

Name:

Phosphorus Balance

Definition:

Based on the IRENA 18 indicator, it is assessed the impact of phosphorus used in agriculture. The gross phosphorus balance is an indicator calculated from the total inputs minus total outputs to the soil. Phosphorus is an element retained by soil and it can be transported in runoff after rainfall, in other words it can be lost through erosion and leaching.

Calculation method:

This indicator is calculated by estimating the average balance in each of the plots / crops.

$$\text{Indicator} = \frac{\sum_i (PB_i \times A_i)}{A_T}$$

Where:

Indicator: Total phosphorus balance (kg of P/ha per year)

PB_i: Phosphorus balance of crop *i* (kg of P/ha)

A_i: Area for the crop *i* (ha)

A_T: Total area considered (ha)

The balance of each crop / plot is calculated as the difference between phosphorus intake and phosphorus outputs in the system:

Inputs: phosphorus fixed by the organic and inorganic fertilizers.

Outputs: phosphorus contained in harvested agricultural products

Interpretation:

A positive phosphorus balance implies a greater amount of released phosphorus than that consumed by the crop. The risk of contamination caused by runoff can increase depending on the type of fertilization and soil management. Otherwise, this implies greater P loss from the soil than P intake and if it continues for a long time, the crops might show symptoms of phosphorus deficiency.

Using the values of this indicator another two indicators, that give information on the management of fertilization, can be calculated:

- Phosphorus use efficiency, which is the ratio between the amount of fertilizer P removed from the field by the crop and the amount of fertilizer P applied.
- Productivity of the phosphorus, which means the kg of crop per kg of applied P

Information source:

Crop area, applied inputs and yields of the different crops are taken from the survey. The values of extractions of phosphorus by the crops are taken from the attached bibliography.

Bibliography and references:

IRENA 18 – Gross nitrogen balance. OECD / Eurostat Nitrogen handbooks (2007)

Ministerio de Medio Ambiente y Medio Rural y Marino (2010). Guía práctica de la fertilización racional de los cultivos en España.

Ministerio de Agricultura, Alimentación y Medio Ambiente (2015). Balance del fósforo en la agricultura española, año 2013. Metodología y resultados.