# SLOVENSKI STANDARD
# SIST-TS CEN/TS 17700-2:2023

**01-januar-2023**

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**Rastlinski biostimulanti - Navedbe - 2. del: Povečanje učinkovitosti hranil pri rastlinah zaradi uporabe biostimulanta**

Plant biostimulants - Claims - Part 2: Nutrient use efficiency resulting from the use of a plant biostimulant

Pflanzen-Biostimulanzien - Auslobungen - Teil 2: Nährstoffverwertungseffizienz infolge der Verwendung eines Pflanzen-Biostimulans

Biostimulants des végétaux - Allégations - Partie 2 : Efficacité d'utilisation des éléments nutritifs résultant de l'utilisation d'un biostimulant des végétaux



**Ta slovenski standard je istoveten z:** **CEN/TS 17700-2:2022**

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**ICS:**

65.080 Gnojila Fertilizers

**SIST-TS CEN/TS 17700-2:2023** **en,fr,de**

TECHNICAL SPECIFICATION

SPÉCIFICATION TECHNIQUE

TECHNISCHE SPEZIFIKATION

# CEN/TS 17700-2

March 2022

ICS 65.080

English Version

# Plant biostimulants - Claims - Part 2: Nutrient use efficiency resulting from the use of a plant biostimulant

Biostimulants des végétaux - Allégations - Partie 2 : Efficacité d'utilisation des éléments nutritifs résultant de l'utilisation d'un biostimulant des végétaux

Pflanzen-Biostimulanzien - Angaben - Teil 2: Effizienz der Nährstoffverwertung infolge der Verwendung eines Biostimulans für die pflanzliche Anwendung

This Technical Specification (CEN/TS) was approved by CEN on 3 January 2022 for provisional application.

The period of validity of this CEN/TS is limited initially to three years. After two years the members of CEN will be requested to submit their comments, particularly on the question whether the CEN/TS can be converted into a European Standard.

CEN members are required to announce the existence of this CEN/TS in the same way as for an EN and to make the CEN/TS available promptly at national level in an appropriate form. It is permissible to keep conflicting national standards in force (in parallel to the CEN/TS) until the final decision about the possible conversion of the CEN/TS into an EN is reached.

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Ref. No. CEN/TS 17700-2:2022 E

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## European foreword

This document (CEN/TS 17700-2:2022) has been prepared by Technical Committee CEN/TC 455 “Plant biostimulants”, the secretariat of which is held by AFNOR.

Attention is drawn to the possibility that some of the elements of this document may be the subject of patent rights. CEN shall not be held responsible for identifying any or all such patent rights.

This document has been prepared under a Standardization Request given to CEN by the European Commission and the European Free Trade Association.

The CEN/TS 17700 series, *Plant biostimulants — Claims*, consists of the following parts:

— *Part 1: General Principles*;

— *Part 2: Nutrient use efficiency resulting from the use of a plant biostimulant*;

— *Part 3: Tolerance to abiotic stress resulting from the use of a plant biostimulant*;

— *Part 4: Determination of quality traits resulting from the use of a plant biostimulant*;

— *Part 5: Determination of availability of confined nutrient in the soil or rhizosphere*.

Any feedback and questions on this document should be directed to the users’ national standards body. A complete listing of these bodies can be found on the CEN website.

According to the CEN/CENELEC Internal Regulations, the national standards organisations of the following countries are bound to announce this Technical Specification: Austria, Belgium, Bulgaria, Croatia, Cyprus, Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, Netherlands, Norway, Poland, Portugal, Republic of North Macedonia, Romania, Serbia, Slovakia, Slovenia, Spain, Sweden, Switzerland, Turkey and the United Kingdom.

# Introduction

This document has been developed to provide guidance for a consistent approach to justify the claims associated with the use of plant biostimulants in agriculture.

The definition of plant biostimulants to be used in the regulation on fertilizing materials is claims-based. For this reason, demonstrating that a product is indeed a *bona fide* plant biostimulant depends on a demonstration of its effect.

The placing of a plant biostimulant on the market should never be considered to guarantee effectiveness under all conditions, as many factors may influence the performance of a biostimulant in the field.

Plant biostimulants used in agriculture can be applied in multiple ways: on soil, on plant, as seed treatment, etc. This document is applicable to all application types of plant biostimulants in agriculture.

# 1 Scope

This document provides guidance for justifying agronomic nutrient use efficiency claims of plant biostimulants used in agriculture.

This document is aimed primarily at manufacturers, laboratories, researchers, technical centres, companies that will put the products on the market, notifying authorities, notified bodies, and market surveillance authorities.

# 2 Normative references

The following documents are referred to in the text in such a way that some or all of their content constitutes requirements of this document. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

CEN/TS 17700-1:2022, *Plant biostimulants — Claims — Part 1: General Principles*

CEN/TS 17724:2022, *Plant biostimulants — Terminology*

# 3 Terms and definitions

For the purposes of this document, the terms and definitions given in CEN/TS 17724:2022, CEN/TS 17701-1:2022 and the following apply.



