SLOVENSKI STANDARD
oSIST prEN 17700-2:2023

01-maj-2023

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-Biostimulantien - Auslobungen - Teil 2: Effizienz der Nährstoffverwertung 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: **prEN 17700-2**

ICS:

65.080 Gnojila Fertilizers

oSIST prEN 17700-2:2023 **en,fr,de**

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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-Biostimulantien - Auslobungen - Teil 2: Effizienz der Nährstoffverwertung infolge der Verwendung eines Pflanzen-Biostimulans

This draft European Standard is submitted to CEN members for enquiry. It has been drawn up by the Technical Committee CEN/TC 455.

If this draft becomes a European Standard, CEN members are bound to comply with the CEN/CENELEC Internal Regulations which stipulate the conditions for giving this European Standard the status of a national standard without any alteration.

This draft European Standard was established by CEN in three official versions (English, French, German). A version in any other language made by translation under the responsibility of a CEN member into its own language and notified to the CEN-CENELEC Management Centre has the same status as the official versions.

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Recipients of this draft are invited to submit, with their comments, notification of any relevant patent rights of which they are aware and to provide supporting documentation.

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EUROPEAN COMMITTEE FOR STANDARDIZATION
COMITÉ EUROPÉEN DE NORMALISATION
EUROPÄISCHES KOMITEE FÜR NORMUNG

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European foreword

This document (prEN 17700-2:2023) has been prepared by Technical Committee CEN/TC 455 “Plant biostimulants”, the secretariat of which is held by AFNOR.

This document is currently submitted to the CEN Enquiry.

This document will supersede CEN/TS 17700-2:2022.

prEN 17700-2:2023 includes the following significant technical changes with respect to CEN/TS 17700-2:2022:

— The table giving the indexes is split into two tables;

— Examples are added for better understanding of the trial design for the indexes RE, PE and AE.

This document has been prepared under a Standardization Request given to CEN by the European Commission and the European Free Trade Association, and supports essential requirements of EU Directive(s) / Regulation(s).

For relationship with EU Directive(s) / Regulation(s), see informative Annex ZA, which is an integral part of this document.

The EN 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 nutrients in the soil or rhizosphere*.

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 plant 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.

To be in compliance with this standard, it is important also to follow the Recommendations and Quality Criteria described in the Standard of General Principles EN 17700-1:—[1].

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.

EN 17700-1:—[1], *Plant biostimulants — Claims — Part 1: General principles*

EN 17724:—[2], *Plant biostimulants — Terminology*

3 Terms and definitions

For the purposes of this document, the terms and definitions given in EN 17700-1:—[1], EN 17724:—[2], and the following apply.

ISO and IEC maintain terminology databases for use in standardization at the following addresses:

— ISO Online browsing platform: available at https://www.iso.org/obp/

— IEC Electropedia: available at https://www.electropedia.org/

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

[1] Under preparation
[2] Under preparation

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, classified as a Primary Macronutrient, Secondary Macronutrient or Micronutrient per the quantity required by the plant

Note 1 to entry: Primary Macronutrients – Nitrogen (N), Phosphorus (P), Potassium (K),

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 standard (EN 17700-1:—[1]).

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 in Table 1.1 and Table 1.2, 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(s) made available to the plant by fertilizers and/or other environment resources.

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

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 baseline control treatment and noted Uo and Yo, as defined in 6.1.

The formulas to calculate the indexes are showed in Table 1.1 and Table 1.2. The indexes in Table 1.2 required additional control as explained in 6.1.

Table 1.1

Index	Calculation	Interpretation
IE = Internal utilization efficiency of a nutrient (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.
PFP = Partial factor productivity of supplied nutrient (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. 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) Evaluates how much nutrient is indeed recovered into the part of interest.

Table 1.2

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 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.
AE = Agronomic efficiency of supplied nutrient (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). AE depends on management practices that affect RE and PE.

Other indices or methods not listed in Table 1.1 and Table 1.2 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 EN 17700-1:—[1].

The different treatments in the test should be:

— Controls: substrate/soil with or without fertilizer,

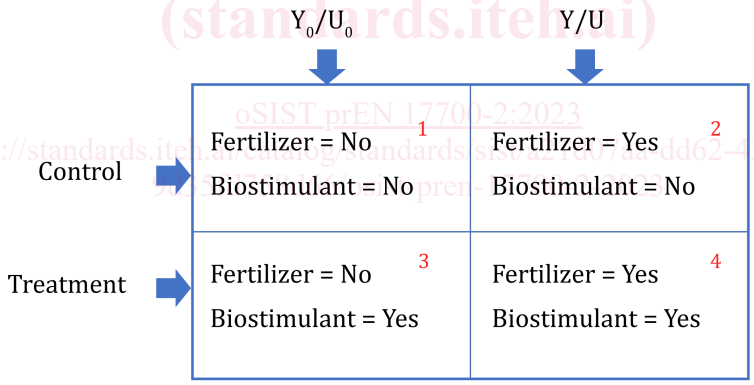
— Treatments: substrate/soil with or without fertilizer + plant biostimulants.

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.

For better understanding of the trial design for the indexes RE, PE and AE, two examples are proposed below:

EXAMPLE 1

1. Control without the application of fertilizer and without the application of the biostimulant
2. Control with the application of fertilizer but without the application of the biostimulant
3. Treatment without the application of fertilizer but with the application of the biostimulant
4. Treatment with the application of fertilizer and with the application of the biostimulant



For RE this would mean: (4[U] – 3[U_0])/F compared to (2[U] – 1[U_0])/F

For PE this would mean: (4[Y] – 3[Y_0])/(4[U] – 3[U_0]) compared to (2[Y] – 1[Y_0])/(2[U] – 1[U_0])

For AE this would mean: (4[Y] – 3[Y_0])/F compared to (2[Y] – 1[Y_0])/F

EXAMPLE 2

For the statistical analysis of RE, PE and AE following treatments are necessary at a minimum:

1. Control without the application of fertilizer and without the application of the biostimulant
2. Control with the application of fertilizer but without the application of the biostimulant
3. Treatment with the application of fertilizer and with the application of the biostimulant