Bin2Bean

From Bio-waste to soil

D3.2 – Testing methods

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Authors	Liisa Maunuksela and Elli Auvinen
Contributors	Mirja Leivuori, Aija Pelkonen, Mikko Lehtonen, Riitta Koivikko, and Markku Ilmakunnas
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D3.2 Testing methods

Author: Liisa Maunuksela and Elli Auvinen (Ruokavirasto)

Contributors: Aija Pelkonen, Mikko Lehtonen (RV), Mirja Leivuori, Riitta Koivikko, and Markku Ilmakunnas (Syke)

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Project partners

Contacts

Sara Daniotti (Project coordinator):
sara.daniotti@italbiotec.it

Liisa Maunuksela and Elli Auvinen (authors):
liisa.maunuksela@ruokavirasto.fi; elli.auvinen@ruokavirasto.fi

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List of Acronyms

CEN - European Committee for Standardization
DM – Dry matter
EC – European Commission
EN – European Norm
ILC – Interlaboratory Comparison
LL – Living Lab
OUR –Oxygen uptake rate
RV – Ruokavirasto/Finnish Food Authority
SI – Soil improver
TOC- Total organic carbon
TS – Technical specification

Executive Summary

Harmonised and reliable analytical methods are essential for evaluating the safety and quality of biowaste-based soil improvers, especially as new EU reference standards are being prepared for this material group. To gain practical information on the performance of current analytical procedures, an interlaboratory comparison (ILC) on biowaste-based compost quality parameters was carried out.

Fourteen laboratories from seven EU countries participated in the ILC, which covered pH, dry matter, bulk density, electrical conductivity, impurities, total nitrogen, organic matter, total organic carbon and stability (oxygen uptake rate, OUR). Samples included two different batches of biowaste-based compost.

Overall, the results for most measured parameters were consistent across laboratories, and the majority of results fell within the satisfactory range. For more challenging parameters, impurities and stability, the results identified two main sources of variability. The first was related to the intrinsic properties of the biowaste-based composts, which are inherently heterogeneous materials. This was particularly evident in the impurity determinations, where the uneven distribution of particles such as glass and metal caused variation in the results. Stability (OUR) measurements were likely also influenced by material properties, as microbial activity is sensitive to temperature changes and storage conditions.

The second source of variability arose from procedural differences between laboratories. For impurity analysis, the main procedural factor was the size of the test portion, which influences how well the heterogeneous material is represented. For stability (OUR), differences were reported in premixing time, measurement temperature and sample amount. In addition, the calculation part of the OUR method is complex and requires careful application.

These findings reveal the analytical steps that most strongly influence reproducibility in compost quality assessment. The results provide practical evidence of where current methods perform well, where they are most sensitive to sample and procedural variation, and which method steps require particular attention when implementing the forthcoming EU reference standards or aligning existing in-house methods with them.

1. Background

To validate the safety and quality of soil improvers (SI), e.g. solid compost and solid and liquid digestate, and to ensure that products fulfil national and EU criteria, testing methods and guidelines based on EN standards are necessary. To ensure reliable results, in addition to competent laboratory analysis and validated testing methodology, also standardized sampling and pretreatment protocols for SI are needed.

The general objective of this work package was to support the validation of SI from bio-waste, by improving their safety and performance. Providing guidelines, indicators and improved testing methods from bio-waste collection to SI production, SI composition and SI use.

The specific aim of this ILC was to provide information on the harmonization of standard testing methods for SI at the EU level and to offer laboratories guidance and information on the new EN standards. In addition, the ILC provided information on laboratories' competence and comparability with other EU laboratories and, when necessary, feedback for improving the testing methodology. ILC was arranged in accordance with the international standard ISO/IEC 17043 [1] and applying ISO 13528 [2] and IUPAC Technical report [3].

