

Fertiliser input estimates in farms

An overview of costs and quantities of the three main fertilizer components used in the EU farms based on FADN data

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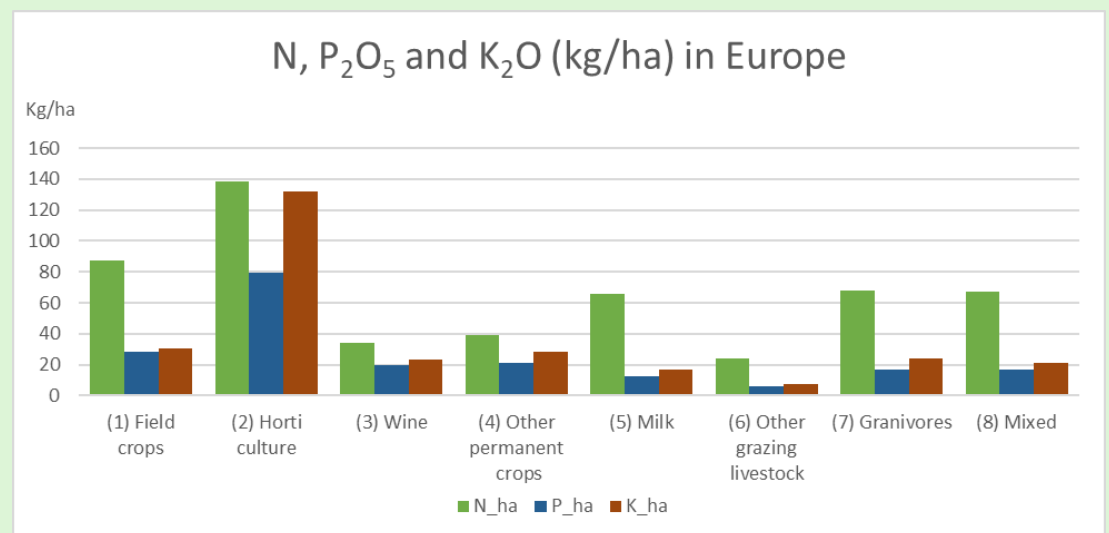
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Annex: Methodology

Since the publication in May 2020 of Farm to Fork Strategy with clearly stated objectives to reduce nutrient losses by at least 50%, to maintain soil fertility and to reduce the use of fertilisers by at least 20% by 2030 there is a growing interest in Europe to analyse the actual use of fertilisers. The Farm Accountancy Data Network (FADN), which has been in place since the beginnings of the CAP to monitor farms' income and business activities, started to collect information on the cost and quantities of fertilisers in farms of various types and sizes in all EU countries. This enables to capture the use and importance of economic cost that fertilisers may represent for the farms.

In the following graph, the average intensity of each of the aforementioned components is shown, by each one of the eight main categories of 'type of farming' defined in FADN.



From 2014, FADN added data on mineral fertiliser quantities in terms of nitrogen (N), phosphorus (P₂O₅) and potassium (K₂O) to understand better the use of these inputs, and link environment-related data like fertilisers with farms' economic performance.

This note presents highlights of fertiliser data available in FADN, with a double aim to inform about their availability for analyses and to offer selected information based on these data. The FADN results are available in its online [public database](#).

EU Farm Economics Briefs are available online:

https://ec.europa.eu/info/food-farming-fisheries/farming/facts-and-figures/performance-agricultural-policy/studies-and-reports/economic-analyses-and-briefs/agricultural-and-farm-economics_en

1. Introduction

The purpose of this first FADN publication about fertilisers is to share the information gathered on the use of fertilisers at farm level in the FADN database. Several graphs and figures are provided in order to illustrate the potential utility of the information yearly collected all across Europe.

The current brief does therefore not intend to highlight specific issues, or to derive concrete economic or environmental conclusions, but remain factual and present some examples to show the use of this new source of information.

The current calculations on the **use** of mineral fertilisers (Nitrate, Phosphorus and Potassium based soil inputs ‘N-P-K’) have been obtained from the accounting data 2016-2018. Some member states started the N-P-K data collection from 2014, and most of them communicated these data to the Commission as of accounting year 2016. From 2017 the N-P-K data are compulsory reported by all member states in FADN.

These are published as variables SE296 Fertiliser N (q), SE297 Fertiliser P2O5 (q) and SE298 Fertiliser K2O (q).

Also average results for **economic value** of the fertilisers and soil improvers are available as variable “SE295 Fertilisers (€)” from the [FADN public database](#).

If looking at **nitrates** alone inputs consist of mineral and organic fertilisers, manure, atmospheric deposition, biological nitrogen fixation, seeds, and planting material.

The presented data for N-P-K do not include these ingredients used in farms in form of organic fertilisers like compost, slurry, manure etc.

Besides FADN, Eurostat also collects data on fertilizers. According to this source¹ “mineral fertilisers accounted for 45 % of the nitrogen input in the EU in 2014 [...]. Manure accounted for 38 % of the nitrogen input in the same year.

