



# SLOVENSKI STANDARD SIST EN ISO 21479:2020

01-november-2020

---

**Kakovost tal - Določanje učinkov onesnaževal na floro tal - Sestava maščobnih kislin v listih rastlin za oceno kakovosti tal (ISO 21479:2019)**

Soil quality - Determination of the effects of pollutants on soil flora - Leaf fatty acid composition of plants to assess soil quality (ISO 21479:2019)

Bodenbeschaffenheit - Bestimmung der Wirkungen von Schadstoffen auf die Bodenflora - Fettsäurezusammensetzung in Blättern zur Beurteilung der Bodenbeschaffenheit (ISO 21479:2019)

(standards.iteh.ai)

Qualité du sol - Détermination des effets des polluants sur la flore du sol - Composition en acides gras foliaires des plantes utilisées pour évaluer la qualité du sol (ISO 21479:2019)

<https://standards.iteh.ai/catalog/standards/sist/f72a4fe-d530-4b52-a72d-723b6278ae33/sist-en-iso-21479-2020>

**Ta slovenski standard je istoveten z: EN ISO 21479:2020**

---

**ICS:**

13.080.30      Biološke lastnosti tal      Biological properties of soils

**SIST EN ISO 21479:2020**

**en,fr,de**

**iTeh STANDARD PREVIEW**  
**(standards.iteh.ai)**

[SIST EN ISO 21479:2020](https://standards.iteh.ai/catalog/standards/sist/ff72a4fe-d530-4b52-a72d-723b6278ae33/sist-en-iso-21479-2020)

<https://standards.iteh.ai/catalog/standards/sist/ff72a4fe-d530-4b52-a72d-723b6278ae33/sist-en-iso-21479-2020>

EUROPEAN STANDARD

EN ISO 21479

NORME EUROPÉENNE

EUROPÄISCHE NORM

May 2020

ICS 13.080.30

English Version

## Soil quality - Determination of the effects of pollutants on soil flora - Leaf fatty acid composition of plants to assess soil quality (ISO 21479:2019)

Qualité du sol - Détermination des effets des polluants sur la flore du sol - Composition en acides gras foliaires des plantes utilisées pour évaluer la qualité du sol (ISO 21479:2019)

Bodenbeschaffenheit - Bestimmung der Wirkungen von Schadstoffen auf die Bodenflora - Zusammensetzung von Fettsäuren in Blättern zur Beurteilung der Bodenbeschaffenheit (ISO 21479:2019)

This European Standard was approved by CEN on 13 April 2020.

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.

(standards.iteh.ai)

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.

<https://standards.iteh.ai/catalog/standards/sist/ff72a4fe-d530-4b52-a72d-7801a7801a78>

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, Republic of North Macedonia, Romania, Serbia, Slovakia, Slovenia, Spain, Sweden, Switzerland, Turkey and United Kingdom.



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

CEN-CENELEC Management Centre: Rue de la Science 23, B-1040 Brussels

<b>Contents</b>	<b>Page</b>
<b>European foreword.....</b>	<b>3</b>

**iTeh STANDARD PREVIEW**  
**(standards.iteh.ai)**

[SIST EN ISO 21479:2020](https://standards.iteh.ai/catalog/standards/sist/ff72a4fe-d530-4b52-a72d-723b6278ae33/sist-en-iso-21479-2020)  
<https://standards.iteh.ai/catalog/standards/sist/ff72a4fe-d530-4b52-a72d-723b6278ae33/sist-en-iso-21479-2020>

## European foreword

The text of ISO 21479:2019 has been prepared by Technical Committee ISO/TC 190 "Soil Quality" of the International Organization for Standardization (ISO) and has been taken over as EN ISO 21479:2020 by Technical Committee CEN/TC 444 "Environmental characterization of solid matrices" the secretariat of which is held by NEN.

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 November 2020, and conflicting national standards shall be withdrawn at the latest by November 2020.

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.

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, Republic of North Macedonia, Romania, Serbia, Slovakia, Slovenia, Spain, Sweden, Switzerland, Turkey and the United Kingdom.

## **iTeh STANDARD PREVIEW** **Endorsement notice** **(standards.iteh.ai)**

The text of ISO 21479:2019 has been approved by CEN as EN ISO 21479:2020 without any modification.