Finnish Food Authority (RV), in collaboration with Proftest Syke's proficiency testing services, organised this interlaboratory comparison (ILC) in October-November 2025 (B2B 12/2025) for laboratories that perform SI/compost quality parameter analyses. The measurands were chosen based on availability of standard methodology, feasibility regarding fresh sample storage and sending times, and relevance to the Bin2Bean project e.g. development of a scoring system. Measurands included in the ILC, and tested from two biowaste compost samples, were: pH, dry matter, bulk density, electrical conductivity, impurities, total nitrogen, organic matter, total organic carbon, and stability (oxygen uptake rate, OUR). After sending the guidelines and the testing methods via an information letter to the confirmed participant laboratories in autumn 2025, the same SI samples were sent to each laboratory.

Finnish Environment Institute (Syke) is the appointed National Reference Laboratory in the environmental sector in Finland. The duties of the reference laboratory include providing interlaboratory proficiency tests and other comparisons for analytical laboratories and other producers of environmental information. This interlaboratory comparison was carried out under the scope of the Syke reference laboratory and it provides an external quality evaluation between laboratory results, and mutual comparability of analytical reliability. This interlaboratory comparison is not included in the Proftest Syke accreditation scope (PT01, finas.fi/sites/en), however, its organisation follows the principles of accredited operations. Detailed information

can be obtained from the published Reports of the Finnish Environment Institute 7 | 2026, Interlaboratory comparison 12/2025, Analyses of biowaste compost quality parameters, http://hdl.handle.net/10138/628385 [4].

2. What is an interlaboratory comparison and how is it organized?

2.1 Purpose

In an ILC, laboratories analyze the same samples using the same methods. Results provided by the laboratories are compared and analyzed statistically in order to demonstrate consistency and reliability of the analysis. The purpose of an ILC is to provide information on the accuracy and repeatability of the methods included, which helps to develop common standards and improve quality of analytics. In addition, performance evaluation of the participant laboratories aids in promoting and marketing their competence (Figure 1).

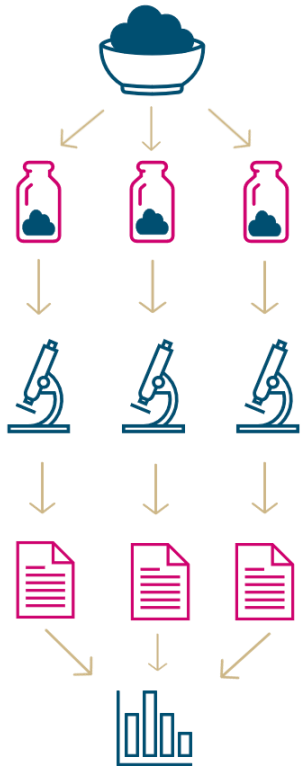


Figure 1. Workflow of the interlaboratory comparison.

2.2 Participants

To receive a sufficient amount of ILC participants, questionnaires, direct email requests and requests via the project LLs and Stakeholder forum were sent in spring 2025. The advantages of participation for the laboratories were described as:

- information and guidance on novel EU standards for analyzing soil improver (compost) safety and quality

- information and monitoring of laboratory performance by comparison with results of other laboratories
- information and results on competence that can be utilized within and outside the laboratory
- possibility to discover potential problems in performance and develop methodology further.

In addition, an announcement was published in spring 2025 on the RV web pages and the national reference laboratory newsletter. Even though the participation was free of charge, some laboratories were not able to attend e.g. due to lack of resources. Unfortunately, none of the LL laboratories registered as ILC participants, but ILC included laboratories from 2/3 of the LL counties.
In the end, a total of 14 laboratories took part in this ILC (Appendix 1), seven from Finland and seven from abroad (Figure 2). Five participants reported that they have an accredited quality management system based on ISO/IEC 17025, while the rest of the participants did not report their accreditation status. From one laboratory, two different units participated. Ten participants used accredited analytical methods for at least some of the measurements. For this ILC, the expert laboratory has codes 4 and 15 in the result tables.