The nitrogen input from seeds and planting materials is negligible. The re-use of nitrogen through the use of compost, sewage sludge, industrial waste etc. is also quite insignificant”.

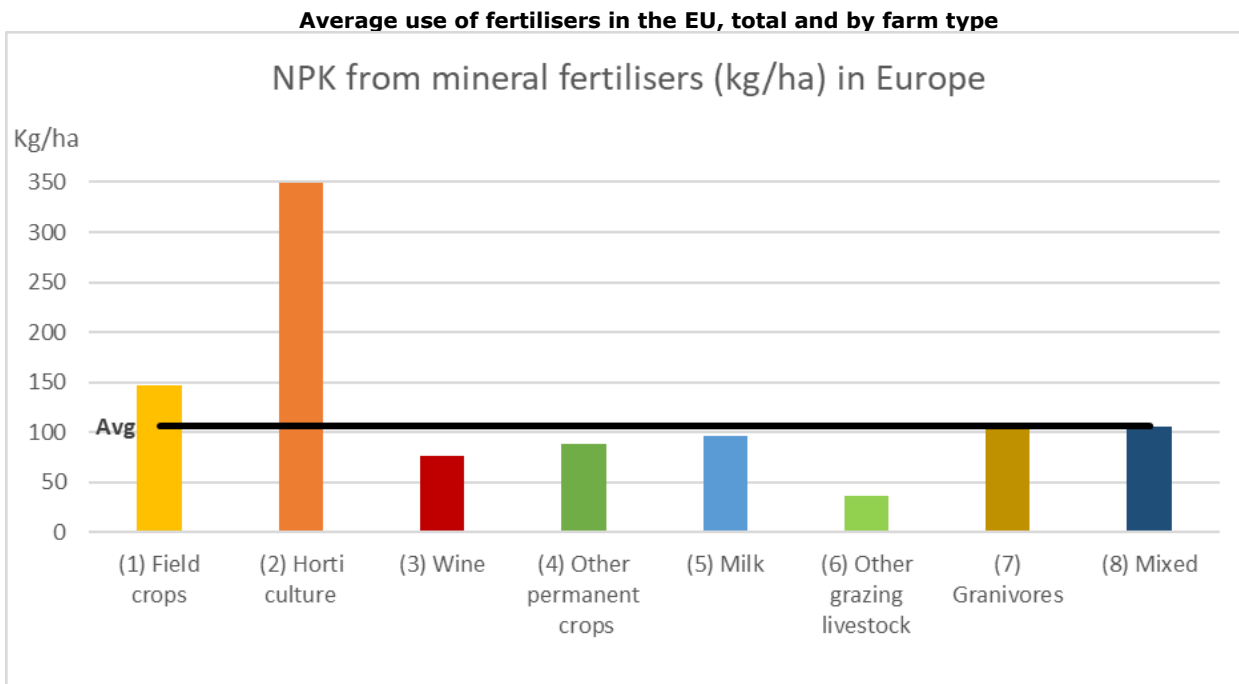
In order to have a common reference between countries and regions the calculations are based on the total quantities (transformed into kg) of the three components together, by hectare of the total utilised agricultural area in a given region, or at country or EU level.

Besides these geographical divisions, this overview also distinguishes and classifies farms by their economic productive orientation ‘Type of farming’ (TF8) and by their respective ‘Economic size’ (ES6) expressed in Standard Output.

Furthermore, in order to soften punctual variations in a concrete year, the calculation takes an average of the three most recent years available (2016, 2017 and 2018).

¹ https://ec.europa.eu/eurostat/statistics-explained/index.php/Agri-environmental_indicator_-_gross_nitrogen_balance#Analysis_at_EU_level

2. Use of mineral fertilisers per hectare by type of farming



The EU farm Typology currently follows a three-dimensional classification of each holding;

Geographical: on subdivisions of FADN specific Regions (which encompass similar agricultural characteristics).

By Economic Size (ES): measured by the total ‘Standard Output’² value (in Euro) of the farm.

By Type of farming (TF): which classifies farms according to its ‘main’ economic orientation, depending on the relative weight of their activities in relation to their total Standard Output.

In FADN all three criteria of classification can be divided in different levels of aggregation. In the graph above, we see an example of the intensity of the use of fertilisers based on 8 types of farming (TF8) classification, which consists on a regrouping of the different sectors shown here.