**3.1**
**nutrient use efficiency**
measure of a plant's ability to acquire and utilize nutrients from the environment for a desired outcome based on (a) nutrient availability (b) uptake efficiency and/or (c) utilization efficiency

Note 1 to entry: Nutrient use efficiency is a complex trait: it depends on the ability to take up the nutrients from the soil, medium, fertilizers… but also on transport, storage, mobilization, usage within the plant.



**3.2**
**nutrient availability**
elements either present in the soil solution or exchangeable on soil colloids

**3.3**
**uptake efficiency**
measure of the plant capacity to acquire nutrients from the environment

**3.4**
**utilization efficiency**
measure of the plant capacity to transform and valorise acquired nutrients into more complex substances (e.g. organic compounds, plant biomass)

**3.5**
**plant nutrient**
chemical element used by the plant for growth and development usually classified as a Primary Macronutrient, Secondary Macronutrient or Micronutrient per the quantity required by the plant

Note 1 to entry: Carbon, hydrogen and oxygen are also essential elements for plant growth.

Note 2 to entry: Primary Macronutrients – Nitrogen, Phosphorus, Potassium,

Secondary Macronutrients – Calcium (Ca), Magnesium (Mg), Sodium (Na), Sulphur (S)

Micronutrients – Boron (B), Cobalt (Co), Copper (Cu), Iron (Fe), Manganese (Mn), Molybdenum (Mo), Zinc (Zn).

## 4 Terminology of the claim

The label shall clearly indicate the effect of the plant biostimulant. For the case of the claim Nutrient Use Efficiency, the effect shall be written on the label as mentioned below:

- Improvement of the nutrient use efficiency of [Plant Nutrient(s)]

The Plant Nutrients indicated shall be one of those demonstrated during the trials.

For terminology of the crops, refer to General Principles Technical Specification (CEN/TS 17700-1:2022).

## 5 Assessment indices to validate the claims

Agronomic indices have been proposed for the short-term assessment of Nutrient Use Efficiency and its components. These indices are reported in Table 1, adapted from Dobermann A. 2007 [1].

They can be used independently to justify the claim. These indices are based on the following measurements:

F: Amount of nutrient made available to the plant

U: Amount of nutrient acquired by the plant biomass (total biomass or biomass in the part of interest). Concentration of each nutrient measured in the plant.

Y: Crop yield. Could be interpreted in different manners: Harvested part or total biomass.

C: Concentration of the plant nutrient in the part of interest.

In order to justify the claims, these indices shall be calculated in presence and absence of plant biostimulants.

U and Y can also be measured for the control treatment without Fertilizers and noted Uo and Yo.

**Table 1**

| Index | Calculation | Interpretation |
|---|---|---|
| RE = Apparent crop recovery efficiency of supplied nutrient | RE = (U-Uo)/F | RE depends on the congruence between plant demand and nutrient made available to the plant by fertilizers and/or other environment resources. RE is affected by the application method (amount, timing, placement, N (*or nutrients)* form) and factors that determine the size of the crop nutrient sink (genotype, climate, plant density, abiotic /biotic stresses) |
| PE = Physiological efficiency of acquired Nutrient(s)<br>Kg yield increase per kg increase in Nutrient Uptake from fertilizer or/and environment | PE= (Y-Yo)/ (U- Uo ) | Ability of a plant to transform nutrients acquired from fertilizer or environment into economic yield. |
| IE=Internal utilisation efficiency of a nutrient<br>(kg yield per kg nutrient uptake) | IE=(Y/U) | Ability of a plant to transform nutrients acquired from all sources (soil, fertilizer) into economic yield (grain). Depends on genotype, environment and management. |
| AE = Agronomic efficiency of supplied nutrient<br>(kg yield increase per kg nutrient applied) | AE = (Y-Yo)/F or AE = RE x PE | Product of nutrient recovery from mineral or organic fertilizer (RE) and the efficiency with which the plant uses each additional unit of nutrient (PE).<br>AE depends on management practices that affect RE and PE. |
| PFP = Partial factor productivity of supplied nutrient<br>( kg Harvest product per kg nutrient applied) | PFP = Y/F or PFP = (Yo/F )+ AE | More important for farmers because it integrates the use efficiency of both indigenous and applied nutrients.<br>High indigenous soil nutrient supply (Yo) and high AE are equally important for PFP. |
| NE = Nutrient export of a plant nutrient in a plant (plant part or total plant) | NE = Y x C | Calculates the quantity of nutrient exported in the part of interest, with same level of nutrition in all treatments (through fertilizers and/or environment)<br>Evaluates how much nutrient is indeed recovered into the part of interest. |

Other indices or methods not listed in Table 1 and officially recognized by scientific community (peer review publications) could be used to justify the claim Nutrients Use Efficiency.

# 6 Specifications for the performance of the trials

## 6.1 Control

Control is defined in Technical Specification CEN/TS 17700-1:2022.

The different treatments in the test should be:

- Controls: substrate/soil with or without fertilizer,
- Treatments: substrate/soil with or without fertilizer + plant biostimulants.

The same substrate/soil should be used in each treatment and in case of field trials a characterization of the substrate/soil should be done.

## 6.2 Under controlled conditions

In the case that certain parameters or technical operations cannot be implemented in the open field, the conduction of the respective trials to prove the plant biostimulants claims should take place under controlled conditions.

EXAMPLE To have a measure of the total nutrient content in the substrate.