Forecast of food, farming & fertilizer use in the European Union 2024-2034



Nitrogen, phosphorus, and potassium are the three primary nutrients for plant growth

The nutrients are transformed from naturally occurring raw materials into more plant-available forms by industrial processing and supplied as mineral fertilizers.

In this report, the nutrients are expressed as follows: \bigcirc nitrogen as a pure element (N), \bigcirc phosphorus as the phosphate equivalent (P₂O₅) and \bigcirc potassium as the potash equivalent (K₂O).

Ν

Nitrogen (N), captured from the air, is essential as an important component of proteins. Ρ

Phosphorus (P), primarily extracted from mined ores, is a component of nucleic acids and lipids, and is a key to energy transfer.



Potassium (K), extracted from mined ores, has an important role in plant metabolism, for photosynthesis, activation of enzymes, osmoregulation, etc. Fertilizers Europe's annual forecast of food, farming and fertilizer use in the European Union has been independently recognized¹ as one of the most trusted inputs into the development of agricultural policy in Europe. Its data is regularly used by many international organizations including the European Commission (DG Agri, DG Environment and DG Energy), the Food and Agriculture Organization (FAO), the European Environment Agency (EEA), and the International Fertilizer Association (IFA).

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¹ Exploring land use trends in Europe: a comparison of forecasting approaches and results: H. van Delden, et al. iEMSs International Congress on Environmental Modelling and Software 2012, Leipzig, Germany.

Map of major fertilizer plants in Europe

$\uparrow \overset{\circ}{\sim} \overset{\circ}{\sim} \downarrow$

Changes in annual fertilizer consumption in Europe by 2034

Ρ

Ν

+3% in nitrogen consumption compared to -2%

+20% in phosphate consumpt compared to +7%

r / /0 oreseen last year.

+16%

in potash consumption, compared to +4%

Κ

² Consider the exceptional drop in consumption due to the Russian invasion of Ukraine in 2022, as well as the 2023 P & K holiday when analyzing percentage comparisons.

Fertilizer consumption in Europe*

Over the season, fertilizers containing an average** of 8.7 million tons of nitrogen, 2 million tons of phosphate, and 2.2 million tons of potash were applied to 122.9 million hectares of farmland. 38.9 million cultivable hectares in the EU were not fertilized.



In 2022, mineral fertilizer consumption in the EU-27 experienced its steepest decline since 2009, driven by the energy crisis triggered by the Russian invasion of Ukraine, which severely impacted the European industry. Compared to last year, consumption is slowly returning to pre-war levels with an increase of 1.2% for nitrogen, 8.4% for phosphate, and 7.0% for potash fertilizer.

Considering the economic outlook and anticipated evolution of Europe's cropping area, the annual nitrogen, phosphate, and potash fertilizer consumption is expected to increase by the 2028/29 season, reaching 9.4, 2.4 and 2.6 million tons respectively.

In the long term, a normalization to previous levels is forecasted. Nitrogen fertilizers consumption over the next 10 years is foreseen to reach 9.0 million tons applied to 122.1 million hectares of fertilized farmland. Phosphate and potash consumption will continue to remain below the levels recorded prior to the 2008 economic downturn, reaching respectively 2.4 and 2.6 million tons.

Arable crops account for:

62% of the fertilized area in Western EU countries

88% of the fertilized area in Central and Eastern EU countries

Agricultural land use in the European Union

Within the total agricultural area of the European Union, the fertilized area comprises 122.9 million hectares. A further 38.9 million farmable hectares are not fertilized, of which 30.6 million are unfertilized grassland and 8.3 million idle or set-aside land.



As a proportion of the fertilized area, arable crops account for 70.7% (41.5% cereals, 9.8% oilseeds, 10.8% fodder crops). Permanent crops account for 9.4% of the fertilized area and grassland for a further 20.1%. The unfertilized area is evenly spread across the countries of the European Union but there are significant differences in fertilized crop areas between the countries of Western, and Central and Eastern Europe.