1. Fieldcrops

Specialist cereals, oilseeds and protein crops
General field cropping
Mixed cropping

2. Horticulture

Specialist horticulture indoor
Specialist horticulture outdoor
Other horticulture

3. Wine

Specialist vineyards

4. Other permanent crops

Specialist fruit and citrus fruit
Specialist olives
Various permanent crops combined

5. Milk

Specialist dairying

6. Other grazing livestock

Specialist cattle - rearing and fattening
Cattle - dairying, rearing and fattening combined
Sheep, goats and other grazing livestock

7. Granivores

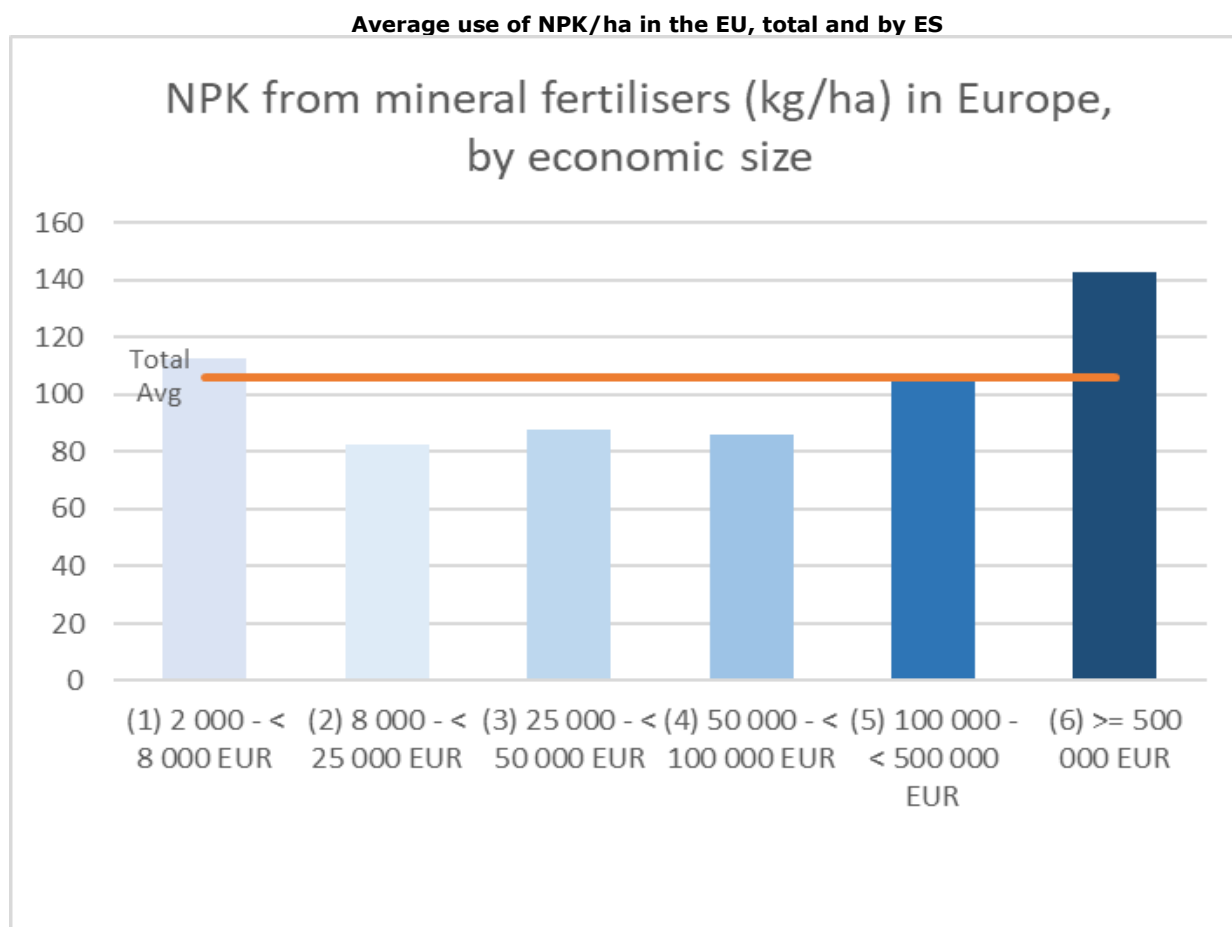
Specialist pigs
Specialist poultry
Various granivores combined

8. Mixed

Mixed livestock, mainly grazing livestock
Mixed livestock, mainly granivores
Field crops - grazing livestock combined

² The **standard output** (SO) of an agricultural product, crop or livestock, is the average monetary value of the agricultural output at farm-gate price, in euro per hectare or per head of livestock.

3. Use of mineral fertilisers per hectare by Economic Size (ES)



The size of a holding is measured in Standard Output (SO), whose value is expressed in euros. The total SO of each farm is computed based on coefficients that are calculated at regular intervals, and correspond to five-year averages calculated at regional level.

The method of calculation for determining the standard outputs of each characteristic and the procedures for collecting the corresponding data are set out in Annex VI of the Regulation 2015/220.

