

Proposed definition of “Bio-Based Nutrients”

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Object of this proposal

This proposal addresses the **definition of “Bio-Based” for fertilisers, fertilising products, and nutrients** (including for functional uses of nutrient elements N, P, K, Ca, S, Mg ... in other applications including animal feed, human food, industry ...).

This proposal **does not address the definition of “Fertiliser” or “Fertilising Product**. For this, it is suggested to refer to regulatory definitions (EU Fertilising Products Regulation 2019/1009 (**EU FPR**) and national fertilisers regulations.

This proposal does not address the definition of “nutrient”. It is noted that the EU FPR lists macronutrients (cf. PFC1(C)(I)(a)(ii)) as “*nitrogen (N), phosphorus (P) or potassium (K), secondary macronutrients: calcium (Ca), magnesium (Mg), sodium (Na) or sulphur (S)*” and micronutrients (PFC1(C)(II)) as “*boron (B), cobalt (Co), copper (Cu), iron (Fe), manganese (Mn), molybdenum (Mo) or zinc (Zn)*”. The FPR distinguishes between “declared” nutrients (on the label) and nutrients present but not declared.

The International Standardisation Organisation (ISO) has a wider definition of Plant Nutrient: “*substance that is essential or beneficial for plant growth*” ([ISO 8157:2022](https://www.iso.org/standard/75422.html) Fertilizers, soil conditioners and beneficial substances — Vocabulary).

Context:

As noted in CEN/TR 16721, **isotopic radio-dating cannot generally be used to identify nutrients of “biological origin”** because bio-based nutrients are often not bound to carbon (e.g. recovered phosphoric acid, ammonium nitrate ...) and in some cases are not bound to O, H or N (elemental sulphur ...). Furthermore, radio-dating will not identify bio-based nutrients from synthetic or mined fossil nutrients, because P and K in plants or animals may come from uptake of mineral fertilisers (directly or indirectly) or from mineral animal feed additives, and atmospheric N is ‘fixed’ into fertilisers both by plants and by chemical synthesis.

According to the C¹⁴ methodology for quantifying the bio-based content of products proposed under [CEN/TR 16721](https://www.cen.eu/CEN/Workshop/16721), a plastic manufactured from CO₂ captured from organic waste incineration would be identified as “Bio-Based” (a plastic manufactured from CO₂ captured from a coal-burning plant would not). By analogy, we suggest that P in phosphoric acid extracted from organic waste incineration ash should also be considered to be “Bio-Based”. Similarly for the N in ammonium sulphate recovered by stripping/scrubbing of manure digestate. This means that **an inorganic nutrient chemical can be “Bio-Based”**, so also an “Inorganic Fertiliser” (EU FPR PFC 1(C)), or indeed a “Mineral Fertiliser” (as defined in the EU FPR Annex III, part II §4(a), that is C_{org} < 1%).

References

- CEN European Standard [EN 16575 \(August 2014\)](https://www.cen.eu/CEN/Workshop/16575) “**Bio-based products: vocabulary**” defines (2.1, 2.5) a bio-based product as “*Wholly or partly derived from biomass. May have undergone physical, chemical or biological treatment*” and (2.4) bio-based content as “*fraction of a product that is derived from biomass. Normally expressed as a percentage of the total mass of the product*”. Biomass is defined (2.7) as “*material of biological origin excluding material embedded in geological formations and/or fossilised*”.



- CEN outline of methodology for quantifying the bio-based content of products [CEN/TR 16721](#) and methodology for calculating % of bio-based carbon using the C¹⁴ isotopic ratio ([EN 16640](#)). This is clarified for bio-based plastics in [EN 16785-1](#) (radiocarbon analysis) and [EN 16785-2](#) (material balance).
- CEN draft standard on comparing Life Cycle Assessment (LCA) of “Bio-Based” materials to fossil-derived materials ([prEN 18027](#)).
- USDA “BioPreferred” programme presentation 2017 [HERE](#) and USA [ASTM D6866-22](#).
- European Commission (DG GROW) “Bio-based products” [web page](#).
- European Commission Communication ([COM\(2022\)682](#), 30th November 2022) on the use of the term “Bio-Based Plastic”.
- European Union Terminology (IATE) <https://iate.europa.eu/home>.
- Lex4Bio EU Horizon R&D project publication: Wester-Larsen et al. Lex4Bio [2022](#).

Translations of “Bio-Based Fertiliser”

The following are based on national standards organisations website translations of CEN “Bio-sourced products” and on EU FPR translation of “Fertiliser”:

Finnish : *Biopohjainen lannoite*

[French](#) : *Engrais biosourcé*

German : *Biobasierte Düngemittel*

Swedish : *Biobaserat gödselmedel*

Input is welcome please for other languages.