Figure 2. ILC participant geographical distribution.

2.3 Samples, measurands and timetable

The sample matrices in this ILC consisted of biowaste composts of two different batches. Laboratories received both fresh and dried samples. Fresh samples were labeled as BioCom1 and BioCom2, while the corresponding dried samples were referred to as BioCom1_DG and BioCom2_DG. Samples for impurity analysis were labeled BioCom1_IMP and BioCom2_IMP. The following measurands were tested from the biowaste compost samples: pH, dry matter (DM), bulk density, electrical conductivity, impurities (IMP), total nitrogen (N_{tot}), organic matter, total organic carbon (TOC), and stability (oxygen uptake rate, OUR) (Figure 3). These measurands were chosen based on availability of standard methodology, feasibility regarding fresh sample storage and sending times, and relevance to the Bin2Bean project.

Figure 3. Examples of testing measurands including bulk density measurement (left) and stability (OUR) measurement (right).

The two different compost samples were collected by RV from a composting facility in Southern Finland (Figure 4). The sampling procedure was adapted from the principles of SFS-EN 12579 [5]. Each sample consisted of approximately 150 litres of material collected from fifteen sampling points. The material was thoroughly mixed and transported to the RV laboratory. The samples were pretreated following the main procedures of SFS-EN 13040 [6], including homogenising and sieving (<10 mm) [6]. The samples were then portioned into batches for participants. A subset was dried at 40 °C, sieved (<2 mm), and ground. All prepared samples were packed with cooling elements and shipped to the participating laboratories. The sample preparation is described in more detail in Appendix 2.

Figure 4. Compost sample collection and pretreatment in the laboratory.

The samples were delivered to the participants on 27 October 2025. Based on the reported information, most of the participants received the samples on 29 October 2025. The samples were requested to be measured as follows:

- pH and electrical conductivity: at the latest by 7 November 2025
- Other measurands: at the latest by 14 November 2025

The results were requested to be reported at the latest by 17 November 2025, and participants delivered them accordingly. The preliminary results report was delivered to the participants via ProftestWEB on 1 December 2025.

2.4 Homogeneity studies

The homogeneity of the samples was tested by repeating measurements on multiple subsamples at the RV laboratory for selected parameters. The data was evaluated using the procedures applied by Proftest Syke. Based on this assessment, the samples were considered sufficiently homogeneous for the ILC, although the impurity content was found to be non-homogeneous. More detailed information on homogeneity testing is provided in [4, Appendix 3].

2.5 Feedback from the interlaboratory comparison

Feedback was collected from the participants and the provider as part of the ILC and is presented in [4, Appendix 4].

2.6 Processing the data

2.6.1 Pretesting the data

The statistical pre-evaluation of the ILC data was carried out using established ILC procedures. The assessment included checking the distribution of the data, identifying potential outliers, and evaluating the consistency of replicate results. More detailed descriptions of the statistical methods are provided in [4].

2.6.2 Assigned values

Assigned values for the measurands were calculated from the results reported by the participants using the most appropriate statistical estimator (mean, median, or robust mean), selected according to the distribution and variability of each dataset. For measurands with high variability or a limited number of results, the assigned values were classified as informative only. The uncertainties of the assigned values were estimated using established ILC procedures. Detailed descriptions of the assigned values, their uncertainties, and the underlying statistical methods are provided in [4, Appendix 5].

2.6.3 Proficiency assessment procedure

The participants' performance in the ILC was evaluated using z-scores. The standard deviation for proficiency assessment was estimated based on the measurand concentration, the results of homogeneity test, the uncertainty of the assigned value, and expanded measurement uncertainties reported by the participants. For measurands with high variability or an insufficient number of results, no proficiency assessment was produced. The reliability of both the assigned values and the standard deviations used for proficiency assessment was checked according to standard statistical criteria. A detailed description of the proficiency assessment procedure and the applied criteria is provided in [4].

