

STN	Kvalita pôdy Odber vzoriek pôdných bezstavovcov Časť 1: Ručné triedenie a extrakcia dážďoviek (ISO 23611-1: 2018)	STN EN ISO 23611-1 46 5270
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Soil quality - Sampling of soil invertebrates - Part 1: Hand-sorting and extraction of earthworms (ISO 23611-1:2018)

Táto norma obsahuje anglickú verziu európskej normy.
This standard includes the English version of the European Standard.

Táto norma bola oznámená vo Vestníku ÚNMS SR č. 12/18

Obsahuje: EN ISO 23611-1:2018, ISO 23611-1:2018

Oznámením tejto normy sa ruší
STN EN ISO 23611-1 (46 5270) z novembra 2011

127685

EUROPEAN STANDARD
NORME EUROPÉENNE
EUROPÄISCHE NORM

EN ISO 23611-1

July 2018

ICS 13.080.30; 13.080.05

Supersedes EN ISO 23611-1:2011

English Version

Soil quality - Sampling of soil invertebrates - Part 1: Hand-sorting and extraction of earthworms (ISO 23611-1:2018)

Qualité du sol - Prélèvement des invertébrés du sol -
Partie 1: Tri manuel et extraction des vers de terre (ISO
23611-1:2018)

Bodenbeschaffenheit - Probenahme von Wirbellosen
im Boden - Teil 1: Handauslese und Extraktion von
Regenwürmern (ISO 23611-1:2018)

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EN ISO 23611-1:2018 (E)

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European foreword

This document (EN ISO 23611-1:2018) has been prepared by Technical Committee ISO/TC 190 "Soil quality" in collaboration with Technical Committee CEN/TC 444 "Test methods for 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of an identical text or by endorsement, at the latest by January 2019, and conflicting national standards shall be withdrawn at the latest by January 2019.

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Endorsement notice

The text of ISO 23611-1:2018 has been approved by CEN as EN ISO 23611-1:2018 without any modification.

INTERNATIONAL STANDARD

ISO
23611-1

Second edition
2018-05

Soil quality — Sampling of soil invertebrates —

Part 1: Hand-sorting and extraction of earthworms

*Qualité du sol — Prélèvement des invertébrés du sol —
Partie 1: Tri manuel et extraction des vers de terre*



Reference number
ISO 23611-1:2018(E)

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Published in Switzerland

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ISO 23611-1:2018(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).

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For an explanation on 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.

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

This second edition cancels and replaces the first edition (ISO 23611-1:2006), which has been technically revised. The main changes are:

- the use of a new chemical extraction compound, AITC (allyl-isothiocyanate), instead of formalin;
- the addition of examples of earthworm monitoring programmes (including presentation of their results) as an informative [Annex E](#).

A list of all parts in the ISO 23611 series can be found on the ISO website.

Introduction

This document has been drawn up since there is a growing need for the standardization of terrestrial zoological field methods. Such methods, mainly covering the sampling, extraction and handling of soil invertebrates, are necessary for the following purposes:

- biological classification of soils including soil quality assessment[25][31][39];
- terrestrial bio-indication and long-term monitoring[11][14][33];
- evaluation of the effects of chemicals on soil animals (ISO 11268-3).

Data for these purposes are gained by standardized methods since they can form the basis for far-reaching decisions (e.g. whether a given site should be remediated or not). In fact, the lack of such standardised methods is one of the most important reasons why bio-classification and bio-assessment in terrestrial (i.e. soil) habitats has so far relatively rarely been used in comparison to aquatic sites.

Since it is neither possible nor useful to standardize methods for all soil organisms, the most important ones have been selected. In this document sampling of earthworms is described.

Originally, the methods described in this document were developed for taxonomical and ecological studies, investigating the role of earthworms in various soil ecosystems. These animals are without doubt the most important soil invertebrates in temperate regions and, to a lesser extent, in boreal and tropical soils[30][16][18]. Since Darwin (1881) (see Reference [8]), their influence on soil structure (e.g. aeration, water holding capacity) and soil functions like litter decomposition and nutrient cycling is well-known[10]. Due to their often very high biomass they are also important in many terrestrial food-webs.

In the previous version of this document the chemical formalin was recommended as extraction fluid. However, within the last years evidence increased that formalin does have critical properties, mainly in terms of human toxicity. In December 2012, the Risk Assessment Committee (RAC) of the European Chemicals Agency (ECHA) stated that there is sufficient scientific evidence to classify this chemical as “probably carcinogenic for humans (Category 1b). In addition, negative effects on non-target organisms (including soil microorganisms, mesofauna and plants) have been reported (e.g. see Reference [7]). Therefore, this substance has been replaced.

Due to the growing reservations against the use of formalin, several alternatives have been studied. In Reference [40] allyl isothiocyanate (AITC) was tested for its effectiveness as a chemical expellant for sampling earthworms. AITC is a natural breakdown product of glucosinolates in many Cruciferae, i.e. it is the component imparting the sharp taste of mustard. According to the European Chemical Agency (ECHA), there is no concern regarding its use under outdoor conditions.

Over the last years, some studies have been performed in which the extraction efficiency of formalin and AITC were compared at the same sites and dates. According to Reference [22] no differences were found in numbers or biomass of earthworms extracted at crop sites when using either formalin or AITC as extractant. In a recent unpublished review (see Reference [28]) no significant differences were reported in earthworm numbers/biomass when comparing the efficiency of the two extraction chemicals. Also, no interaction was found on the sampling sites between the extractant and the site, indicating that no site-specific differences were observed in extraction efficiency of the extractants. When plotting the correlation between worm numbers extracted with AITC versus formalin in a Bland-Altman graph (a common way to compare a gold-standard method to an alternative method in the medical sciences), no significant bias of the AITC method as compared to the formalin method was found, indicating the similarity / exchangeability of the two methods.

Basic information on the ecology of earthworms and their use as bioindicators in the terrestrial environment can be found in the references listed in the Bibliography.

Soil quality — Sampling of soil invertebrates —

Part 1:

Hand-sorting and extraction of earthworms

1 Scope

This document specifies a method for sampling and handling earthworms from field soils as a prerequisite for using these animals as bioindicators (e.g. to assess the quality of a soil as a habitat for organisms).

This document applies to all terrestrial biotopes in which earthworms occur. The sampling design of field studies in general is given in ISO 18400-101 and guidance on the determination of effects of pollutants on earthworms in field situations is given in ISO 11268-3. These aspects can vary according to the national requirements or the climatic/regional conditions of the site to be sampled (see also [Annex C](#)).

This document is not applicable for semi-terrestrial soils and it can be difficult to use under extreme climatic or geographical conditions (e.g. in high mountains). Methods for some other soil organism groups, such as collembolans, are covered in other parts of ISO 23611.

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.

ISO 10390, *Soil quality — Determination of pH*

ISO 10694, *Soil quality — Determination of organic and total carbon after dry combustion (elementary analysis)*

ISO 11260, *Soil quality — Determination of effective cation exchange capacity and base saturation level using barium chloride solution*

ISO 11277, *Soil quality — Determination of particle size distribution in mineral soil material — Method by sieving and sedimentation*

ISO 11465, *Soil quality — Determination of dry matter and water content on a mass basis — Gravimetric method*

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