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Plant biostimulants - Claims - Part 5: Determination of availability of confined nutrients in the soil or rhizosphere

Biostimulanzien für die pflanzliche Anwendung - Angaben - Teil 5: Verfügbarkeit von im Boden und in der Rhizosphäre enthaltenen Nährstoffen

Biostimulants des végétaux - Allégations - Partie 5 : Détermination de la disponibilité des éléments nutritifs confinés dans le sol ou la rhizosphère

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English Version

Plant biostimulants - Claims - Part 5: Determination of availability of confined nutrients in the soil or rhizosphere

Biostimulants des végétaux - Allégations - Partie 5 : Détermination de la disponibilité des éléments nutritifs confinés dans le sol ou la rhizosphère

Biostimulanzien für die pflanzliche Anwendung - Angaben - Teil 5: Verfügbarkeit von im Boden und in der Rhizosphäre enthaltenen Nährstoffen

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

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European foreword

This document (FprCEN/TS 17700-5:2021) 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 Vote on TS.

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*.

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

The claim described in this document concerns the improvement of availability of confined nutrients in the soil or rhizosphere by a plant biostimulant.

This document is aimed primarily at manufacturers, laboratories, researchers, technical centres, companies that will put the products on 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:—[1], *Plant biostimulants - Claims Part 1: General Principles*

CEN/TS 17724:—[2], *Plant biostimulants - Terminology*

3 Terms and definitions

For the purposes of this document, the terms and definitions given in CEN/TS 17700-1:—, CEN/TS 17724:— and the following apply.

3.1
available nutrient
element either present in the soil solution or exchangeable on soil colloids

3.2
confined nutrient
element present in the solid and gaseous phases of the soil, excepting soil colloids

3.3
improvement of availability of confined nutrients in the soil or rhizosphere
moving soil nutrients from the pool of confined nutrients to the pool of available nutrients

3.4
rhizosphere
volume of soil around living roots that is influenced by root activities

3.5
soil
layer of unconsolidated material consisting of weathered material particles, dead and living organic matter, air space, and soil solution

3.6
soil solution
liquid phase of the soil and its solutes

1 Under preparation. Current stage is: FprCEN/TS 17700-1:2021.

2 Under preparation. Current stage is: FprCEN/TS 17724:2021.

3.7
soil colloid
finer size fraction of the soil (clay and organic matter), being also considered as the most chemically active portion of the soil because of its large surface area and the chemical structure of the materials involved

4 Terminology of the claims

4.1 Claims

Claimed improvement of availability of confined nutrients shall be completed with one or more nutrient(s) which is/are concerned by this effect (e.g. nitrogen (N), phosphorus (P), nitrogen and phosphorus (N and P), zinc (Zn), microelements, …).

Moreover, it is possible to specify in the claim if it is applied to soil or rhizosphere or both.

Some examples of claims which can be mentioned on the label are presented hereunder:

- “Improve availability of microelements confined in soil and rhizosphere”,
- “Improve availability of phosphorus in rhizosphere”,
- “Improve availability of nitrogen in soil”.

5 Assessment markers to validate the claim

5.1 General considerations for markers measurements

Improvement of the availability of nutrient confined in the soil shall be evaluated by comparing the concentration or quantity of the available nutrient element (in the soil, soil and rhizosphere or plants) in control treatment (without plant biostimulant application) and in plant biostimulant treatment (applied plant biostimulant).

Markers shall be determined with the same methods and same equipment on both control treatment and plant biostimulant treatment.

Markers to evaluate the improvement of the availability of nutrient confined in the soil or rhizosphere, noted as markers in the text, could be determined on **3 different matrixes** (soil, soil and rhizosphere or plants). For each matrix, markers shall be determined on representative samples.

NOTE Growing media are not considered as soil or soil rhizosphere in this document.

5.2 Soil or rhizosphere markers

5.2.1 Soil sample preparation

Soil or rhizosphere samples should be processed according to EN 16179.