3. Results and conclusions

Detailed results were published in: "Reports of the Finnish Environment Institute 7 | 2026, Interlaboratory comparison 12/2025, Analyses of biowaste compost quality parameters", http://hdl.handle.net/10138/628385 [4]. Below is a summary of the main outcomes.

3.1 Results

The summary of the ILC results is presented in Table 1. Detailed result tables, participant-specific results, uncertainties, z-scores and related appendices are reported in [4].

Table 1. The summary of the results in the ILC.

Measurand	Sample	Unit	Assigned value	s_{rob} / *s* %	2 x s_{pt} %	n_{all}	Acc z %
Bulk density	BioCom1	g/l	549	4.3	10	13	85
	BioCom2	g/l	522	4.2	10	13	85
Conductivity 25	BioCom1	mS/m	331	11.1	20	13	85
	BioCom2	mS/m	357	4.9	15	13	85
Dry matter, DM	BioCom1	% by mass	48.6	1.3	6	14	100
	BioCom2	% by mass	51.4	1.9	6	14	100
Impurities	BioCom1_ Glass	g/kg DM	1.38	*69.1*	-	7	-
	BioCom1_ Metal	g/kg DM	0.17	*120.7*	-	7	-
	BioCom1_ Plastic	g/kg DM	1.90	83.0	-	7	-
	BioCom1_ Total	g/kg DM	2.80	86.2	-	7	-
	BioCom2_ Glass	g/kg DM	2.19	*70.2*	-	7	-
	BioCom2_ Metal	g/kg DM	0.46	*103.7*	-	7	-
	BioCom2_ Plastic	g/kg DM	1.30	69.5	-	7	-
	BioCom2_ Total	g/kg DM	4.40	73.4	-	7	-
N_{tot}	BioCom1_DG	g/kg DM	28.8	7.2	20	12	100
	BioCom2_DG	g/kg DM	29.8	7.5	20	12	100
Organic matter	BioCom1	% m/m DM	52.8	4.3	10	13	77
	BioCom2	% m/m DM	54.2	5.6	10	13	85
pH	BioCom1	pH unit	8.04	1.3	3.7	14	100
	BioCom2	pH unit	7.72	1.7	3.9	14	100
Stability	BioCom1	mmol O2/kg OM/h	3.69	*94.9*	-	4	-
	BioCom2	mmol O2/kg OM/h	2.09	*23.2*	-	4	-
TOC	BioCom1_DG	g/kg DM	284	8.5	15	10	100
	BioCom2_DG	g/kg DM	285	7.4	15	10	100

s_{rob} %: the robust standard deviation as percent, *s* %: the standard deviation as percent, $2 \times s_{pt}$ %: the standard deviation for proficiency assessment at the 95 % confidence level, n_{all}: the number of the participants, Acc z %: the share of results (%), where $|z| \leq 2$.

3.2 Analytical methods

The participants could use different analytical methods for the measurements in the ILC. Information on the analytical methods used by the participants was collected through a background survey and the detailed responses are presents in [4, Appendix 11]. The used analytical methods and results of the participants grouped by methods are shown in more detail in [4, Appendix 12].

3.2.1 Bulk density

Most of the participants (10) determined bulk density using the standard method EN 13040-1. Three participants reported the use of another method i.e. national EN 13040-1 version (2008), internal method based on EN 13040-1 or internal method.
Differences in the application of the method may have contributed to variation in the results. The standard includes steps such as compacting the subsample in a cylinder using a plunger of a specified mass for a specified time. EN 13040-1 also defines the criteria for the equipment used in the analysis. One participant, whose result deviated from the majority, did not report the duration for which the plunger weight was applied in the background survey.

3.2.2 Conductivity 25

Most of the participants (11) determined conductivity using the standard method EN 13038. Two participants reported the use of other methods, i.e. internal method based on EN 13040-1 or internal method. No specific observations were noted regarding the results for this measurand.

