



SLOVENSKI STANDARD
SIST EN 16086-1:2012

01-marec-2012

**Izboljševalci tal in rastni substrati - Določevanje sprejemljivosti za rastline - 1. del:
Preskus rasti v loncu s kitajskim zeljem**

Soil improvers and growing media - Determination of plant response - Part 1: Pot growth test with Chinese cabbage

Bodenverbesserungsmittel und Kultursubstrate - Bestimmung der Pflanzenverträglichkeit - Teil 1: Wachstumstest mit Chinakohl im Topf

Amendements du sol et supports de culture - Détermination de la réponse des plantes - Partie 1: Essai de croissance en pot avec du chou de Chine

<https://standards.iteh.ai/catalog/standards/sist/3b36fe21-0ecc-4a8e-882f-3d3b6adb5799/sist-en-16086-1-2012>

Ta slovenski standard je istoveten z: EN 16086-1:2011

ICS:

65.080

Gnojila

Fertilizers

SIST EN 16086-1:2012

en,fr,de

iTeh STANDARD PREVIEW
(standards.iteh.ai)

SIST EN 16086-1:2012

<https://standards.iteh.ai/catalog/standards/sist/3b36fe21-0ecc-4a8e-882f-3d3b6adb5799/sist-en-16086-1-2012>

EUROPEAN STANDARD

EN 16086-1

NORME EUROPÉENNE

EUROPÄISCHE NORM

November 2011

ICS 65.080

English Version

Soil improvers and growing media - Determination of plant response - Part 1: Pot growth test with Chinese cabbage

Amendements du sol et supports de culture -
Détermination de la réponse des plantes - Partie 1: Essai
de croissance en pot avec du chou de Chine

Bodenverbesserungsmittel und Kultursubstrate -
Bestimmung der Pflanzenverträglichkeit - Teil 1:
Wachstumstest mit Chinakohl im Topf

This European Standard was approved by CEN on 17 September 2011.

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. Up-to-date lists and bibliographical references concerning such national standards may be obtained on application to the CEN-CENELEC Management Centre or to any CEN member.

This European Standard exists 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.

CEN members are the national standards bodies of 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, Romania, Slovakia, Slovenia, Spain, Sweden, Switzerland and United Kingdom.

[SIST EN 16086-1:2012](https://standards.iteh.ai/catalog/standards/sist/3b36fe21-0ecc-4a8e-882f-3d3b6adb5799/sist-en-16086-1-2012)

<https://standards.iteh.ai/catalog/standards/sist/3b36fe21-0ecc-4a8e-882f-3d3b6adb5799/sist-en-16086-1-2012>



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

Management Centre: Avenue Marnix 17, B-1000 Brussels

Contents

Page

Foreword.....	4
1 Scope	5
2 Normative references	5
3 Terms and definitions	5
4 Principle of the plant growth response test.....	6
4.1 General.....	6
4.2 Pot experiment with direct use of the prepared sample.....	6
4.3 Pot experiment using an extract of the original sample.....	6
5 Choice of methodology.....	6
6 Pot experiment with direct use of the prepared sample.....	6
6.1 Materials	6
6.1.1 Water of class 3.....	6
6.1.2 Sphagnum peat.....	6
6.1.3 Fertilized and limed sphagnum peat.....	6
6.1.4 Ground limestone	7
6.1.5 Seeds of Chinese cabbage (<i>Brassica napa</i> , ssp. <i>pekinensis</i>).....	7
6.1.6 Seeds of Spring barley (<i>Hordeum vulgare</i>).....	7
6.2 Apparatus	7
6.3 Preparation of the sample.....	7
6.3.1 General preparation.....	7
6.3.2 Mixing procedure.....	8
6.4 Test procedure.....	10
6.5 Control sample.....	10
6.6 Validity of the test.....	10
6.7 Evaluation parameters	11
6.7.1 Germination rate (%)	11
6.7.2 Fresh weight.....	12
6.7.3 Growth inhibition	13
6.7.4 Abnormalities in comparison to the control	13
7 Pot experiment using an extract of the original sample.....	14
7.1 Materials	14
7.1.1 Water of class 3.....	14
7.1.2 Perlite	14
7.1.3 Seeds of Chinese cabbage (<i>Brassica napa</i> , ssp. <i>pekinensis</i>)	14
7.1.4 Seeds of Spring barley (<i>Hordeum vulgare</i>).....	14
7.1.5 Balanced nutrient solution (see B.1)	14
7.1.6 Nitric acid (HNO ₃), 1M.....	14
7.2 Apparatus	14
7.2.1 Sieve with 20 mm mesh size.....	14
7.2.2 Circular plant pot	14
7.2.3 Saucer	14
7.2.4 Bucket.....	14
7.2.5 Thin fleece or plastic sheet for covering the containers.....	15
7.2.6 Testing facility.....	15
7.2.7 Irrigation device for watering the pots	15
7.2.8 Analytical balance.....	15
7.3 Preparation of the sample.....	15
7.3.1 General preparation.....	15