[SIST EN ISO 21479:2020](https://standards.iteh.ai/catalog/standards/sist/ff72a4fe-d530-4b52-a72d-723b6278ae33/sist-en-iso-21479-2020)

<https://standards.iteh.ai/catalog/standards/sist/ff72a4fe-d530-4b52-a72d-723b6278ae33/sist-en-iso-21479-2020>

**iTeh STANDARD PREVIEW**  
**(standards.iteh.ai)**

[SIST EN ISO 21479:2020](https://standards.iteh.ai/catalog/standards/sist/ff72a4fe-d530-4b52-a72d-723b6278ae33/sist-en-iso-21479-2020)

<https://standards.iteh.ai/catalog/standards/sist/ff72a4fe-d530-4b52-a72d-723b6278ae33/sist-en-iso-21479-2020>

INTERNATIONAL  
STANDARD

ISO  
21479

First edition  
2019-06

---

---

**Soil quality — Determination of the  
effects of pollutants on soil flora —  
Leaf fatty acid composition of plants  
used to assess soil quality**

*Qualité du sol — Détermination des effets des polluants sur la flore du  
sol — Composition en acides gras foliaires des plantes utilisées pour  
évaluer la qualité du sol*

iTeh STANDARD PREVIEW  
(standards.iteh.ai)

[SIST EN ISO 21479:2020](https://standards.iteh.ai/catalog/standards/sist/ff72a4fe-d530-4b52-a72d-723b6278ae33/sist-en-iso-21479-2020)

<https://standards.iteh.ai/catalog/standards/sist/ff72a4fe-d530-4b52-a72d-723b6278ae33/sist-en-iso-21479-2020>



Reference number  
ISO 21479:2019(E)

© ISO 2019

## iTeh STANDARD PREVIEW (standards.iteh.ai)

SIST EN ISO 21479:2020

<https://standards.iteh.ai/catalog/standards/sist/ff72a4fe-d530-4b52-a72d-723b6278ae33/sist-en-iso-21479-2020>



### **COPYRIGHT PROTECTED DOCUMENT**

© ISO 2019

All rights reserved. Unless otherwise specified, or required in the context of its implementation, no part of this publication may be reproduced or utilized otherwise in any form or by any means, electronic or mechanical, including photocopying, or posting on the internet or an intranet, without prior written permission. Permission can be requested from either ISO at the address below or ISO's member body in the country of the requester.

ISO copyright office  
CP 401 • Ch. de Blandonnet 8  
CH-1214 Vernier, Geneva  
Phone: +41 22 749 01 11  
Fax: +41 22 749 09 47  
Email: [copyright@iso.org](mailto:copyright@iso.org)  
Website: [www.iso.org](http://www.iso.org)

Published in Switzerland



# Contents

Page

Foreword.....	iv
Introduction.....	v
<b>1 Scope</b> .....	<b>1</b>
<b>2 Normative references</b> .....	<b>1</b>
<b>3 Terms, definitions and abbreviated terms</b> .....	<b>1</b>
3.1 Terms and definitions.....	1
3.2 Abbreviated terms.....	2
<b>4 Principle</b> .....	<b>2</b>
<b>5 Apparatus and reagents</b> .....	<b>2</b>
5.1 Apparatus.....	2
5.2 Reagents.....	3
<b>6 Sampling strategies</b> .....	<b>3</b>
<b>7 Sampling of leaf tissues</b> .....	<b>3</b>
<b>8 Obtaining, extraction and analyses of FAMES</b> .....	<b>4</b>
8.1 Contamination control.....	4
8.2 Obtaining and extraction of FAMES from plant leaves.....	4
8.3 Analysis of FAMES.....	4
<b>9 Test report</b> .....	<b>6</b>
9.1 A reference to this document, i.e. ISO 21479.....	6
9.2 Description of the site and areas analysed.....	6
9.3 Leaf sampling.....	6
9.4 Fatty acid composition.....	6
9.5 Conclusion.....	6
<b>Annex A (informative) Results of the ring test</b> .....	<b>7</b>
<b>Annex B (informative) Assessment of soil quality by determining the Omega-3 index of <i>Lactuca sativa</i> seedlings grown ex situ under controlled conditions</b> .....	<b>14</b>
<b>Annex C (informative) Plant species previously successfully used to assess soils of contaminated sites (organic and/or metals)</b> .....	<b>16</b>
<b>Annex D (informative) Variation of the Omega-3 index as function of harvest time, plant size and leaf development</b> .....	<b>17</b>
<b>Annex E (informative) Effect of the quantity of foliar tissues on the FAMES composition</b> .....	<b>19</b>
<b>Annex F (informative) Example of chromatogram obtained after the FAMES analysis of foliar tissues</b> .....	<b>20</b>
<b>Annex G (informative) Recommended mathematical method to rate soils of areas when some sampled plant species are not found in all areas</b> .....	<b>21</b>
<b>Bibliography</b> .....	<b>23</b>

## ISO 21479:2019(E)

## Foreword

ISO (the International Organization for Standardization) is a worldwide federation of national standards bodies (ISO member bodies). The work of preparing International Standards is normally carried out through ISO technical committees. Each member body interested in a subject for which a technical committee has been established has the right to be represented on that committee. International organizations, governmental and non-governmental, in liaison with ISO, also take part in the work. ISO collaborates closely with the International Electrotechnical Commission (IEC) on all matters of electrotechnical standardization.