3.2.3 Dry matter, DM

Nine participants determined dry matter using the standard methods EN 13040-1. Five participants reported the use of other methods, i.e. standard method EN 13039, internal method based on EN 13040-1, national EN 13040-1 version (2008), in-house method or internal method. No specific observations were noted regarding the results for this measurand.

3.2.4 Impurities

Three to five participants determined impurities (glass, metal, plastic) using the technical specification CEN/TS 16202. One to two participants reported the use of other methods, i.e. internal method based on national version (2008) or internal method.
The observed variation in impurity results is primarily related to the heterogeneous distribution of the impurities within the material. Impurities such as glass or metal fragments occur sporadically and differ widely in size and mass, meaning they are not evenly distributed even if the bulk matrix appears homogenous. A random inclusion of a single large particle can substantially affect the measured impurity content, which may lead to differences between subsamples.
Subsample size also likely contributed to the observed variability. Participants reported using sample masses ranging from 50 g to 1000 g, and although results are expressed per kg of dry matter, smaller subsamples have a lower probability of capturing a representative assortment of impurity particles. Larger subsamples increase the likelihood of reflecting the impurity profile of the bulk material more

consistently. Differences in subsample mass may therefore have influenced comparability across laboratories.
The variation observed is consistent with the results of the Draft prEN 16202:2025 standardisation interlaboratory studies [8]. This alignment indicates that such variability is characteristic of impurity determinations in heterogeneous compost materials rather than specific to this study.

3.2.5 Total nitrogen, N_{tot}

Two of the participants determined total nitrogen using the standard method EN 13654-1 and four participants using the standard method EN 13654-2. Six participants reported the use of other methods i.e national EN 16168 (2012), internal method, internal method based on ISO 11261 (1995) and EN 16169 (2012) or Kjeldahl method. No specific observations were noted regarding the results for this measurand.

3.2.6 Organic matter

Most of the participants (10) determined organic matter using the standard method EN 13039. Three participants reported the use of other methods i.e. national EN 13040-1 version (2008), internal method based on EN 13039 or internal method. Two participants reported considerably lower organic matter results compared to the rest. One of these participants later indicated, that the result had been reported on a fresh-matter basis rather than on a dry-matter basis as requested. The other participant did not provide an explanation. Apart from these cases, the remaining results showed only minor variation, which may be attributed to the heterogeneous nature of the material, including the presence of inorganic particles such as rocks in subsamples.

3.2.7 pH

Most of the participants (12) determined pH using the standard method EN 13037. Two participants reported the use of other methods, i.e. internal method based on EN 13037 or internal method. No specific observations were noted regarding the results for this measurand.

3.2.8 Stability

Stability was tested by the oxygen uptake rate, OUR, using the standard method EN 16087-1. Four participants reported the results of the stability. Most of the participants reported significantly lower OUR values compared to the homogeneity study.
Several factors may have contributed to these differences. During transport, the samples were in contact with a frozen cold pack, which may have temporarily reduced microbial activity or affected temperature-sensitive microorganisms. Some participants also reported shorter premixing times (0–4 h) than specified in the standard method (4–8 h), which may have limited the reactivation of microbial

activity prior to measurement. Reported measurement temperatures varied between 20 °C and 30 °C, and lower temperatures are generally associated with lower OUR because microbial processes slow down as temperature decreases.
Some variation may also be linked to the manual selection of the linear portion of the measurement curve, which forms the basis for calculating the results. Although this step follows the guidance of the standard method, it relies on visual assessment, as no more objective or automated procedure is available for defining the linear region. In addition, the calculation of OUR results by each laboratory involves several sample-specific and instrument-specific parameters including bottle volume, the pressure drop and corresponding measurement time, and the concentrations of organic matter and dry matter. These parameters require precise and consistent application. As only four laboratories submitted OUR results, the stability comparison should be interpreted as indicative.