7.3.2	Extraction procedure	15
7.4	Test procedure.....	15
7.5	Control sample	16
7.6	Validity of the test.....	16
7.7	Evaluation parameters	16
8	Precision.....	16
9	Test report.....	16
Annex A (informative) Validation		18
Annex B (normative) Nutrient supply and fist test		21
B.1	Composition of the nutrient solution	21
B.2	Possible adjustments of the nutrient supply during the test	22
B.2.1	Possible reasons for nutritional adjustments	22
B.2.2	Recommendations for nutritional adjustments	22
B.2.3	Supplement to the report.....	23
B.3	Fist test.....	24
Bibliography		25

iTeh STANDARD PREVIEW (standards.iteh.ai)

[SIST EN 16086-1:2012](https://standards.iteh.ai/catalog/standards/sist/3b36fe21-0ecc-4a8e-882f-3d3b6adb5799/sist-en-16086-1-2012)

<https://standards.iteh.ai/catalog/standards/sist/3b36fe21-0ecc-4a8e-882f-3d3b6adb5799/sist-en-16086-1-2012>

Foreword

This document (EN 16086-1:2011) has been prepared by Technical Committee CEN/TC 223 "Soil improvers and growing media", the secretariat of which is held by ASI.

This European Standard shall be given the status of a national standard, either by publication of an identical text or by endorsement, at the latest by May 2012, and conflicting national standards shall be withdrawn at the latest by May 2012.

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

SAFETY PRECAUTIONS – Care should be taken when handling samples that may contain sharps or is of a dusty nature.

According to the CEN/CENELEC Internal Regulations, the national standards organizations of the following countries are bound to implement this European Standard: 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, Romania, Slovakia, Slovenia, Spain, Sweden, Switzerland and the United Kingdom.

iTeh STANDARD PREVIEW
(standards.iteh.ai)

SIST EN 16086-1:2012

<https://standards.iteh.ai/catalog/standards/sist/3b36fe21-0ecc-4a8e-882f-3d3b6adb5799/sist-en-16086-1-2012>

1 Scope

This European Standard describes a method for the routine determination of the effect of soil improvers and growing media or constituents thereof on the growth of Chinese cabbage (and in certain cases spring barley).

This test may not be suitable for all growing media since the growing media characteristics (e.g. nutrient content) will vary according to target use and the product is not tested in accordance with the specified use and pack recommendations.

This test is not appropriate for the detection of nitrogen immobilization.

2 Normative references

The following referenced documents are indispensable for the application 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 13037, *Soil improvers and growing media – Determination of pH*

EN 13038, *Soil improvers and growing media – Determination of electrical conductivity*

EN 13040, *Soil improvers and growing media – Sample preparation for chemical and physical tests, determination of dry matter content, moisture content and laboratory compacted bulk density*

EN ISO 3696, *Water for analytical laboratory use – Specification and test methods (ISO 3696:1987)*

3 Terms and definitions

SIST EN 16086-1:2012

[https://standards.iteh.ai/catalog/standards/sist/3b36fe21-0ecc-4a8e-882f-](https://standards.iteh.ai/catalog/standards/sist/3b36fe21-0ecc-4a8e-882f-3d3b6adb5799/sist-en-16086-1-2012)

[3d3b6adb5799/sist-en-16086-1-2012](https://standards.iteh.ai/catalog/standards/sist/3b36fe21-0ecc-4a8e-882f-3d3b6adb5799/sist-en-16086-1-2012)

For the purposes of this document, the following terms and definitions apply.

3.1

plant response

variation in plant germination and/or growth when sown and grown in a growing medium, soil improver or constituent thereof or in an extract obtained from these materials

Factors causing negative plant growth cannot be identified nor quantified by applying this method.