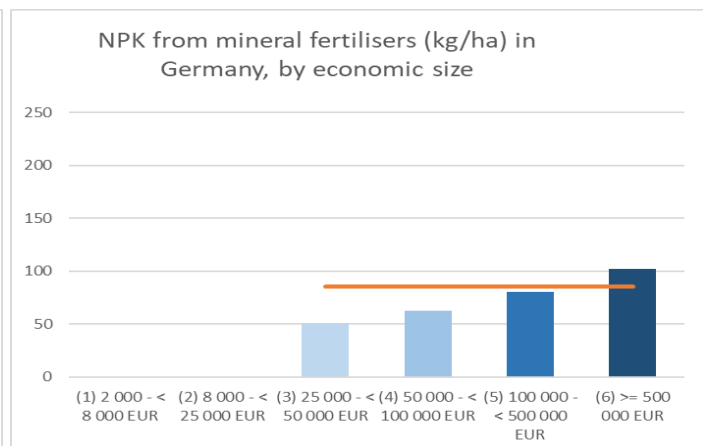
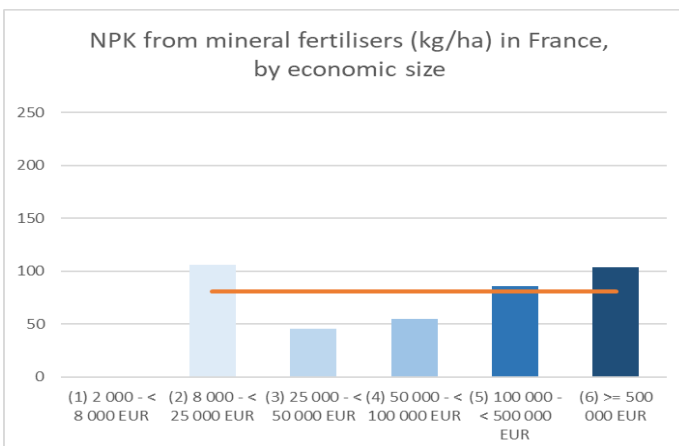
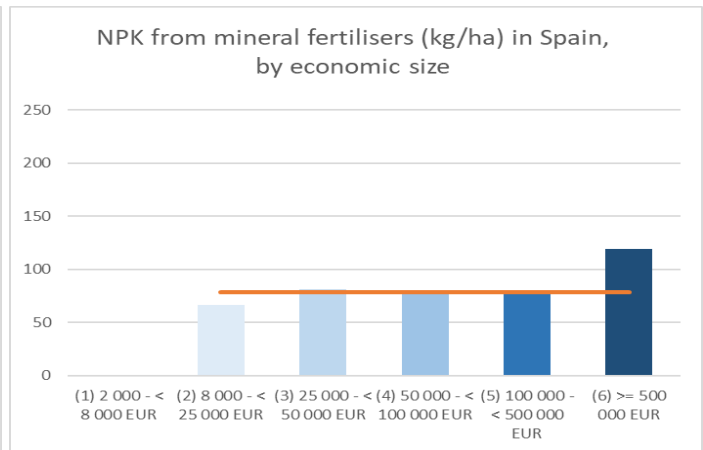
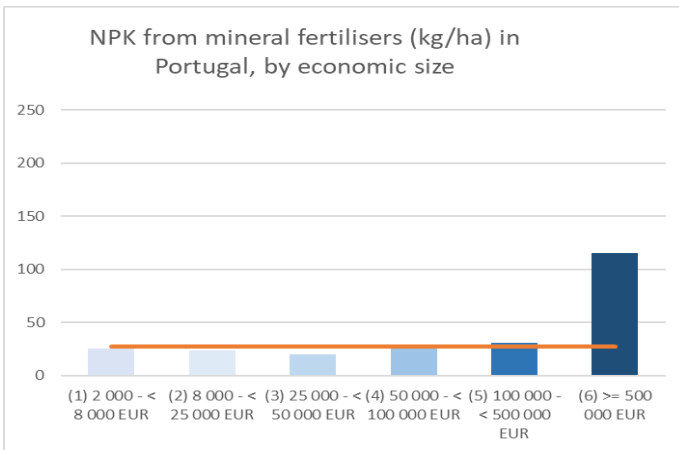
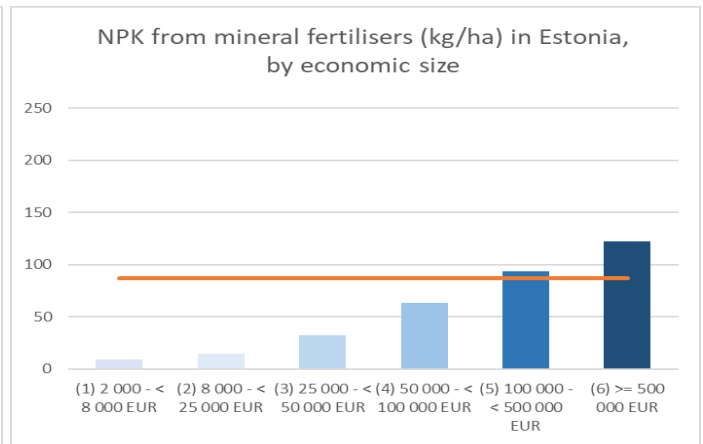
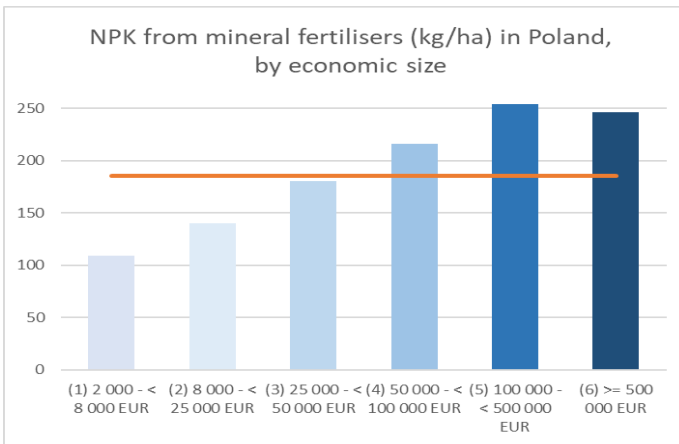
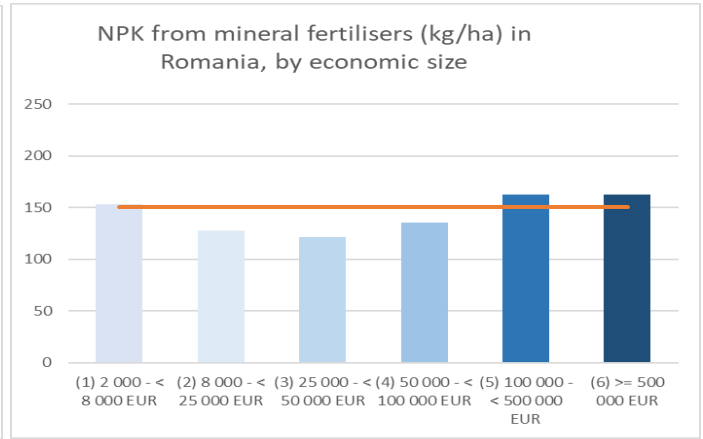
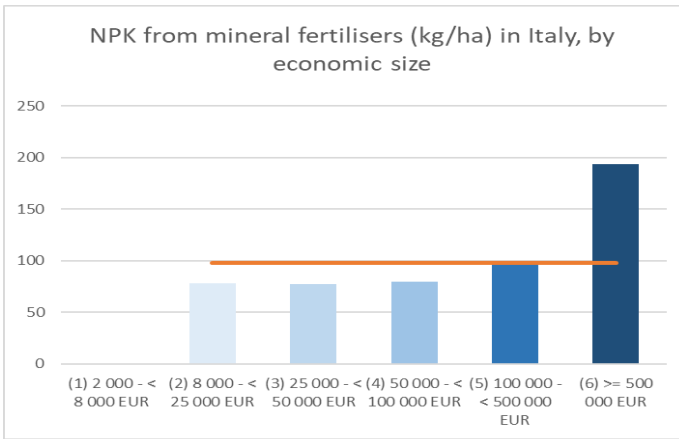
The Regulation foresees the creation of 14 pre-defined groups or sizes of farms. However, for the sake of simplicity FADN has created an alternative grouping based on six categories (ES6 classification).