3.2.9 Total organic carbon, TOC

Two participants determined TOC using the method CEN/TS 17776. Eight participants reported the use of other methods i.e. national version EN 15936 (withdrawn, 2012) or EN 15936 (2022), internal method, EN 15936 (2022) and SFS-EN 13137 (withdrawn, 2001), EN ISO 15936A (2022), or internal method. No specific observations were noted regarding the results for this measurand.

3.3 Uncertainties of the reported results

The participants were required to report the expanded uncertainties (k=2) as a percentage. Six to eight of the participants reported the measurement uncertainty with at least some of their results. Information on the reported uncertainties, the approaches used for uncertainty evaluation and the summary of uncertainty data is presented in [4, Table 3 and Appendix 11].

4. Evaluation of the results

The performance evaluation of the participants was based on the z-scores, which were calculated using the assigned values and the standard deviation for proficiency assessment. More detailed information on the calculation of z-scores is provided in [4, Appendix 6].

Table 2. Assessment of the z and En scores.

Criteria for z-scores	Assessment
$\lvert z \rvert \leq 2.0$	Satisfactory
$2.0 < \lvert z \rvert < 3.0$	Questionable
$\lvert z \rvert \geq 3.0$	Unsatisfactory

In total, 93 % of the results were satisfactory when a total deviation of 0.3 pH units for pH values and 6–20 % for the other measurements from the assigned value was accepted [4, Appendix 9]. Five participants used accredited analytical methods at least for part of the measurands, and all those results (100 %) were satisfactory. The summary of the performance evaluation is presented in Table 5. Table 5 also depicts comparison to the previous ILC SIM 15/2018, where the same measurands, namely bulk density, conductivity, dry matter, organic matter and pH, were tested from compost [7].

Table 3. Summary of the performance evaluation in the ILC.

Sample	Satisfactory results (%)	Accepted deviation from the assigned value (%)	Remarks
BioCom1	89	3.7–20	Good performance. Stability was not evaluated (see 2.6.3). In the SIM 15/2018 the performance was satisfactory for 98 % of the results, when accepting deviation of 6.5-50 % from the assigned value [7].
BioCom1_DG	100	15 – 20	Excellent performance.
BioCom2	91	3.9 – 15	Very good performance. Stability was not evaluated (see 2.6.3). In the SIM 15/2018 the performance was satisfactory for 95 % of the results, when accepting deviation of 8.5-50 % from the assigned value [7].
BioCom2_DG	100	15 – 20	Excellent performance.

5. Summary and conclusions

Finnish Food Authority, in collaboration with Proftest Syke's proficiency testing services, organised an interlaboratory comparison (ILC) for laboratories that perform soil improver/compost quality parameter analyses. The following measurands were tested from two biowaste compost samples: pH, dry matter (DM), bulk density, electrical conductivity, impurities (IMP), total nitrogen (N_{tot}), organic matter, total organic carbon (TOC), and stability (oxygen uptake rate, OUR). A total of 14 laboratories participated in this interlaboratory comparison.

The robust mean, the mean, or the median of the results reported results by the participants was used as the assigned value for the measurands. The uncertainties of the assigned values were estimated at the 95 % confidence level (k=2) and they varied between 0.8 % and 6.2 %.

The performance evaluation was based on the z-scores**. In total, 93 % of the results were satisfactory** when total deviation of 0.3 pH units for pH values and 6–20 % for the other measurements from the assigned value was accepted at the 95 % confidence level. **Five participants used accredited analytical methods at least for a part of the measurements and all those results were satisfactory.**

Some of the measurands in this ILC, namely stability, organic matter and impurities, were also included in the Bin2Bean projects' further studies covering agronomic testing and scoring system development. Therefore, **results and reliability assessments from this ILC can be taken into account in further method usability evaluations.**

The compliance of products covered by the EU Fertilising Products Regulation (EU) 2019/1009 can be demonstrated using harmonised reference standard methods. At the time of the interlaboratory comparison, the new versions of these methods were still under development. [9]. Due to this, participating laboratories used earlier standard versions or validated in-house procedures. **The results indicate two main sources of variability**.