Proposals

- A. This position paper discusses the **definition of the term “Bio-Based” as concerning nutrients only**, and as used in “Bio-Based fertiliser” or “Bio-Based fertilising product” or “Bio-Based nutrient”. This position paper does not discuss the definition of “Fertiliser” because this is covered by the EU Fertilising Products Regulation 2019/1009 (FPR) or national fertiliser regulations.
- B. **“Bio-based” should be defined as is in [CEN 16575 \(August 2014\)](#): “derived from biomass ... excluding material embedded in geological formations and/or fossilised ... May have undergone physical, chemical or biological treatment”.**
It is considered that this definition includes “thermochemical” treatment.
It is noted that this definition **includes biomass materials which have undergone no processing**, e.g. plant parts or raw manure.
It is noted that, following this definition, **chemicals or energy used in processing are not assessed**, but if such chemicals remain in or react into the final product then they will result in the product being only “Partly Bio-Based” (subject to ‘Tolerance’ see below). Assessment of chemicals and energy used in processing can be included in Life Cycle Analysis of chemicals and energy (see [prEN 18027](#)).
- C. In coherence with the European Commission Communication ([COM\(2022\)682](#)) and the Waste Hierarchy, **the priority should be Bio-Based Fertilisers derived from organic wastes and by-products**.
It is clarified that this includes derived from municipal wastewater, food industry processing wastewaters, etc., which are mainly of biological origin but also include some non-biological inputs (e.g. phosphates in cleaning products or phosphate food additives), but not purely industrial wastewaters (e.g. phosphates recovered from metal processing or microchip etching). The latter may be covered by some other vocabulary, such as “recycled nutrients” or “recovered nutrients”.
- D. As an overall principle, a nutrient product in which only part of the declared nutrients is bio-based should be labelled as a **“Partly Bio-Based”**. E.g., an inorganic fertiliser should only be termed “Bio-Based fertiliser” if the totality (see ‘Tolerance’ below) of its declared nutrients is bio-based.



- E. Where only one or two of the declared nutrient elements in a fertiliser are “Bio-Based” it should be acceptable to **indicate “Bio-Based” for these elements only**, subject to the points above concerning minimum bio-based content and the use of the term “Partly Bio-Based” for each concerned nutrient.
- F. For **defining the “Bio-Based content”**, we suggest to follow [EN 16575 \(August 2014\)](#) (2.4) “*fraction of a product that is derived from biomass. Normally expressed as a percentage of the total mass of the product*”. This should be taken as % dry weight (DW). As above, the fraction coming from municipal and similar wastewaters should be considered to be totally derived from biomass.
- G. **Calculation of the “Bio-Based” % in “Partly Bio-Based fertilisers”**.
We propose that:
- where a material is termed “inorganic fertiliser” or “mineral fertiliser”, this calculation should address the total dry mass of all nutrients present in the product and declared on the label (N, P, K, Ca, Mg, S, micronutrients).
- where the material is termed “organic” or “organo-mineral” fertiliser, this calculation should apply to the total dry mass of these same (declared) nutrients plus the mass of C-org.
Should be considered non-nutrient elements such as Si, Na.
The calculation method should follow [EN 16785-2](#) modified as follows: the mass of O and H are considered to be “Bio-Based” if chemically bound to a bio-based nutrient (however, unlike in EN 16785-2, the N is considered as a nutrient itself and is not calculated depending on its being bound to carbon)
- H. **For fertilisers, a minimum level of bio-based nutrients (+ organic carbon) should be specified**, below which the term “Bio-Based” or “Partly Bio-Based fertiliser” should not be used. This minimum should apply to the declared nutrient content, as % weight of dry matter (DW). This minimum could be 10% (TBD).
- I. A **tolerance** should be defined: if the nutrients of biological origin are > X%, then the term “Bio-Based” remains applicable (not “Partly Bio-Based”). Below this tolerance, the material should be termed “**Partly Bio-Based**”. We suggest that this tolerance (X) could be 90 % DW.
- J. **EU Fertilising Products Regulation (FPR) labelling for “Bio-Based” fertilising products**.
We request that the definitions of “*Bio-Based*” and “*Partly Bio-Based*”, as applicable to fertilising products, be added to the EU FPR labelling specifications (Annex III), that it be added to Part I 8(c) that the claim “*Bio-Based*” or “*Partly Bio-Based*” should not be used unless this definition is respected, and for “*Partly Bio-Based*” the % bio-based should be specified on the label.
It should be specified that products making a “*Bio-Based*” or “*Partly Bio-Based*” labelling claim must undergo Conformity Assessment of this claim by a Notified Body as per Module B or D1 of Annex IV.
- K. **P₄ (white phosphorus)** is not as such a “nutrient” and recovered P₄ is not expected to be used in fertiliser, animal feed or human food & beverage additive production (these can be supplied by purified wet-acid route P). However, by extension of the above, ESPP suggests that P₄ recovered from sewage sludge, bone meal ash or other organic materials could be termed “Bio-Based phosphorus” or “Bio-Based chemical”. Similarly for other phosphorus, nitrogen or other nutrient mineral elements used in industrial applications, where the element provides a functional value (e.g. phosphorus in lithium iron phosphate battery cathodes).
- L. We suggest that **guidance on terminology, labelling and validation methodology should be developed** through a CEN standard, En methodology and/or a European Commission Communication. This should include guidance on methodology on the Materials Flow Analysis necessary to demonstrate the bio-based origin or nutrient materials.