This is the division used in the graph above for all EU farms in the reference years.

Beside the economic size, other factors such as the type of crops, the specific soil and climatic conditions, and particular agricultural practices on each region/country also influence the fertilizing practices. Those factors are not analysed in the present brief.

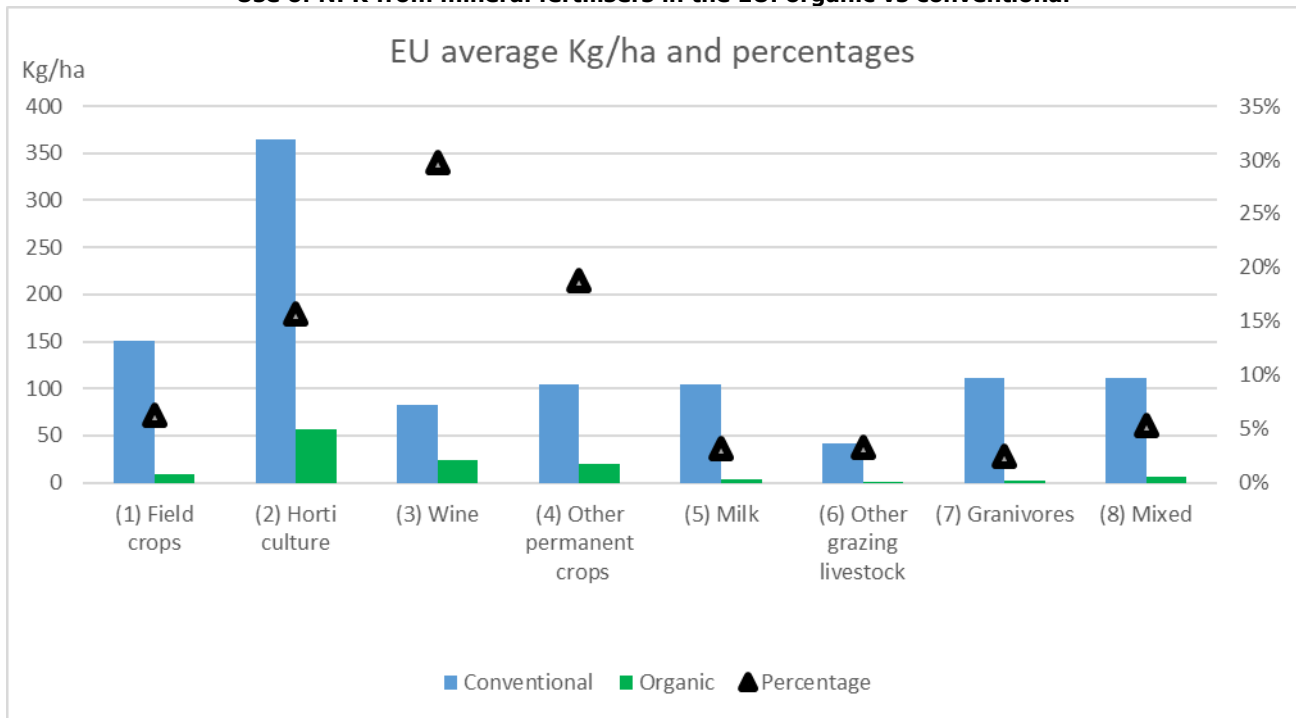
Next page there are also some examples at country level. The horizontal line represents the average of the country.