In Western Europe (EU-14), the fertilized area comprises 61.9% arable crops (35.6% cereals, 7% oilseeds, 10.5% fodder crops), 12.6% permanent crops (vineyards, orchards, forests) and 25.7% fertilized grassland. Agriculture in Central and Eastern Europe (EU-13), however, is far more directed towards arable production, which accounts for 88.2% of the fertilized area (53.5% cereals, 15.3% oilseeds, 11.2% fodder crops), with permanent crops and fertilized grassland only comprising 3% and 8.8% of the fertilized area respectively.



The grain sector (wheat, coarse grains and oilseeds) accounts for 63% of total nutrient consumption, with wheat accounting for 26%. Fodder crops and grassland account for a further 19%.

Changes in farming food crops 2024-2034

The anticipated cropping pattern in the European Union over the next 10 years sees a significant increase in cereal yield (+3.9%).



The decrease in the agricultural area devoted to wheat (-0.3%) and grain maize (-2.1%) is compensated by a significant increase in crop yield of +2.6% and +8.3% respectively. Area cultivated with barley is expected to increase by +1.3%, accompanied by higher yields (+4%) while the area planted to other coarse grains is expected to drop by -0.4%, balanced in part by an expected increase in yields of +3%.

Compared to last year, there is a reversal in the trend for the potato area, which is expected to show an increase (+2.8%) after a previous decline. This increase is offset by a decrease in crop yields (-1.8%). Sugar beet yield is estimated to drop further (-0.6%). The oilseed rape area will increase (+2.5%), accompanied by an increase in yield (+0.8%).

Over the next 10 years, nearly all arable crops will experience an increase in consumption of all three nutrients (N, P, K).



During the same period, we may observe a decrease in N consumption for maize used for silage and biogas.

Changes in fertilizer use by crop 2024-2034

The forecasted nutrient consumption follows a similar positive trend as the yield projections, showing an increase for most crops.



Nitrogen consumption is forecasted to increase for all major crops, except fodder crops and grassland where a consumption decrease of respectively -3.0% and -0.4% is foreseen.

Phosphate consumption is expected to increase for all major crops (with the biggest increase forecasted for oilseeds with +27.6%). *

Potash consumption is equally expected to increase for all major crops (i.e. sugar beet +24.5% and potato +21.9%). *

* Consider the exceptional drop in consumption due to the Russian invasion of Ukraine in 2022, as well as the 2023 P & K holiday when analyzing percentage comparisons.



For the period 2024 – 2034, most European member states (EU-27) as well as Norway and the UK expect an increase in nutrient consumption.

Changes in regional fertilizer use 2024-2034

Increased or stable consumption of nitrogen is foreseen in the majority of European member states (EU-27) as well as Norway and the UK. Significant decreases in nitrogen consumption are foreseen in Ireland (-12.7%), the Netherlands (-10.7%) and Croatia (-4.2%).



For nitrogen, an average increase of +2.6% in consumption is expected in Central and Eastern European countries (EU-13) and +3.7% in Western European countries (EU-14). For phosphate, a +20.1% average increase is foreseen in EU-27 in the next ten years. Growth is registered in all European countries, except Ireland (-16%), Slovenia (-3%), Croatia (-2.1%), and Hungary (-1.7%). For potash, growth is reported for most European countries, except Italy, Hungary and Ireland (+4.8% average in EU-13 and +22.3% in EU-14). To substantiate the discussion around organic nutrients and the role they can play in EU food security, Fertilizers Europe has developed a database on the availability of livestock-derived nutrients in Europe, which represent the vast majority of organic nutrient sources.

The database provides estimates of major nutrient additions to the soil from non-mineral fertilizer sources. It covers EU-27, Norway, Switzerland, and the UK.

How the organic database was developed

Quantify the number of livestock in all countries. Reasonable data is available for most livestock categories in most countries. Some extrapolation was required in certain cases. Approximate the proportion of manure spread on land. This involves estimating the time each livestock category spends in housing per year.

Estimate the amounts of nitrogen, phosphate, and potash in the collected manures, based on published or derived figures for typical nutrient contents. Estimate the loss of nitrogen as ammonia during storage and spreading, based on published figures for typical losses with extrapolation for countries in which there are no published figures.