3.2

prepared sample

portion of the laboratory sample, undiluted or diluted with sphagnum peat at given ratios, fertilized and limed as required

EN 16086-1:2011 (E)**4 Principle of the plant growth response test****4.1 General**

Depending on the material to be tested, one of the two methods described in this standard shall be used.

4.2 Pot experiment with direct use of the prepared sample

Sowing a defined quantity of Chinese cabbage into pots containing the prepared sample, cultivating under controlled conditions for a defined period of time and evaluating the plant response by determining the germination rate, fresh weight, abnormalities and overall plant growth.

If the presence of graminaceous herbicides is suspected, Spring barley shall be used in addition to Chinese cabbage. For testing of other specific effects, the use of additional plant species (for example lettuce) can be considered.

4.3 Pot experiment using an extract of the original sample

Mixing the original sample with nutrient solution as an extractant, soaking for 4 h at ambient temperature and collecting the freely available nutrient solution. Filling pots with perlite saturated with the extract and continuing as described under 4.2, irrigating during the test period with a fixed quantity of the extract and afterwards water.

If the presence of graminaceous herbicides is suspected, Spring barley shall be used in addition to Chinese cabbage. For testing of other specific effects, the use of additional plant species (for example lettuce) can be considered.

STANDARD PREVIEW
(standards.iteh.ai)

[SIST EN 16086-1:2012](#)

5 Choice of methodology

standards.iteh.ai/catalog/standards/sist/3b36fe21-0ecc-4a8e-882f-3d3b6adb5799/sist-en-16086-1-2012

For most materials, the pot growth test can be carried out as described in Clause 6. However, for coarse materials such as bark, expanded clay, lava, mineral wool, perlite, polyurethane and pumice with an inherently low water holding capacity which are used as growing media without amendment, this procedure is unsuitable and the extract method described in Clause 7 shall be adopted.

6 Pot experiment with direct use of the prepared sample**6.1 Materials****6.1.1 Water of class 3**

According to EN ISO 3696.

6.1.2 Sphagnum peat

Sphagnum peat with a degree of humification of H3 – H5 according to von Post scale, having a pH measured according to EN 13037 of between 3,0 and 4,5, an EC measured according to EN 13038 of between 1 mS m⁻¹ and 5 mS m⁻¹, a particle size of < 10 mm and to which neither lime nor fertilizer has been added.

6.1.3 Fertilized and limed sphagnum peat

Sphagnum peat (see 6.1.2), having a pH measured according to EN 13037 adjusted using ground limestone (see 6.1.4) to a range between 5,5 and 6,5, fertilized with a water soluble “complete” fertilizer with essential

micronutrients, added at a rate to supply $(225 \pm 25) \text{ mg N} \cdot \text{l}^{-1}$, (for example $1,5 \text{ g} \cdot \text{l}^{-1}$ water soluble complete fertilizer N : P_2O_5 : $\text{K}_2\text{O} - 15 : 10 : 20$), (see B.1).

6.1.4 Ground limestone

Finely ground limestone, containing at least 5 % MgCO_3 , having a particle size less than 1 mm and a moisture content of less than 1 % m/m.

6.1.5 Seeds of Chinese cabbage (*Brassica napa*, ssp. *pekinensis*)

Specified germination capacity ≥ 95 %.

6.1.6 Seeds of Spring barley (*Hordeum vulgare*)

Specified germination capacity ≥ 95 %.

6.2 Apparatus

6.2.1 Sieve with 20 mm mesh size

6.2.2 Sieve with 5 mm mesh size

6.2.3 Circular plant pot

Upper diameter $(12 \pm 0,5) \text{ cm}$, height between 8,5 cm and 9,0 cm, volume between 650 ml and 700 ml, perforated bottom to provide drainage (for example plastic pot used in horticulture).

6.2.4 Saucer

Saucer capable of catching all surplus water from the plant container after overhead watering.

6.2.5 Thin fleece or plastic sheet for covering the containers

6.2.6 Testing facility

Testing facility capable of maintaining and monitoring the temperature and light intensity specified in 6.4 such as a greenhouse or plant growth room.

6.2.7 Irrigation device for watering the pots

For example watering can, greenhouse watering hose

6.2.8 Analytical balance

Accuracy 0,01 g, capacity 500 g.