After sampling, the soil or rhizosphere samples should be kept cool and processed as soon as possible (ISO 18512 may be used for the preservation and storage of soil samples).

Prior to analysis, the soil or rhizosphere samples can be air-dried, or dried in an oven at temperatures not exceeding 40 °C for at least 72h, or freeze-dried or cool stored (4°C) according to the recommended methodology for the measured markers.

5.2.2 Available soil nutrient determination

Available nutrient concentration in the soil or rhizosphere shall be determined after extraction and analytical determination methods.

Extraction and determination methods shall be carried out following different National, European, International standards or by scientific methods, excluding methods elaborated to determine total element in the soil (e.g. ISO 11466, ISO 22036 and EN ISO 11885 methods are excluded).

Annex A gives examples of methods that should be used to determine nutrient content in soil and rhizosphere for each nutrient. This list is not exhaustive and can be extended as long as the same method is applied to all soil and rhizosphere samples.

Available nutrient content in soil and rhizosphere shall be expressed in mg of the element per kg of soil dry matter.

5.3 Plant markers

5.3.1 Plant sample preparation

Parts of the plant which are targeted by the plant biostimulant effect shall be sampled (e.g. shoots and root individually or pooled together).

After sampling, the plant samples should be dried in an air-forced oven at temperatures not exceeding 40 °C to reduce the risk of volatilization (as described in ISO 16198:2015, see Annex B).

When steady biomass is achieved (usually after ca. 3 d), the plant samples shall be removed from the oven and be weighed with an accuracy of ± 1 mg for biomass determination. Plant samples shall then be conserved under dry conditions in their container until analysis.

5.3.2 Plant nutrient determination

In trials with plants, the improvement of availability of confined nutrients in soil or rhizosphere should be demonstrated by the increase of nutrient exports (NE) by the plant.

Plant samples should be washed if the plant biostimulant is applied by foliar application.

Prior to the determination of nutrient concentration, plant samples should be prepared according to the information given in the adequate methods. An example of procedure for the digestion of plant samples and a plant analysis review article are presented in Annex B.

The nutrient export (NE) in plants during the test culture period shall be calculated according to the formula:

$$NE = C \times Y$$

where

- NE is the nutrient export of the nutrient in the plant (shoot or root or both), in g/ha or g/plant;
- C is the concentration of the plant nutrient in the part of interest, in g/g;
- Y is the crop yield. Can be interpreted in different manners: harvested part or total biomass, in g/ha or g/plant.

6 Specifications for the performance of the trials

6.1 General specifications

Trials intended to demonstrate the efficacy of a plant biostimulant claiming the “improvement of the availability of confined nutrients in the soil or rhizosphere” shall comply with the requirements of this clause.

- The experimental trials can be carried out in controlled conditions or at the field.
- Trials can be implemented on bare soil or on planted soil.

6.2 Trial design

6.2.1 General

Trial design shall comply with the *General Principles* Technical Specification (CEN/TS 17700-1:—).

For trial designs, it is necessary to take into account pH and texture of soils described below and the minimum of trial defined in Table 1:

Table 1

Effect claimed for specific type of soil and for all pHs	2 trials in total from 2 different pH categories in one specific type of soil Product is successfully demonstrated on the soil chosen during the same year or different years
Effect claimed for specific pH categories for all type of soil textures	3 trials in total from 3 different soil texture categories in one specific pH category Product is successfully demonstrated on the soil chosen during the same year or different years
Effect claimed for all type of soil and all pH categories	6 trials in total from 2 different pH categories and 3 different soil texture categories Product is successfully demonstrated on the soil chosen during the same year or different years

Table 1: Minimum number of trials required

Three pH categories (pH < 6,2 /6,2 < pH < 7,5 /pH > 7,5) have to be considered.

Four type of textures categories (Silty, Sandy, Clay, Loam) have to be considered.

See Annex C for detail of texture categories.

6.2.2 Timetable of measures

Sampling and measures can be carried out at different times, but the delay between the application of the plant biostimulant and the measure shall be mentioned.