focusing on Yara. Therefore we paid extra attention to what this fertilizer company is saying to justify its activities. In this case, the '**Yara Fertilizer Industry Handbook 2018**'<sup>1</sup> was very useful. There, the company is presenting its activities and strategies. However, most other companies and the lobby organisations of the industry are using similar arguments.

**Myth #1: 'Fertilizers are essential plant nutrients that are applied to a crop to achieve optimal yield and quality.'**<sup>2</sup>

Yara and the rest of the industry are always talking about fertilizers in general. Let's be clear: nobody will say that fertilizers are not essential. The real question is: what the kind of fertilization can be used best?

Are we talking about synthetic fertilizers (in Yara's wording 'mineral fertilizers'), those the company is producing and selling, or about other types of fertilizers like compost, green manure

<sup>1</sup> Yara Fertilizer Industry Handbook 2018 - <https://www.yara.com/siteassets/investors/057-reports-and-presentations/other/2018/fertilizer-industry-handbook-2018-with-notes.pdf>

<sup>2</sup> idem, page 1.

and stimulating microorganisms in the soil? In the same handbook, Yara is also more specific: ‘mineral fertilizers are necessary to replace those nutrients that have been removed from the field’.<sup>3</sup>

Here we disagree with Yara. Nutrients used by the plants and therefore taken away when the crop is harvested should be replaced, but there are good reasons not to do this with mineral fertilizers. Indeed, **mineral fertilizers are finite resources while renewable alternatives do exist. Though for this, it is necessary to close the cycle.** In contrast, an agriculture based on exports will always require mineral fertilizers as external inputs.

In 2002 already, organic farmer and author Jason McKenney explained in a clear way that the use of synthetic fertilizer results in a cascade of adverse effects on the soil:

‘Fertiliser application begins the destruction of soil biodiversity by diminishing the role of nitrogen-fixing bacteria and amplifying the role of everything that feeds on nitrogen. These feeders then speed up the decomposition of organic matter and humus.

As organic matter decreases, the physical structure of soil changes. With less pore space and loss of their sponge-like qualities, soils are less efficient at retaining moisture and air. More irrigation is needed. Water leaches through soils, draining away nutrients that no longer have an effective substrate on which to cling. With less available oxygen the growth of soil microbiology slows, and the intricate ecosystem of biological exchanges breaks down. Acidity rises and further breaks down organic matter. As soil microbes decrease in volume and diversity, they are less able to physically hold soils together in groups called aggregates. Water begins to erode these soils away. Less topsoil means less volume and biodiversity to buffer against these changes. More soils wash away.

Meanwhile, these events have a cumulative effect of reducing the amount of nutrients available to plants. Industrial farmers address these observed deficiencies by adding more fertiliser. Such a scenario is known as a negative feedback loop; a more blunt comparison is substance abuse.’<sup>4</sup>

**Myth #2: ‘Increasing crop yields is essential if we are going to be able to produce enough food for everyone. This increase is not possible without carefully planned fertilizing.’<sup>5</sup>**

This sentence is from Yara. However, the International Fertilizer Association, one of the main lobby organisations Yara is part of, is also spreading messages like ‘Fertilizers Are Crucial for Closing the Yield Gap’.<sup>6</sup> And not surprisingly, pesticide producers like Syngenta use the same argument<sup>7</sup> to promote pesticide use.

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3 Yara Fertilizer Industry Handbook 2018 - <https://www.yara.com/siteassets/investors/057-reports-and-presentations/other/2018/fertilizer-industry-handbook-2018-with-notes.pdf>, page 2.

4 Jason McKenney, author of ‘*Artificial fertility: The Environmental Costs of Industrial Fertiliser*’, published in 2002 in ‘The Fatal Harvest Reader -the tragedy of industrial agriculture’.

5 Yara website <https://www.yara.com/knowledge-grows/why-do-plants-need-fertilizers>

6 [https://www.fertilizer.org/Public/Stewardship/Publication\\_Detail.aspx?SEQN=4824&PUBKEY=582FA7AB-0F40-40B2-A62B-C61976F254AC](https://www.fertilizer.org/Public/Stewardship/Publication_Detail.aspx?SEQN=4824&PUBKEY=582FA7AB-0F40-40B2-A62B-C61976F254AC)

7 <https://aseed.net/en/pesticides-debate-report/>

A growing world population will require more food, but we need to ask ourselves “*where and by whom additional food must be produced*”<sup>8</sup>. Indeed, the easy 'we must feed the world' narratives are often used by the industrial agriculture industry, and they have been severely criticized by the International Panel of Experts on Sustainable Food Systems (IPES-Food) in their 2016 report *From Uniformity to Diversity*. The authors identify such narratives as locks-in, or 'key mechanisms locking industrial agriculture in place, regardless of their outcomes'.