There, we can observe that, when looking at the levels of mineral fertilisers input by farm size groups, the distributions vary notably from one country to another.



4. Use of mineral fertilisers per hectare in the organic sector

Use of NPK from mineral fertilisers in the EU: organic vs conventional



The percentage is expressed as the ratio Kg/ha in the organic sector, to the Kg/ha used by conventional farms

Neither mixed conventional-organic production, nor farms in conversion to organic are considered here.

The average intensity for organic farms is therefore represented by those holdings where only organic production is applied.

According to FADN data, slightly above 6% of EU commercial farms are producing exclusively organic.

The current regulation in place does not completely ban the use of mineral fertilisers for the organic production.

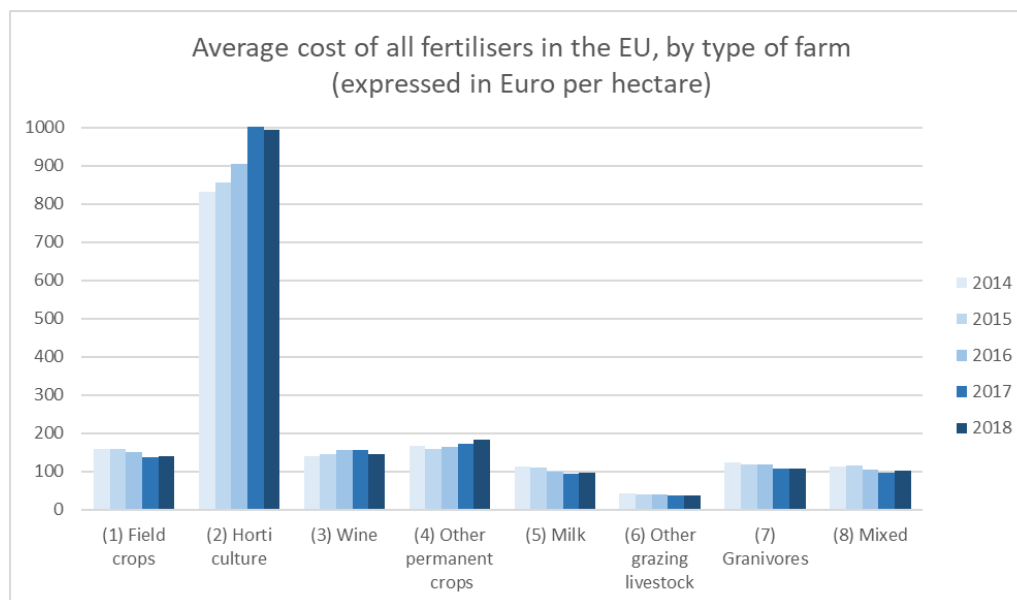
In the figure above the ‘percentage’ value is simply showing the impact of being ‘organic’ as opposed to ‘conventional’ in each given sector, meaning; the higher the ratio (%) the smaller the gap between both sectors. 100% would imply no difference between both.

In this case, it can be seen that the use of NPK in the organic sector is lower in all sectors.

