



A brief description of the methodology used to quantify remaining import needs and unrealized export availabilities for fertilizer in 2022

Objective and background

This document provides a brief overview of the underlying methodology to forecast import gaps and export surpluses for fertilizer. It also includes a brief description of the data used and the methods applied to standardize and aggregate and to eventually nowcast and forecast the timeseries.

TDM database

The principal source of all trade data used for the analyses is the “Trade Data Monitor”, or TDM for short. TDM is a commercial data supplier, offering a comprehensive and up-to-date global trade dataset at the monthly frequency. TDM covers the entire product space of merchandise trade at different levels of aggregation. Data are encoded according to the Harmonized System (HS), which is the main international classification standard for trade reporting and analysis. Default levels of international comparable aggregation include HS2, HS4 and HS6. In addition, data are available at “tariff-line levels”. While tariff line information provides a more granular level of disaggregation than HS6, there is no assurance of comparability of product definitions across countries. Therefore, to ensure comparability and historical consistency, only data at the three HS levels of aggregation were used for this assessment, whereby the specific needs of the analysis determined the level of disaggregation chosen.

Currently, TDM covers trade flows for 113 individual reporting countries and more than 200 partner countries and thus accounts for about 95 percent of trade in agriculture and a similar share of trade in all other merchandise products, including fertilizer. TDM coverage rates for country reporters are ever-increasing, thus improving global capture rates.

To further enhance the available data coverage in the absence of missing reported data, numerous imputation techniques are applied to the raw data obtained from TDM. The principal goal of these imputation techniques is to supplement the existing data and thus broaden coverage over countries, flows, years and months. The most important imputation technique is known as “mirroring”, i.e. supplementing data for non-reporting countries with flows from reporting partners. While mirroring of missing data is a widely accepted and adopted imputation process, its efficacy is critically limited by the overall availability of data from trading partners. With 113 reporting countries, TDM offers excellent availability of reported data for all major regions, perhaps with the notable exception of sub-Saharan Africa. But also here, data coverage after mirroring yields a near complete global picture of fertilizer trade.



The particular advantage of TDM data lies in its timeliness and the officiality of reported data. Trade flows are available for all reporters with a time lag of merely two to three months. This allows to move from otherwise largely backwards-oriented trade analyses to near-casting and forecasting processes.

Aggregating/standardizing fertilizer trade

Trade data of chemical and mineral fertilizers are reported in TDM as fertilizer **products**, which contain various types and concentrations of nutrients, i.e., N, P, K. Given the vast differences in terms of nutrient contents, fertilizer products need to be converted into nutrients. This is done by applying standard conversion/extraction rates, as e.g. available through [default conversion tables](#) in FAOSTAT.

Data forecasts

In the absence of complete supply/utilization accounts, the basic approach to quantify the unrealized imports and exports is to estimate the gap between a *normal* trade volume and the implemented volume. The target time horizon for the potential import gap/exportable surplus is the end of the crop year in the northern hemisphere, i.e., 30 June 2022. Simply put, the remaining volumes for the 2021/22 crop year are:

$$\textit{Remaining volume} = \textit{projected normal volume} - \textit{actually traded volume}$$

The *normal* trade volume is based on a process that captures historical trends and seasonal patterns. The traded volume is calculated as the sum of the monthly trade volumes from the beginning of current crop year to the latest reported data, i.e., trade from July 2021 to March 2022.

The normal volume is defined as a trade level that would take place in the absence of the factors that have contributed to the currently tight market situation, i.e., soaring prices of food, energy and fertilizer, and commodity shipments. The normal level is forecast for each major importer/exporters and each of the major nutrients, i.e., N, K₂O and P₂O₅, based on data for 2010-2020 on a monthly basis.

A self-learning ensemble is applied to produce the forecasts. Its core is based on an amalgamation of 10 different econometric models, which are combined into a self-learning, cross-validated AI framework.

Finally, the remaining gaps are calculated as the difference between the volume of fertilizers supplied or needed by a country for the period from April 2022 to June 2022 to reach the “normal level” of fertilizer exports or imports.