“Data show that diversified agroecological systems can compete with industrial agriculture in terms of total outputs, performing particularly strongly under environmental stress, and delivering production increases in the places where additional food is desperately needed. Diversified agroecological systems can also pave the way for diverse diets and improved health.”<sup>9</sup>

In 2014 researchers from Berkeley looked into the topic: “With global food needs predicted to greatly increase in the next 50 years, it’s critical to look more closely at organic farming, because aside from the environmental impacts of industrial agriculture, the ability of synthetic fertilizers to increase crop yields has been declining.”<sup>10</sup>

The researchers conducted a meta-analysis of 115 studies comparing organic and conventional agriculture. They found that organic yields are about 19.2 percent lower than conventional ones, a smaller difference than in previous estimates. The yields also depended upon the type of crop grown, the researchers found. There were no significant differences between organic and conventional yield gaps for leguminous crops, such as beans, peas and lentils, for instance.

They also found that taking into account methods that optimize the productivity of organic agriculture could minimize the yield gap. They specifically highlighted two agricultural practices, multi-cropping (growing several crops together on the same field) and crop rotation, that would substantially reduce the organic-to-conventional yield gap to 9 percent and 8 percent, respectively.

In the report ‘Who will feed us?’<sup>11</sup> from the ETC Group it is explained that industrial farming gets all the attention (and most of the land). It accounts for more than 80% of the fossil fuel emissions and uses over 70% of the water supply used in agriculture, but it actually produces only about 30% of the world's food.

In the past decades a lot of money has been invested in research to increase the yields of industrial farming. Organic farming and other alternative, more sustainable practices have been a bit disregarded. Here as well the yields could go up in the near future.

Olivier de Schutter, who was by that time United Nations Special Rapporteur on the right to food published a report stating that average crop yield is 79% higher after implementing agroecological practices.<sup>12</sup> Research commissioned by the Foresight Global Food and Farming Futures project of the UK Government reviewed 40 projects in 20 African countries where sustainable intensification

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8 [http://www.ipes-food.org/\\_img/upload/files/UniformityToDiversity\\_FULLL.pdf](http://www.ipes-food.org/_img/upload/files/UniformityToDiversity_FULLL.pdf)

9 [http://www.ipes-food.org/\\_img/upload/files/UniformityToDiversity\\_FULLL.pdf](http://www.ipes-food.org/_img/upload/files/UniformityToDiversity_FULLL.pdf)

10 <https://news.berkeley.edu/2014/12/09/organic-conventional-farming-yield-gap/>

11 <http://www.etcgroup.org/sites/www.etcgroup.org/files/files/etc-whowillfeedus-english-webshare.pdf>

12 [http://www.srfood.org/images/stories/pdf/officialreports/20110308\\_a-hrc-16-49\\_agroecology\\_en.pdf](http://www.srfood.org/images/stories/pdf/officialreports/20110308_a-hrc-16-49_agroecology_en.pdf)

was developed during the 2000s. On average crop yields more than doubled. Push - pull strategy adopted in Kenya reports up to double yields for maize crops.

**One of the solutions is to produce food and proteins more efficiently by reducing the production of meat and dairy.** Food that can be used for human consumption should not be fed to animals. And land that can be used to produce food for humans directly should not be used to produce animal feed. This is one of the findings of the study 'Strategies for feeding the world more sustainably with organic agriculture' published in 2017 in Nature Communication<sup>13</sup>.

In conclusion, the argument that increasing the food production with synthetic fertilizer is the only solution to feed the world is quite simplistic.

**Myth #3: 'Mineral fertilizers will play an important role to improve land-use efficiency and to prevent deforestation and emissions from land use change.'**<sup>14</sup>

Partly true, but this can be done in different ways. More traditional practices and alternative practices like agroforestry can also result in high yields per hectare (see the previous myth). Most land use change from forest to agriculture land takes place to produce animal feed. Reducing livestock farming is a much better way to save forest and other natural areas and to feed the world population.

