PHILIPPINE NATIONAL STANDARD

PNS/BAFS 183:2023
ICS 65.080

Organic Soil Amendments and Plant Supplements (OSAPS) — Product Standard — Specifications

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Foreword

In 2021, the Batangas Egg Producers Cooperative (BEPCO) submitted a request to the National Organic Agriculture Program (NOAP) and was endorsed to the Department of Agriculture (DA)-Bureau of Agriculture and Fisheries Standards (BAFS) to amend the PNS/BAFS 183:2020 specifically, the acceptable limits of the Total N-P_2O_4-K_2O (NPK). BEPCO requested to evaluate and review the set levels of Total N-P_2O_4-K_2O (5-10%) and possible exclusion of the upper limit in PNS/BAFS 183:2020 (PNS OSA). This is noting the use of chicken manure as fertilizer for vegetables that may exceed the acceptable limits of Total NPK from a range of 5-10%. Further, BEPCO requested to reconsider the minimum acceptable limit of 5% for the NPK to align with the fertilizer specifications of the Food and Agriculture Organization (FAO) for Organic Manure.

Similarly, the DA-BAFS Organic Agriculture Division (OAD) submitted a request for the review and reformulation of the PNS relevant to organic agriculture including PNS/BAFS 183:2020. Issues/concerns raised by the OAD includes 1) product descriptions that are limiting (e.g., undergone substantial decomposition) and 2) tables on moisture content (MC) by weight for microbial inoculants. In addition, they requested to reconsider the MC of microbial inoculants to accommodate innovations such as drying and freeze drying to prolong the shelf life of microbial inoculants.

A TWG was established through the following Special Orders (SO):

1. SO No. 146, series of 2023 (Creation of TWG for the Development of PNS for Agricultural and Fishery Products, Machinery, and Infrastructures);
2. SO No. 532, series of 2023 (Addendum to SO No. 146 series of 2023 entitled “Creation of TWG for the Development of PNS for Agricultural and Fishery Products, Machinery, and Infrastructures”);
3. SO No. 1314, series of 2023 (Addendum to SO No. 146 series of 2023 entitled (“Creation of TWG for the Development of PNS for Agricultural and Fishery Products, Machinery, and Infrastructures”); and
4. SO No. 1457, series of 2023 (Addendum to SO No. 146 series of 2023 entitled “Creation of TWG for the Development of PNS for Agricultural and Fishery Products, Machinery, and Infrastructures”).

The TWG was composed of relevant stakeholders from the government sector, academe/research institutions, private sector organization, and Civil Society Organizations (CSO). The draft PNS underwent a series of TWG meetings and stakeholder consultations conducted via an online platform before its endorsement to the DA Secretary for approval.

This Standard includes the following significant changes compared to its previous version:

a) Inclusion of normative references;
b) Amendment of the Clause 3 Terms and Definitions;
c) Modification on the Total NPK specification for liquid organic plant supplement;

d) Inclusion of Total N in the specifications for solid and liquid organic fertilizer, organic soil conditioner, and organic plant supplement;
e) Modification on the lower limit of C:N ratio for organic fertilizer (solid) and organic soil conditioner (solid and liquid);
f) Amendment on the specifications for microbial inoculants;
g) Amendment on the maximum allowable level of microbial contaminants for solid and liquid organic fertilizer, organic soil conditioner, and organic plant supplement;
h) Amendment on the maximum allowable level of heavy metals for solid and liquid organic fertilizer, organic soil conditioner, and organic plant supplement;
i) Modification on the required number of samples for solid and liquid products and weight of composite solid and liquid samples needed to be submitted to the laboratory;
j) Amendment on the labeling requirements; and
k) Amendment on Annex A (Methods of analysis for organic fertilizer, organic soil conditioner, and organic plant supplement) and Annex B (Methods of analysis for the microbial inoculants).

This Standard cancel and replaces PNS/BAFS 183:2020, which has been technically amended. This document was drafted in accordance with the editorial rules of the DA-BAFS-Standards Development Division (SDD) Standardization Guide No. 1: Writing the PNS.

1 Scope

This Standard applies to organic fertilizers, organic soil conditioners, microbial inoculants, and organic plant supplements. The emphasis on how to minimize contamination from microbiological, physical, and chemical hazards is in accordance with the relevant provisions under the PNS/BAFS 291:2019 (Code of practice for the production of organic soil amendments).