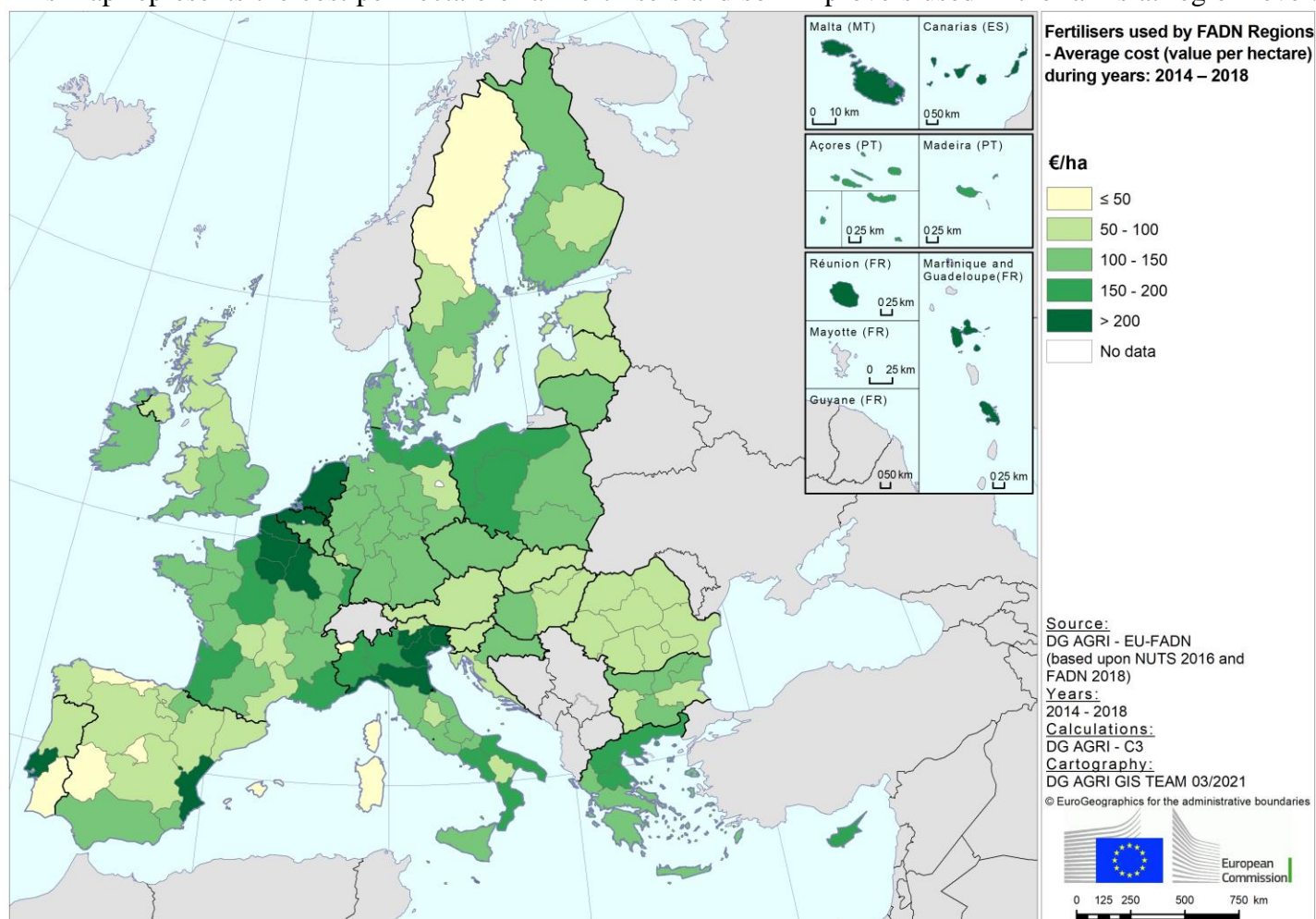
The gap between organic and conventional farms’ NPK use is especially high in the milk sector and more limited in the wine sector.