A more important argument to mention here is that **adding synthetic fertilisers will be bad for the quality of the soil life**, which will not only have negative effects on the plants, but will also result in soil degradation and erosion. This is one of the reasons farmers move to newly deforested land. Examples are exhausted fields in the South East of Brazil that have been used for soy production.

**So our main goal should be to save and improve the soils of our current agricultural land.**

This can be done best with other ways of fertilization and farming.

**Myth #4: 'To reduce the emission of greenhouse gasses we have to reduce livestock farming. To compensate the manure more synthetic fertilizers will be needed.'**

Okay, this is not a quote from Yara but it was somebody from the International Fertilizer Association (IFA) who said this during their side event at the COP23 Climate Summit in Bonn. And Yara is a member of the IFA as well.

Yes, less livestock is necessary, but no, this doesn't mean that this should be replaced by synthetic fertilizers. There are other ways to keep up the levels of nutrients; composting, growing protein rich legumes as green manure, closing the cycle by using human urine and faeces, agroforestry. And if the amount of livestock is reduced, this will already reduce the pressure on the existing land and yield per hectare.

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13 <https://aseed.net/en/feeding-the-world-with-organic-agriculture-not-easy-but-it-is-possible/>

14 [https://www.yara.com/siteassets/sustainability/position-papers/40869\\_pp\\_agricultureandclimate.pdf](https://www.yara.com/siteassets/sustainability/position-papers/40869_pp_agricultureandclimate.pdf)

An additional argument to replace manure with synthetic fertilizers is coming from Yara though; 'The low nutrient content and bulky nature of manure makes transportation inconvenient and costly.'<sup>15</sup>

Synthetic fertilizers are more concentrated which means that the transport is easier and costs less energy. In itself this is true. But the answer is more regional food production. This will also lower the transport effort and enable a real circular agriculture that doesn't need synthetic fertilizers. The current industrial agriculture of which synthetic fertilizers are part of is all based on specialisation and long distance transports. For this reason it is hypocritical to talk just about the inconvenient transport of organic fertilizers.

**Myth #5: 'The efficiency of organic fertilizer is dependent on the bacteria content in the soil. (For this reason) the quality and quantity of nutrients supplied to plants via this process is inconsistent and is very much dependent upon climatic factors. Plant productivity achieved by supplying only organic matter is low compared with mineral nutrients supplied in the form of fertilizers.'**<sup>16</sup>

Here, Yara tries to turn a problem into an advantage. The nutrients added by synthetic fertilizers are not fixated. This means that plants can use them immediately and don't depend on the bacteria and other microorganisms in the soil to free those nutrients. But this also means that those nutrients can easily leak to the ground water or to the air. This is why synthetic fertilizers contribute to environmental problems such as climate change, dead zones in the sea, decrease of biodiversity.

**But is it a problem to be dependent on microorganisms? A healthy soil can provide enough nitrogen and other nutrients.** There can be a problem in spring when the temperatures are too low for an optimal soil life, but this disadvantage is small compared to the benefits the microorganisms in the soil bring to the plants the rest of the year. Partly, this has already been explained by Jason McKenney to debunk myth#1. Soil specialist Marc Siepman explains very clearly a related problem created by synthetic nitrogen fertilizers (and some types of manure).<sup>17</sup> Here a summarised translation of his text:

"Plants produce enzymes to be able to take up nitrogen from organic resources without the help of microorganisms. Plants almost always need the help of bacteria to absorb nitrogen from the air. For this reason bacteria form a crucial part of the nitrogen cycle.

Before nitrogen can be used by any living organism, it has to be transferred into a different form. This is called nitrogen fixation. Some bacteria, the diazotrophs, are able to turn air nitrogen (N<sub>2</sub>) into ammonium (NH<sub>4</sub><sup>+</sup>), that can be taken up by plants. The best known nitrogen fixating bacteria are the Rhizobia types that live in symbiosis with certain plants, often Fabaceae (better known as 'the bean family' although this is not completely correct).

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15 Yara Fertilizer Industry Handbook 2018 – <https://www.yara.com/siteassets/investors/057-reports-and-presentations/other/2018/fertilizer-industry-handbook-2018-with-notes.pdf>, page 7.

16 idem.