6.3 Preparation of the sample

6.3.1 General preparation

Pass the sample through a 20 mm sieve (see 6.2.1). Any foreign material such as plastic, metal or glass retained on the sieve shall be removed and noted. Other material that is retained on the sieve and which is an intrinsic part of the sample shall be physically reduced to parts of similar size as few times as are necessary to permit the entire sample to pass through the sieve. Fibrous materials i.e. coir fibres and straw shall be cut to a length $\leq 20 \text{ mm}$ by using scissors. Thoroughly mix the laboratory sample with the broken particles that had been retained on the sieve taking care to minimise physical damage to the sample as a whole. Transportation

EN 16086-1:2011 (E)

and possible storage of the samples shall be done in accordance with EN 13040, using food grade polyethylene bags.

6.3.2 Mixing procedure

Before mixing, the laboratory compacted bulk density shall be measured (according to EN 13040).

To produce the prepared sample, the material prepared as described in 6.3.1 is thoroughly mixed with sphagnum peat (see 6.1.2) on a volume/volume – basis as given in Table 1. The pH according to EN 13037 is ideally within the range between 5,5 and 6,5. If it is below, the pH shall be adjusted by adding limestone (see 6.1.4). If it is above, the pH shall be noted.

Additionally, a water soluble complete fertilizer with essential micronutrients, added at a rate to supply $(225 \pm 25) \text{ mg N} \cdot \text{l}^{-1}$ (for example $1,5 \text{ g} \cdot \text{l}^{-1}$ water soluble complete fertilizer N : P₂O₅ : K₂O – 15 : 10 : 20) (see B.1) is added to one litre of prepared sample (according to EN 13040).

The dilution ratios in Table 1 are based on horticultural practice in the usage of growing media, growing media constituents, soil improvers and soil improver constituents. In general, it is sufficient to carry out the test using the highest proportion of test material. The second dilution ratio may be helpful for further judging plant response.

If required (for example to fulfil certain quality certification requirements or legislation), materials can be tested with other dilution ratios than mentioned in Table 1 or without dilution. It might also be necessary to apply further nutritional adjustments, cases are described in B.2. Any adjustments shall be reported.

iTeh STANDARD PREVIEW
(standards.iteh.ai)

SIST EN 16086-1:2012

<https://standards.iteh.ai/catalog/standards/sist/3b36fe21-0ecc-4a8e-882f-3d3b6adb5799/sist-en-16086-1-2012>

Table 1 — Dilution ratios for test materials (growing media and constituents thereof; soil improvers and constituents thereof), using sphagnum peat (see 6.1.2) as the dilution material for pot growth tests with Chinese cabbage

Test material	Ratio (V/V) of test material to sphagnum peat to obtain the prepared sample ^a	
Growing media		
All kinds (except pre-shaped growing media and roof-garden media)	100 : 0	
Organic materials		
	obligatory	optional
Bark (uncomposted)	50 : 50	25 : 75
Brown coal (lignite)	50 : 50	25 : 75
Cocoa hulls	50 : 50	25 : 75
Coir pith	100 : 0	50 : 50
Coir fibres	50 : 50	25 : 75
Coir chips	50 : 50	25 : 75
Composts made of material such as biodegradable waste, bark, wood, straw, manure	50 : 50	25 : 75
Forest litter	50 : 50	25 : 75
Manure	25 : 75	10 : 90
Peat (any type)	100 : 0	50 : 50
Rice hulls	50 : 50	25 : 75
Solid digestate	20 : 80	10 : 90
Spent mushroom casing soil	25 : 75	10 : 90
Straw	50 : 50	25 : 75
Wood fibres	50 : 50	25 : 75
Wood chips	50 : 50	25 : 75
Wood shavings	50 : 50	25 : 75
Mineral materials		
Clay	25 : 75	10 : 90
Expanded clay (also broken)	50 : 50	25 : 75
Lava	50 : 50	25 : 75
Mineral wool flakes	50 : 50	25 : 75
Perlite (expanded)	50 : 50	25 : 75
Pumice	50 : 50	25 : 75
Sand	50 : 50	25 : 75
Vermiculite	50 : 50	25 : 75
Synthetic-organic materials (plastics)		
Expanded polystyrene flakes (styrofoam), urea-formaldehyde foam resins, etc.	50 : 50	25 : 75
NOTE Non-listed materials may also be tested; the dilution ratio(s) for non-listed materials may be chosen by analogy with similar product groups listed in Table 1.		
^a To obtain the required quantity of test material and sphagnum peat for example at a ratio of 25 % (V/V) : 75 % (V/V), take – for example – one litre of test material and three litres of sphagnum peat. The laboratory compacted bulk density of the materials according to EN 13040 shall be the basis.		