The first source relates to the **intrinsic properties of the biowaste-based composts**. These materials are naturally heterogeneous, which was evident in the impurity determinations. The uneven distribution of particles, such as glass and metal, affected strongly on the results depending on the test portion selected. The stability measurement was influenced by sample biological properties, as the OUR parameter is sensitive to temperature changes and requires sufficient time for microbial activity to recover before analysis.

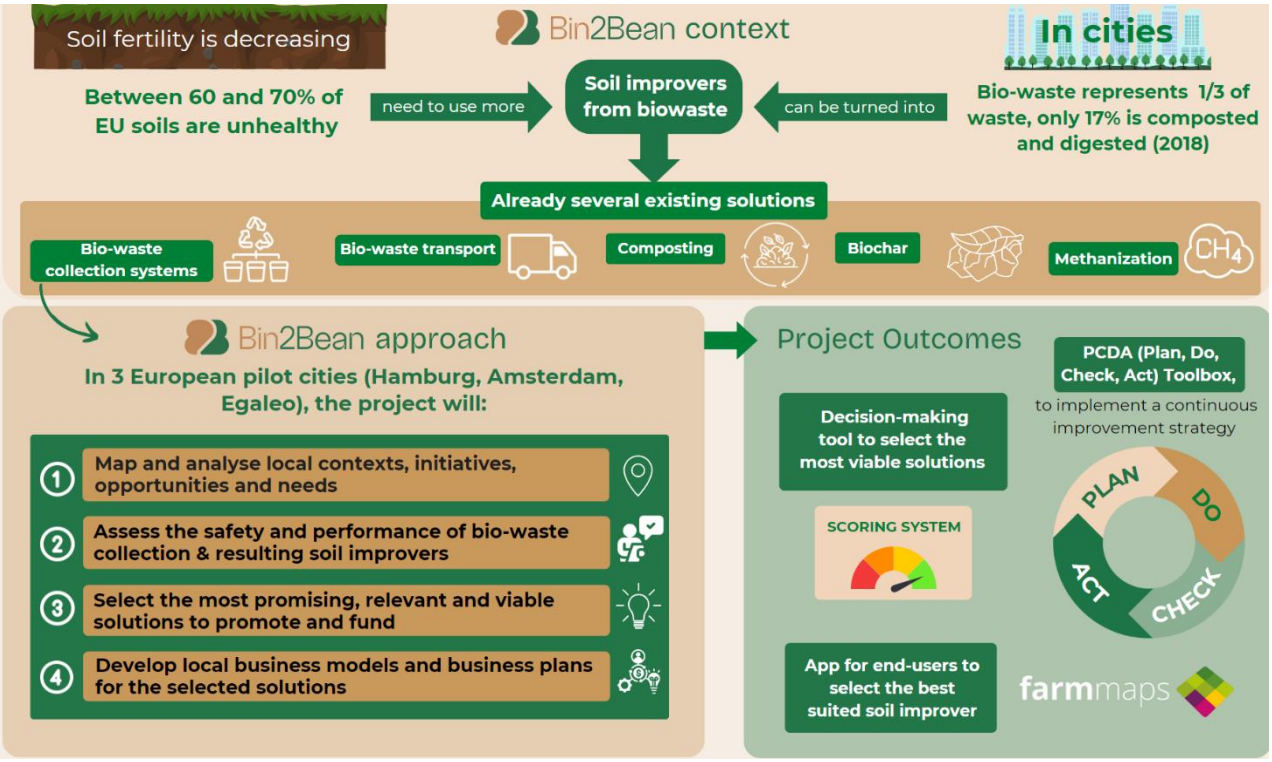
The second source of variability was related to **procedural differences between laboratories**. These included, for example, differences in the test portion size used in impurity analysis, differences in pre-mixing times and measurement temperatures in the OUR test, and other deviations from the standard procedures.