17 Only available in Dutch 'Stikstof: essentieel maar lastig' - <https://marcsiepman.nl/artikel/stikstof-essentieel-maar-lastig-deel-1/>

The good thing about both the symbionts and the free living bacteria is that they stop fixating nitrogen when the value of absorbable nitrogen becomes too high. This way there can never be a surplus. Due to human interference the amount of absorbable nitrogen doubled, which has resulted in a chain reaction [as partly described at 'myth#1'].

Dinitrogen (N<sub>2</sub>O) and ammonia (NH<sub>3</sub>) result in an acidification of the soil and water because they are turned into nitric acid. This doesn't only result in soil degradation and erosion, when the soil is too acid or the nitrogen levels is too high, mycorrhizas (fungi freeing nutrients and feeding them to plants) don't function.

Until about a hundred years ago about 80% percent of the bacteria in the *chernozem*, the extremely fertile soil in Ukraine, consisted of *Azotobacter* (a free living nitrogen binding bacteria). Because of this farmers could grow a nitrogen loving crop like maize for decades without adding extra nitrogen. Since the introduction of synthetic fertilizers those bacteria disappeared and the soils became totally dependent on external inputs. Animal manure, compost and even mulch with a high nitrogen level can also make the nitrogen fixators lazy.

Adding nitrogen to the soil without adding carbon as well will disturb the carbon-to-nitrogen ratio. This will result in overactive bacteria and those will use the left-over carbon in the soil for their metabolism, which then results in CO<sub>2</sub> emission. According to the EU, soils in Europe emit ten times more CO<sub>2</sub> than the European industry.”

**Myth #6: 'Good crop nutrition enables increased water efficiency.'**<sup>18</sup>

Yes, a crop that grows well and gives good yields will require less litres of water per kilogramme of production. But again, synthetic fertilizers are not needed for this. What is helping here is to increase the humus layer. **A thicker and healthier layer of topsoil will be able to store more water.** This means that less irrigation is necessary when the weather is dry for for some days, weeks or even months.

**Irrelevant argument #1: 'It would not be possible to achieve this scale of production without intensive agriculture and use of mineral fertilizers.'**<sup>19</sup>

Here Yara refers to the four crops (wheat, rice and soy) that make up a large part of the world-wide agricultural production. This bulk monoculture production is indeed only possible with the use of synthetic fertilizers. But there are several environmental and social reasons to stop with this model and switch towards a more diverse agriculture. And this can be done without synthetic fertilizers.

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18 Yara Fertilizer Industry Handbook 2018 – <https://www.yara.com/siteassets/investors/057-reports-and-presentations/other/2018/fertilizer-industry-handbook-2018-with-notes.pdf>, page 13.

19 Idem page 19.

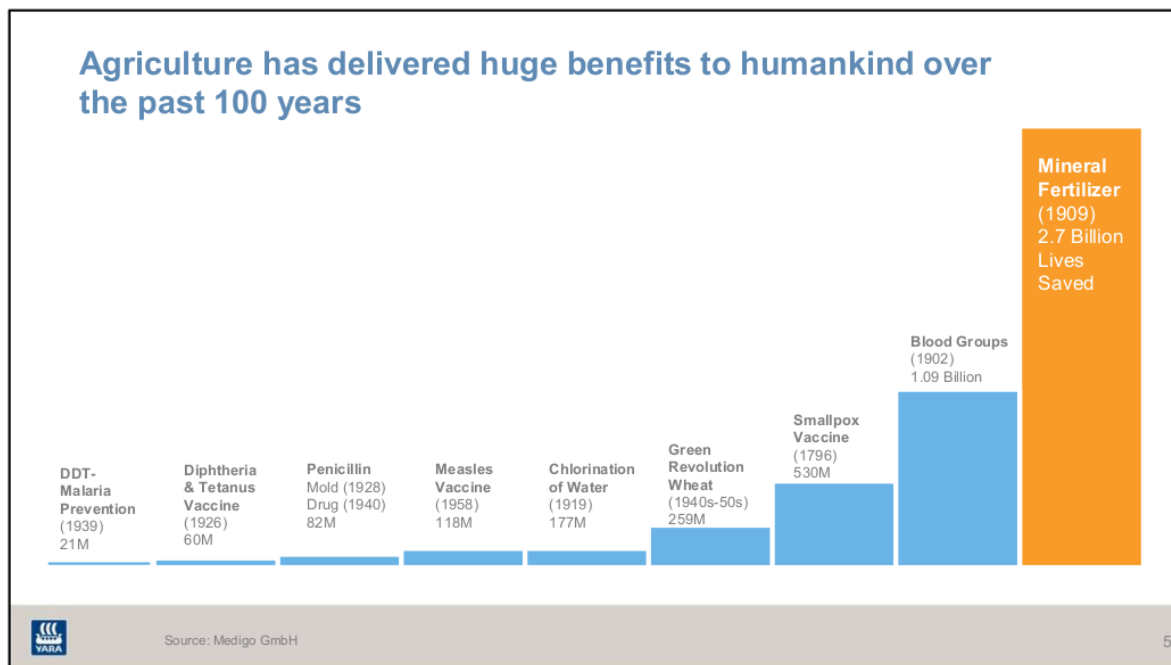
**Irrelevant argument #2: ‘Yara's production is more energy-efficient than competitor average’<sup>20</sup>**

