Definition:

$$\frac{Grain/Fruit/\ Tuber\ yield}{Phosphorus\ fertilizer}$$

Description

Benefit: This impact area refers to the weight of harvested parts of plants that possess economic value. It is suitable, where production is to be used food or feed purposes or as a non-energetic production factor in bio-refineries. Crops with high per hectare yield will show high efficiencies in this impact area.

Resource: The primary source of inorganic phosphorous used in fertilizers is phosphate rock. As global reserves are limited and risk of contamination with heavy metals like uranium and costs of processing are expected to increase, there is a strong motivation to reduce the dependence on mineral phosphorous inputs.
Furthermore, phosphorous availability is a key limiting factor for aquatic ecosystems. High application rates of phosphorous fertilizer in agricultural management, in combination with runoff and erosion, can lead to phosphorous entering into waterways and thereby damaging aquatic ecosystems through eutrophication. Finally, fertilizer application is a relevant factor in farmers' cost calculations. It is therefore considered a stressed resource.

Correlation with soil management

[252] In the case of crop rotations, increasing resource-use efficiency while reducing yield gaps can be addressed by suitable agricultural management practices

Strength & weaknesses pertaining to measurement of this impact area

Yield: Yield values are generally easy to measure and readily available at farm level or in the form of national inventories. However, their informative value is limited where they do not account for qualitative differences between types of biomass and are not accompanied by information on site conditions such as local climate or soil fertility. Therefore, comparisons between efficiencies of different production processes with regard to yields should only be made where products and site conditions are similar. In some cases, it may be advisable to select alternative indicators where the type of benefit is more clearly defined (e.g., energetic value, financial benefit).

Can be measured as

Yield:

- yield, fresh weight [t]
- yield, dry matter weight [t]

Phosphorus fertilizer:

- total phosphorous fertilizer application [kg P]

Sample Indicators

Indicator values from		Survey	
Experiment or direct measurement		Statistical- or census data	
Expert assessment		Literature values	
Model		Maps or GIS	
Stakeholder participation		Not provided	

Table 1: Farm Scale

Indicator	**Unit**	**Indicator values from**
[252] Phosphorus use efficiency (Grain yield/Available phosphorus)	kg * kg^{-1}	

References

ID	**Citation**	**[1]Soil type/ texture**
252	Tomaz, A., et al. (2018). "Efficient use of water and nutrients in irrigated cropping systems in the Alqueva region." Spanish Journal of Soil Science **8**(1): 12-23.	Chromic Cambisols (Bc); Silt loam

[1]**Soil type/ texture:** If provided, what are type and texture of the soils studied in the paper?