These observations depicted in this report reveal **the critical procedure steps affecting result reproducibility.** These results will help laboratories focus on the stages that require particular attention when implementing the forthcoming

reference standards or aligning in-house methods in the future. In general, this will aid in maximizing the chances of obtaining homogenous performance at EU level. This report could eventually be used to define and implement harmonised testing methods for soil improvers from biowaste in the EU.

About Bin2Bean

Bin2Bean is a research-action project, co-funded by the European Commission under the Mission Soil, which aims to optimise the performance of bio-waste collection and transformation into soil improvers. It started in September 2023 and will last 3 years.



Bin2Bean collaborates with 3 City-Region Living Labs (*Amsterdam*, *Egaleo*, *Hamburg*), which have different states of progress and levels of experience on the topic, to implement a series of activities:

1. **Map local contexts**, in terms of state-of-progress, existing initiatives, needs, material and monetary flows.

2. **Design a tailored evaluation framework** to demonstrate the safety, environmental and socio-economic performance of bio-waste collection systems and soil improvers.

3. **Develop a scoring system**, fed by data from the evaluation framework, to help cities select the most effective and market-ready solutions adapted to their context.

4. **Develop tailored and viable business and/or community models** for the highest scored solutions, according to stakeholders' willingness-to-adopt.

5. **Draft local, national and EU policy roadmaps**, including waste charging policies and citizen awareness campaigns.

All this will feed into a **PDCA (Plan, Do, Check, Act) toolbox**, enabling any city-region to create a continuous improvement loop towards effective bio-waste recycling and regenerative soil systems.

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Appendix 1 Participants in the interlaboratory comparison

Country	Participant
Belgium	Innolab BV
Finland	Finnish Food Authority
	HAMK Häme University of Applied Sciences
	KVVY Tutkimus Oy, Tampere
	MetropoliLab Oy
	Natural Resources Institute Finland
	Savonia-ammattikorkeakoulu oy
	SGS Finland Oy, Kotka
France	Eurofins Galys
Germany	LUFA Nord-West, Institut für Boden und Umwelt
Greece	Polyeco S.A.
	Qlab -Research, Analytical and Quality Control Lab
Italy	Centro Ricerche Produzioni Animali Soc. Cons. p. A.
Spain	Eurofins Analisisi Agro, S.A.

Appendix 2 Sample preparation

Sample collection procedure

Two compost samples were obtained from a composting facility. For each sample, the collection process was as follows:

- A single compost pile was selected. Approximately 15 sampling points were created by removing the surface layer with a shovel to avoid contamination.
- From each point, 10 l material was collected to obtain a total of approximately 150 l of material. All collected material was combined on a tarpaulin and thoroughly mixed to ensure homogeneity.
- The material was placed in plastic bags and transported to the Finnish Food Authority's laboratory for further processing.

Sample Preparation Protocol

1. **Homogenization and sieving**

   Samples were homogenized and sieved using a 10 mm mesh. Particles retained on the sieve were discarded.

2. **Portioning**

   The sieved material (<10 mm) was thoroughly mixed and portioned into 3-liter batches for each participant by adding one 0.5-liter scoop at a time. These batches were labelled BioCom1 and BioCom2. Additionally, part of the sieved material was divided into 1.2 kg bags using the same method and labelled BioCom1_IMP and BioCom2_IMP.

3. **Dried and ground samples**

   Approximately 2 kg of each sieved sample was dried at 40 °C for 2-3 days until completely dry. The dried material was sieved through a 2 mm mesh, and particles smaller than 2 mm were ground using a ball mill. These dried and ground samples were packed into small plastic bottles and labelled BioCom1_DG and BioCom2_DG.

4. **Packing and shipping**

   Samples were packed in boxes with cooling elements and shipped to the participating laboratories.

Bin2Bean

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