5. Average cost per hectare of fertilisers used, by FADN regions

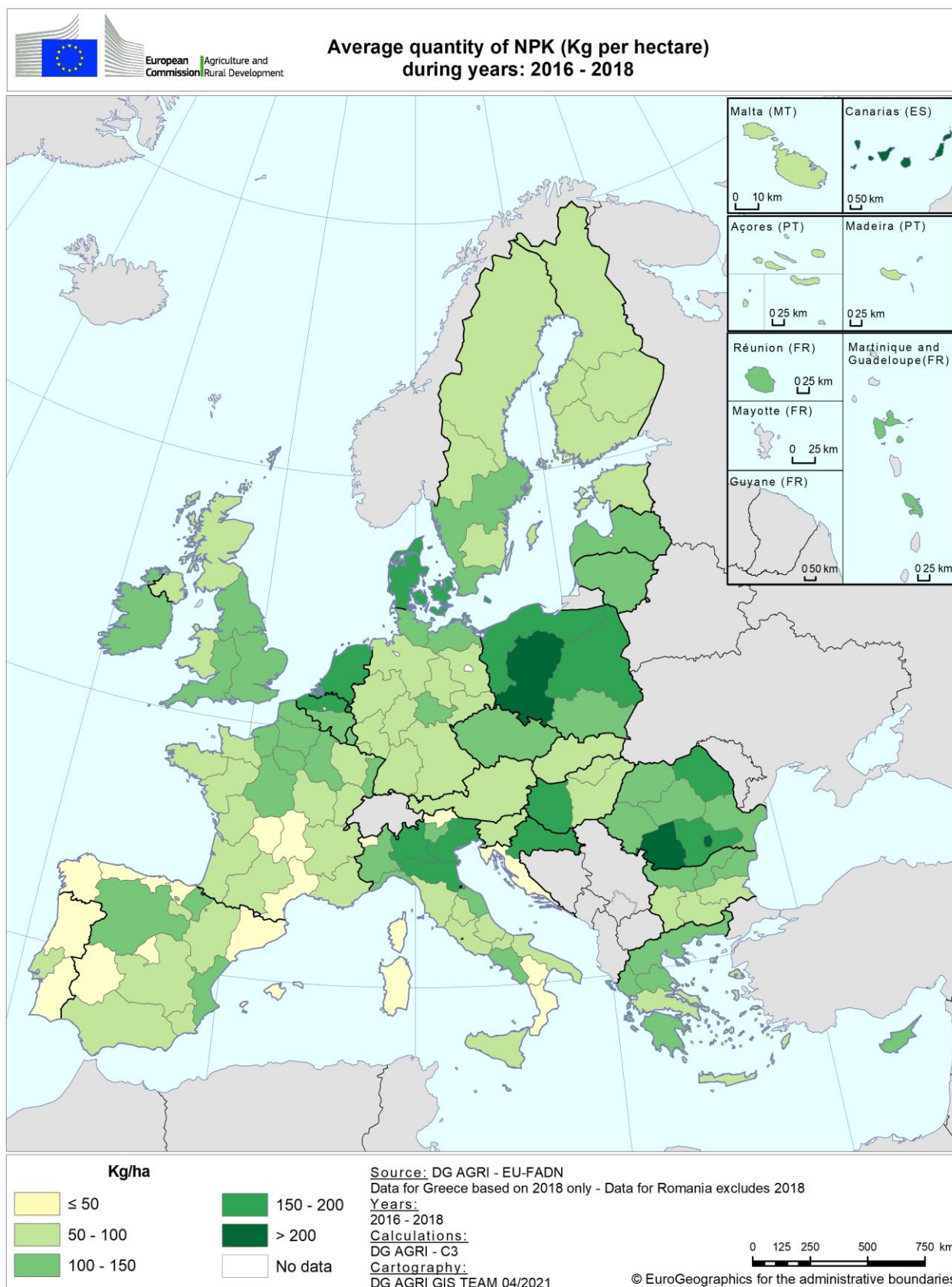
The total value of **all** fertilisers applied, related to utilised agricultural area of farms, including the three (Nitrate, Phosphorus and Potassium based) soil inputs covered by this brief is yearly reported in the FADN survey (variable SE295). This is an overview of the evolution of costs during the last years in Europe:



This map represents the cost per hectare of all fertilisers and soil improvers used in the farms at region level:



6. Average intensity of mineral fertilisers used, by FADN regions



Annex: Methodology

Principles, filters applied and calculations

All data is based on **weighted averages** calculated at EU, Country or regional level. Each one of the farms in the FADN sample has a weight assigned, which indicates the number of farms in the total population, represented by that holding in particular.

These averages are calculated on a set of three accounting years (AY) together (2016, 2017, 2018). The aim of this is to soften any variation of the data in a given area for a given year.

Claim year 2015 has been discarded since it was the first reporting year and it can be considered as a pilot exercise with (often) severe misreporting. Furthermore, in the case of Romania, accounting year 2018 has not been included for the calculations, since 'NPK' data is under revision. On the contrary, for Greece, only data corresponding to 2018 has been considered due to the same reason.

In the case of the cost of fertilisers (map in point 5) the time series cover the latest five years available.

Even though the three different components are reported separately in FADN, this study has considered them together, since they tend to be combined in fertilisers and for agricultural use.

Filters have been applied on the sample farms of FADN database in order to leave potential outliers aside from the calculations. An outlier can be a farm with wrongly reported (or encoded) data in relation to any of the N-P-K variables. It could also be the 'extreme' observations, too far away from the Median, and that therefore become non-representative to calculate the average value.

The filter is based on a maximum upper threshold of NPK quantity (kg) per unit of surface (ha), and it also distinguishes those farms in the **horticulture sector** (much more intensive in the use of fertilisers) and **all other farms**. For both groups the aforementioned ceiling is set based on the value of the upper percentile of the distribution (1% of the farms with the highest values of kg/ha) whose farms are removed from the sample. For this filtering exercise, the surface of reference used does not take into consideration those type of land not suitable for being fertilised. This means that, from the Total Utilised Agricultural Area (UAA) in the farm, those parts corresponding to 'rough grazing', and the 'total agricultural area out of production' Standard Result variable **SE074** (including some areas of permanent grasslands or meadows).

When calculating the final intensities by country of farm typology group, 'global ratios' are used at this step. It is the ratio of the average of both variables (numerator and denominator), rather than the average of the ratio calculated individually for each farm.

At this step however, all the UAA in field of observation is included (without focusing only on arable areas) in order to better picture the environmental impact, since fertilisers are likely to spread around, and also, to make it comparable to other similar statistics produced.

This document does not necessarily represent the official views of the European Commission

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https://ec.europa.eu/info/food-farming-fisheries/farming/facts-and-figures/performance-agricultural-policy/studies-and-reports/economic-analyses-and-briefs/agricultural-and-farm-economics_en

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