True. But the fact that others are worse doesn't make you good. Yara's production facilities are still using a lot of fossil gas. And the use of synthetic fertilizers is still bad for the humus layer. Alternative and really circular and sustainable agricultural practices can have high yields as well and do build up the humus layer.

In a similar way, the following argument can be countered: **‘Nitrogen leaching can be effectively avoided through well-managed fertilization practises, e.g. by using fertilizer with a quick, predictable nitrogen release, such as nitrates.’**

Obviously using less synthetic fertilizers is better than more. The precision fertilisation with modern fertilizers, precise measuring of nutrients and even the use of drones and other expensive high tech is better than the simple spreading of too high quantities of fertilizers as it has been done in the past 75 years. But this is no argument against the implementation of more sustainable practices that are also resulting in high yields. Here fertilizer companies are mainly protecting their market and increasing their power over farmers.

**Yara in a Trumpian mode: “Yara and fertilizers’ contribution to this world goes far beyond growing food. It has saved lives, more lives in fact than any other human innovation to date.”**



*Yara presenting itself as a hero to their shareholder - From: Capital Markets Day 2019*

This quote is taken from the presentation Yara made for the Capital Markets Day 2019.<sup>21</sup> Next to this text they had a table showing that mineral fertilizers have saved 2.7 billion lives.

<sup>20</sup> Idem page 10.

<sup>21</sup> <https://www.yara.com/siteassets/investors/057-reports-and-presentations/capital-markets-day/2019/capital-markets-day-2019-with-reader-notes.pdf>

Again Yara is presenting the use of synthetic fertilizers as the only way to obtain high yields. Other fertilizer companies and their lobby organisations also present their products as indispensable part of the global food production. Recently Charlotte Hebebrand, director-general of the International Fertilizer Association (IFA), phrased it this way “Today, fertilizers feed about 50% of the world’s population which amounts to around 20 billion meals per day.”<sup>22</sup>

As mentioned at myth #1, they don’t mean compost and green manure when they mention fertilizers, they are talking about ‘their’ synthetic fertilizers. We are not going to repeat the counter arguments from myth#2, but **there are ways to produce those meals and ‘save those lives’ in other ways as well, in more sustainable ways that ensure that next generations can continue to produce food from fertile land. Moreover, starvation has hardly ever been the result of too low yield.** Wars, other conflicts, mismanagement and poverty are way more often the reason that people die from starvation. The appearance of industrial agriculture which is partly based on the introduction of synthetic fertilizers, has forced a lot of farmers off their land, which has also resulted in poverty and starvation.

## **A different view on the world**

Although we don’t like myths we do have a story to tell. Talking about agricultural practices and the way we want to grow our food now and in the future is not just a technical discussion about numbers and chemical processes. It is also about a vision on society. **In what kind of world do we want to live?**

Synthetic fertilizers go together with industrial agriculture. This model is producing food with mechanisation, high-tech, specialisation and monoculture. It is part of a capitalist economy and society in which farmers and consumers depend on powerful corporations. There are good reasons to say that this is not going to be sustainable. But even if it was possible to feed the world population this way, not just now but also in the future, we would still reject it! We don’t want to just fill our bellies regardless of what is going on around us. We want to eat it in a more social and fair world where communities can decide themselves how they produce and what they consume, where people care about needs instead of profits and where land and wealth are more equally divided than in the current system.

**No climate change but a system change!**



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<sup>22</sup> <https://agfundernews.com/how-fertilizer-companies-are-using-technology-to-stay-relevant.html>