

Food and Agriculture Organization of the United Nations



FAOSTAT ANALYTICAL BRIEF 47

Inorganic fertilizers

1990-2020

>> FAO Statistics Division

HIGHLIGHTS

- → Global agricultural use of inorganic fertilizers rose significantly between 1990 and 2020 to about 200 million tonnes, a 46 percent increase since 1990. Nitrogen fertilizers contribute 56 percent (113 million tonnes) of the total, phosphorus fertilizers 24 percent (48 million tonnes) and potassium fertilizers the remaining 20 percent (39 million tonnes).
- → World production of inorganic fertilizers went up 44 percent since 1990, to 213 million tonnes in 2020. Nitrogen fertilizers represent 58 percent (123 million tonnes) of the total production, while phosphorus and potash each contribute about 21 percent (45 million tonnes each).
- → Africa has the lowest levels of inorganic fertilizers use among regions, although they have increased faster than the global average. In 2020, Egypt, Nigeria and South Africa represented over 30 percent of all consumption of inorganic fertilizers in the region.

FAOSTAT INORGANIC FERTILIZERS

BACKGROUND

FAOSTAT provides statistics at the country, regional and global level on the production, trade and agricultural use of inorganic (mineral or chemical) fertilizers, by nutrient and by product.

The nutrients covered in this report are the three primary nutrients: nitrogen, phosphorus and potassium, which are used in large quantities by plants. Other nutrient categories are referred to as secondary nutrients (calcium, magnesium and sulphur) and micronutrients, required in smaller quantities though also essential to plant growth and function (FAO, 1984). This brief provides estimates of agricultural use of inorganic fertilizers from 1990 to 2020, both globally and by major region (Africa, the Americas, Asia, Europe and Oceania). At the country level, it presents the top producers and top consumers and their share of the world total. The brief also discusses important indicators such as fertilizer use by cropland area, per capita and per value of agricultural production.

At the time of publication, the war in Ukraine is disrupting global agricultural markets, with important repercussions on national, regional and global fertilizer production and trade. These impacts are not analysed herein, due to the time needed between questionnaire dispatch and final publication of the fertilizers data. A statistical analysis of the effects of the war in Ukraine will be covered in future briefs.

GLOBAL

World inorganic fertilizer use increased by 46 percent between 1990 and 2019, from 137.8 million tonnes (Mt) to 200.6 Mt (Figure.1). Agricultural use of nitrogen was 77.1 Mt in 1990, rising to 113.3 Mt in 2020, or 56 percent of total inorganic fertilizers use. For phosphorus (expressed as P_2O_5), the data show an increase from 36.0 Mt in 1990 to 48.1 Mt in 2020 (24 percent of the total), and for potassium (expressed as K_2O), from 24.7 Mt in 1990 to 39.2 Mt in 2020 (20 percent of the total).





Source: FAO. 2022. FAOSTAT: Fertilizers by Nutrient. In: *FAO*. Rome. Cited July 2022. http://www.fao.org/faostat/en/#data/RFN





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While inorganic fertilizer use increased in absolute terms by 46 percent between 1990 and 2020, use normalized by cropland area, population and value of agricultural production followed very different trends during the same period (Figure 2). Inorganic fertilizer use by hectare of cropland area increased by 39 percent from 93 kilograms per hectare (kg/ha) in 1990 to 129 kg/ha in 2020. More than half of the increase took place after 2008–2009. Inorganic fertilizers use per capita is roughly the same in 1990 (25.9 kg per capita) and 2020 (25.7 kg per capita): it decreased sharply in the early 1990s following the dissolution of the Union of Soviet Socialist Republics (USSR), slowly increased until the early 2010s and remained fairly stable since. Use of inorganic fertilizers normalized by the value of agricultural production steadily decreased between 1990 and 2020, from 64 kg per 1000 international dollar (kg/1000 l\$) in 1990 to 50 kg/1000 l\$ in 2020, a drop of 22 percent.

The production of inorganic fertilizers have increased from 148 Mt in 1990 to 213 Mt in 2020, an increase of 44 percent (Figure 3). In general, the production of inorganic fertilizers is higher than agricultural use, and the gap (expressed in absolute quantities) tended to widen in the last decade. The only exception is phosphorus, for which agricultural use exceeded production several times since 1990 (and three years in a row since 2018). The shares of the different nutrients in total production are very close to the shares in agricultural use mentioned above. Nitrogen fertilizers represented 58 percent of the global inorganic fertilizers production in 2020, going up 50 percent from 82 Mt in 1990 to 123 Mt in 2020. Phosphorus and potassium each accounted for 21 percent of the global production in 2020. Phosphorus production went up 15 percent between 1990 and 2020, from 39 Mt to 45 Mt, while potassium production went up 67 percent over the same period, from 27 Mt to 45 Mt.





Source: FAO. 2022. FAOSTAT: Fertilizers by Nutrient. In: *FAO*. Rome. Cited July 2022. http://www.fao.org/faostat/en/#data/RFN

REGIONAL

Africa's agricultural use of inorganic fertilizers almost doubled between 1990 and 2020 in 2020, from 3.6 Mt to 7.1 Mt, even though the region represented 4 percent of the global total in 2020 (and 3 to 4 percent for each individual nutrient). Most of the increase is due to the growth in nitrogen use, which went from 2.1 Mt in 1990 to 4.4 Mt in 2020. The production of inorganic fertilizers went up 159 percent between 1990 and 2020, and is larger than agricultural use – the surplus actually increased from 1.3 Mt in 1990 to 5.5 Mt in 2020. Egypt, Nigeria and South Africa are the largest users in the region.