The procedures used to develop this document and those intended for its further maintenance are described in the ISO/IEC Directives, Part 1. In particular the different approval criteria needed for the different types of ISO documents should be noted. This document was drafted in accordance with the editorial rules of the ISO/IEC Directives, Part 2 (see [www.iso.org/directives](http://www.iso.org/directives)).

Attention is drawn to the possibility that some of the elements of this document may be the subject of patent rights. ISO shall not be held responsible for identifying any or all such patent rights. Details of any patent rights identified during the development of the document will be in the Introduction and/or on the ISO list of patent declarations received (see [www.iso.org/patents](http://www.iso.org/patents)).

Any trade name used in this document is information given for the convenience of users and does not constitute an endorsement.

For an explanation on the voluntary nature of standards, the meaning of ISO specific terms and expressions related to conformity assessment, as well as information about ISO's adherence to the World Trade Organization (WTO) principles in the Technical Barriers to Trade (TBT) see the following URL: [www.iso.org/iso/foreword.html](http://www.iso.org/iso/foreword.html). (standards.iteh.ai)

This document was prepared by Technical Committee ISO/TC 190, *Soil quality*, Subcommittee SC 4, *Biological characterization*.

<https://standards.iteh.ai/catalog/standards/sist/ff72a4fe-d530-4b52-a72d-7731c6580000/iso-draft-21479-2020>

Any feedback or questions on this document should be directed to the user's national standards body. A complete listing of these bodies can be found at [www.iso.org/members.html](http://www.iso.org/members.html).

## Introduction

Among the more than 150 ISO standards on soil quality that have been developed, less than 40 address living organisms, and among them only five address higher plants. This is despite the importance of monitoring the adverse effects of soil quality on living organisms.

One of these five standards addresses genotoxicity<sup>[1]</sup>, and four of them address emergence and/or growth inhibition<sup>[2-5]</sup>. It therefore appears that these International Standards are focused either on a very specific effect (genotoxicity), or on effects great enough to induce developmental (and, therefore, visible) phenotypes (emergence or growth inhibition of young seedlings) in soils sampled in the field. Hence, more sensitive/earlier bio-indicators of the adverse effects of pollutants on plants, such as the “Omega-3 index”, are needed.

The assessment of soil contaminant effects by the Omega-3 index is based on the leaf fatty acid composition of angiosperm species grown in sites of concern. The use of the Omega-3 index has proven to be appropriate for highlighting the presence of metallic and organic contaminants (herbicides, etc.) in the soils. With this aim, physical and chemical properties (pH, N/P/K content) of soils should also be determined because plant fatty acid composition may vary as a function of nutrient content<sup>[12]</sup> and pH may influence chemical compound bioavailability. It should be noted that this bio-indicator has proved to be more sensitive (i.e. responding to lower doses of contaminants) than the biometric parameters of rate of germination and biomass<sup>[6][14]</sup>. Hence, this makes it possible to gain evidence of adverse effects of soils on plants that could not be highlighted by the rate of germination or biomass. Additionally, for in situ assessment purposes, it can be difficult to observe evident effects on the rate of germination and/or biomass of plants.

It should be noted that from a practical point of view, especially with plant species harvested in the field, and in comparison with other bio-indicators, the Omega-3 index presents several advantages.

- For fatty acid analysis, only 20 mg to 50 mg of fresh leaf tissues per sample are needed. Hence, this is not destructive for plants, and there is not a problem with getting enough tissues of one species from a given area.
- Samples of plant tissues can be stored in methanol for several days at room temperature prior to analyses.
- It is not necessary to find a particular species at a site, and that a priori any species (often chosen among the most representative) can be sampled ([Clause 6](#)).

The results of a ring test performed by six individual laboratories to assess the reproducibility and the repeatability of the method are shown in [Annex A](#). The results obtained by the same investigator with the same sample and the same measuring instrument over a short period of time are shown in [Annex B](#).

**iTeh STANDARD PREVIEW**  
**(standards.iteh.ai)**

SIST EN ISO 21479:2020

<https://standards.iteh.ai/catalog/standards/sist/ff72a4fe-d530-4b52-a72d-723b6278ae33/sist-en-iso-21479-2020>