2 Normative References

The following documents are referred to in the text in such a way that some or all their contents constitute the requirements of this document. The latest edition of the referenced documents (including any amendments) applies.

Bureau of Agriculture and Fisheries Standard (BAFS) – Department of Agriculture (DA). (2019). Code of practice for the production of organic soil amendments (PNS/BAFS 291:2019). http://www.bafs.da.gov.ph/bafs_admin/admin_page/pns_file/PNS%20291%20COP%20OSA.pdf

DA. (2020). National list of permitted substances for organic agriculture (Department Circular [DC] No. 09, series of 2020). https://bafs.da.gov.ph/bafs_admin/admin_page/laws_files/DC.No.09%20s%202020%20National%20List%20of%20Permitted%20Substances%20for%20OA.pdf

3 Terms and Definitions

For the purposes of this Standard, the following terms and definitions apply:

3.1
batch
set of units of a product that is uniform in character and quality obtained from a given process under practically identical circumstances and produced in a given place within one defined production period (Republic Act [RA] 10611, 2013)

3.2
biofertilizer
broad term used for products containing living or dormant microorganisms such as bacteria, fungi, actinomycetes and algae, alone or in combination, which on application help in fixing atmospheric nitrogen or solubilize/mobilize soil nutrients (Food and Agriculture Organization [FAO], 2019)

3.3
contaminant
any substance that can come in contact with organic soil amendments and plant supplements that compromise its organic integrity (Association of Southeast Asian Nations [ASEAN], 2014). In the context of this Standard, a contaminant also refers to any foreign material, unwanted microorganism, or chemical.

3.4
label
display of any written, printed, or graphic representation on the label of a product for the purpose of promoting its sale or disposal. Information on the label provides the sellers and the buyers with the safe and effective use of the product for which it is registered (DA, 2015, *modified*)

3.5
lot
quantity of produce presented for inspection as one unit, having similar characteristics regarding type and or variety and origin (Codex Alimentarius Commission [CAC], 2022)

3.6
organic plant supplement
any compound of organic origin in liquid or solid form, which in low concentration, promotes or modifies physiological processes in plants. It may contain beneficial microorganisms, micronutrients, and plant growth regulators (DA, 2015)

3.7
organic soil amendments
composed of organic substances derived from biomass and applied to or mixed into the topsoil to improve soil health and plant growth (Traunfeld, 2023, *modified*). It includes the products within the scope of this Standard, i.e., organic fertilizer, organic soil conditioner, and microbial inoculant

3.8
pathogens
biological agents (e.g., bacteria, fungi, protozoa, virus) that may cause diseases (DA-FPA, 2019, *modified*)

3.9
raw materials
naturally-occurring materials (including those permitted substances that are not naturally-occuring as prescribed in the Department Circular No. 09) used in the production of organic soil amendments and plant supplements (DA-BAFS, 2019, *modified*)

4 Product Description

4.1 **Organic fertilizer** – any product in solid or liquid form, derived from plants and/or animals that have undergone substantial decomposition that can supply available nutrients to plants with a total Nitrogen (N) - Phosphorus (P_2O_5) - Potassium (K_2O) content of five to ten percent (5-10%).

4.2 **Organic soil conditioner** – any product in solid or liquid form, derived from plants or animals that have undergone substantial decomposition that can supply available nutrients to plants with a total N- P_2O_5 - K_2O content of 2.5 to less than five percent (2.5 - <5%).

4.3 **Microbial inoculant** – biologically-active product containing optimum population of one or a combination of active strains of bacteria, algae, and fungi that are useful in different biological activities, such as, but not limited to: N_2-fixation, decomposition of organic residues, and enhancement of nutrient availability.

4.4 **Organic plant supplement** – any compound of organic origin in liquid or solid form that has a total N-P_2O_5-K_2O content of not less than 0.5% to not more than 10% for solid and liquid. These include but are not limited to: FPJ (Fermented Plant Juice), FFJ (Fermented Fruit Juice), FAA (Fish Amino Acid), FE (Fish Emulsion), Seaweed Extracts, Vermi Tea, Compost Tea, and the like.

5 Minimum Requirements

5.1 Raw materials

Raw materials to be used for the production of organic soil amendments shall be in accordance with the list of permitted raw materials for the production of organic soil amendments and plant supplements as listed in DC No. 9 series of 2020 (National list of permitted substances for organic agriculture).

5.2 Specifications

5.2.1 Solid and liquid organic fertilizer, organic soil conditioner, and organic plant supplement shall be in accordance with the specifications shown in Table 1.