Calculate the amount of nitrogen, phosphate, and potash added to soil using information from the above points.

* Eurostat database for agricultural products

Organic nutrient availability in Europe





Over the last 10 years, organic nutrient consumption in Europe has remained stable.

In 2023, 8.3 million tons of organic livestockderived nitrogen was applied to European crops, compared to 8.7 million tons of nitrogen coming from mineral fertilizers applied during the season.

For phosphate, 4.5 million tons of organicderived nutrient were consumed in 2023, complementing 2.0 million tons of phosphate from mineral fertilizers applied over the season.

Organic-derived potash accounted for 9.9 million tons in 2023, in addition to 2.2 million tons from mineral fertilizers.



Differences in national organic nutrient availability

Organic nutrient availability varies significantly across European countries, mainly due to substantial differences in the number of livestock present on the national territories.



Higher availability is registered in Western European countries, with France, Spain, Germany, and the United Kingdom recording the highest levels of consumption. Limited availability is registered in Eastern and Central European countries (EU-13), where in 2023 1.6 million tons of nitrogen, 915 thousand tons of phosphate, and 1.9 million tons of potash from organic sources were consumed. In comparison, 6.7 million tons of nitrogen, 3.5 million tons of phosphate and 7.9 million tons of potash from organic sources were applied in Western European countries (EU-14).

How the forecast is made

Fertilizers Europe's forecast is an annual exercise that uses the following procedure:

- At the end of each growing season, a general European scenario is established based on quantitative information (from the FAO-OECD, USDA, FAPRI, and the European Commission), and a qualitative analysis made by Fertilizers Europe experts;
- → the general scenario is then adapted to the specificities of each country and national forecasts are made;
- \Rightarrow the national forecasts are analyzed and discussed by all the experts;
- > when the market and economic situation require it, the forecasters carry out a final update of the current situation before integration and publication.

The forecast is an upward crop-based procedure where fertilizer consumption is evaluated by assessing the evolution of the cropping area and the nutrient application rates for each crop. However, two different methodologies are used to achieve this crop-based procedure:

- → In most European Union countries, representing the majority of its agricultural area and fertilizer consumption, the forecast is an expert-based approach constructed from national forecasts generated by Fertilizer Europe's members.
- In Croatia, Cyprus, Estonia, and Slovakia, evaluation of the crop area and production as well as N, P and K application rates on each crop are based on a combination of data taken out of the IFA, FAO, and European Commission databases. When precise figures are not available, the evaluation is based on an agronomic model developed by the group of forecasters, for both the current value and the 10-year forecasted value.
- \rightarrow Malta is currently not covered in the forecast.

REFERENCE VOLUMES

The reference volumes used to calculate the percentage changes in fertilizer demand are based on the average value of the last three growing seasons (for the current exercise: 2021/2022, 2022/2023, and 2023/2024). This mitigates the extent to which exceptional years (positive or negative) may impact the calculated evolution of demand.

In this brochure, we refer to EU-14 and EU-13 as the following countries: EU 14 – AT, BELUX, DE, DK, ES, FI, FR, GR, IE, IT, NL, PT, SE; EU 13 – BG, CY, CZ, EE, HR, HU, LT, LV, PL, RO, SI, SK (MT is currently not covered)

The fertilizer industry at a glance



(€



€ 1.2 BN* INVESTMENT



76.000 EMPLOYEES

*total including supply chain (5 year average representative profile)

Disclaimer: This publication contains forward-looking statements, which involve risks and uncertainties because they relate to events, and depend on circumstances, that will or may occur in the future. Actual outcomes may differ depending on a variety of factors.

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Fertilizers Europe represents the majority of fertilizer producers in Europe and is recognized as the dedicated industry source of information on mineral fertilizers. The association communicates with a wide variety of institutions, legislators, stakeholders and members of the public who seek information on fertilizer technology and topics relating to today's agricultural, environmental and economic challenges. The Fertilizers Europe website provides information on subjects of relevance to all those interested in fertilizers contribution to global food security.

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