The **Americas** saw a 92 percent increase in the agricultural use of inroganic fertilizers between 1990 and 2020, from 28.6 Mt to 55.1 Mt. The region represented 27 percent of global use in 2020 (23 percent for nitrogen, 31 percent for phosphorus and 36 percent for potassium). While production went down 4 percent between 1990 and 2020, the region was the third largest producer in 2020 (19 percent of the world total). The diverging trends between agricultural use and production caused use to overtake production in the early 2000s: in 2020, the region used 14.1 Mt more than it produced. Brazil and the United States of America are the largest users in the region, while the United States of America and Canada are the largest producers.

Agricultural use of inorganic fertilizers in **Asia** almost doubled since 1990, from 56.0 Mt to 110.5 Mt. The region accounted for 55 percent of the global agricultural use of inorganic fertilizers in 2020, mainly driven by China and India, which together represent about 70 percent of consumption within the region. Use of nitrogen fertilizers went up 78 percent between 1990 and 2020; phosphorus experienced a 90 percent increase and potassium a 254 percent one, from 5.3 Mt to 18.9 Mt. Asia's production of inorganic fertilizers rose by 138 percent between 1990 and 2020, representing almost 50 percent of the global total in 2020. Despite these large increases in both production and use, Asia uses more inorganic fertilizers than it produces – but the gap between the two shrank from 11.8 Mt in 1990 to 5.2 Mt in 2020.

Data for **Europe**, in contrast, showed a 49 percent decrease in agricultural use levels between 1990 and 2020. Most of the reduction occurred in the wake of the dissolution of the USSR in the early 1990s,¹ although agricultural use has been slowly increasing since 2009. The region accounted for 12 percent of the global agricultural use of inorganic fertilizers in 2020 (14 percent for nitrogen, 9 percent for phosphorus and 12 percent for potassium). Figure 5 shows that production values also decreased between 1990 and 2020, but not as much as for agricultural use (-10 percent). The region produces more inorganic fertilizers than it uses, with the surplus increasing from 11 Mt in 1990 to 28.5 Mt in 2020.

Oceania increased its agricultural use of inorganic fertilizers by 128 percent between 1990 and 2020, from 1.5 Mt to 3.5 Mt. Still, the region represented 2 percent of the global use of inorganic fertilizers. Even though production went up 66 percent between 1990 and 2020, the region accounted for less than 1 percent of the global total. Production represented about one-third of agricultural use in 2020.

¹ In FAOSTAT, Armenia, Azerbaijan, Georgia, Kazakhstan, Kyrgyzstan, Tajikistan, Turkmenistan and Uzbekistan are classified in Asia, whereas the USSR is classified entirely in Europe. This reallocation from Europe to Asia contributes very little to the reduction in fertilizer use observed for Europe at that time (the reallocation represents 5 percent or less of the decrease, for each nutrient).



Figure 4: Inorganic fertilizer agricultural use, by nutrient and region

Source: FAO. 2022. FAOSTAT: Fertilizers by Nutrient. In: *FAO*. Rome. Cited July 2022. http://www.fao.org/faostat/en/#data/RFN

Figure 5: Inorganic fertilizers production, by nutrient and region





Figure 6 shows that a different picture emerges when agricultural use of inorganic fertilizers is normalized by cropland area, population and value of agricultural production. Asia (187 kg/ha) and the Americas (151 kg/ha) are well above the global average of 129 kg/ha, Europe and Oceania have similar levels of 82–83 kg/ha, and Africa has the lowest value (26 kg/ha). Use per capita is the highest in Oceania (83 kg/capita), followed by the Americas (54 kg/capita), Europe (33 kg/capita), Asia (24 kg/capita) and Africa (5 kg/capita). The top three regions in terms of use per value of agricultural production have very close levels: they are Oceania (61 kg/1000 l\$), the Americas (58 kg/1000 l\$) and Africa (54 kg/1000 l\$), followed by Europe (43 kg/1000 l\$) and Africa (19 kg/1000 l\$).



Figure 6: Inorganic fertilizers agricultural use indicators by region (2020)

Use per value of agricultural production





COUNTRY

The top consumers of inorganic fertilizers in 2020 are, for each nutrient (although in a slightly different order), China, India, Brazil, United States of America and Indonesia (Figure 7). They accounted for over 60 percent of the global total. The top producers in 2020 showed more diversity by nutrient: for nitrogen and phosphorus, the largest producers were China, India, the Russian Federation and the United States



of America, while Canada, the Russian Federation, Belarus and China were the largest producers of potassium (Figure 8).



Figure 7: Agricultural use of inorganic fertilizers, top countries (2020)

Source: FAO. 2022. FAOSTAT: Fertilizers by Nutrient. In: *FAO*. Rome. Cited July 2022. http://www.fao.org/faostat/en/#data/RFN

Figure 8: Production of inorganic fertilizers, top countries (2020)







https://www.yunbaogao.cn/report/index/report?reportId=5 31495