Table 1. Specifications for solid and liquid organic fertilizer, organic soil conditioner, and organic plant supplement (BAFS-DA, BSWM-DA, SIDC, OCCP-ICSI, UPLB-Biotech, 2023)

Specifications	Organic Fertilizer (Solid)	Organic Fertilizer (Liquid)	Organic Soil Conditioner (Solid and Liquid)	Organic Plant Supplement (Solid and Liquid)
Total N-P_2O_5-K_2O, %	5 - 10%	5 - 10%	2.5 - <5%	0.5 - 10%
Total N, %	≥1.5	≥1.5	1 - <1.5	≥0.3
C:N ratio	8:1 - 20:1	-	8:1 - 20:1	-
Organic Matter (OM), %	≥20	-	≥20	-
Actual Moisture Content (MC), %	≤35	-	Solid: ≤35 Liquid: none	-
Odor	No foul odor: (ammonia, rotting or fermentation)	-	No foul odor: (ammonia, rotting or fermentation)	-

5.2.1.1 Verification should be done on the raw materials and process if the total N-P_2O_5-K_2O content of the product exceeds the specified limit in Table 1. A confirmatory test should be conducted on the product based on the methods of test for the total N-P_2O_5-K_2O specified in Annex A (Methods of analysis for organic fertilizer, organic soil conditioner, and organic plant supplement).

5.2.1.2 For solid organic fertilizer, all specifications in Table 1, except actual MC, should be on a dry weight basis.

5.2.1.3 For solid and liquid organic fertilizer, organic soil conditioner, and organic plant supplement containing microbial inoculants, the genus should be verifiable and stated on the label.

5.2.2 Microbial inoculants such as biofertilizers and composting microorganisms depending on their category or genus should be in accordance with the specifications shown in Table 2 to Table 9.

5.2.2.1 Specifications for Rhizobia shall be in accordance with Table 2.

Table 2. Minimum requirements for Rhizobia

Parameter	Minimum level
Viable Cell Count	$1x10^6$ cfu/g (solid)[1] $1x10^6$ cfu/ml (liquid)[2]
Contaminants	No microbial contamination at 10^{-5} dilution[3]

[1]University of the Philippines Los Baños (UPLB)-National Institute of Molecular Biology and Biotechnology (BIOTECH). (2023). Minimum viable cell count for rhizobia. [Unpublished raw data].
[2]Central Luzon State University (CLSU). (2023). Minimum viable cell count for rhizobia. [Unpublished raw data].
[3]United States (US) Food and Drug Administration (FDA). (2001). Bacteriological Analytical Manual (BAM). https://www.fda.gov/food/laboratory-methods-food/bam-chapter-3-aerobic-plate-count

5.2.2.2 Specifications for *Azospirillum* shall be in accordance with Table 3.

Table 3. Minimum requirements for *Azospirillum*

Parameter	Minimum level
Viable Cell Count	$1x10^7$ cfu/g (solid, powdered form)[1] $1x10^8$ cells/ml (liquid)[2]
Contaminants	No microbial contamination at 10^{-5} dilution[3]
Moisture content by weight	20-40%[4]

[1]University of the Philippines Los Baños (UPLB)-National Institute of Molecular Biology and Biotechnology (BIOTECH). (2023). Minimum viable cell count for *azospirillum*. [Unpublished raw data].
[2]Yadav, A. K. & Chandra K. National Centre of Organic Farming, Department of Agriculture and Cooperation. (2014). Mass production and quality control of microbial inoculants. https://web.archive.org/web/20180602065513id_/http://www.insa.nic.in/writereaddata/UpLoadedFiles/PINSA/Vol80_2014_2_Art29.pdf
[3]United States (US) Food and Drug Administration (FDA). (2001). Bacteriological Analytical Manual (BAM). https://www.fda.gov/food/laboratory-methods-food/bam-chapter-3-aerobic-plate-count
[4]Central Luzon State University (CLSU). (2023). Minimum moisture content for *azospirillum*. [Unpublished raw data].

5.2.2.3 Specifications for Phosphate Solubilizer (Bacteria) shall be in accordance with Table 4.

Table 4. Minimum requirements for Phosphate Solubilizer (Bacteria)

Parameter	Minimum level
Viable Cell Count	$1x10^7$ cfu/g[1]
Contaminants	No microbial contamination at 10^{-5} dilution[2]
Moisture content by weight	20-40%[1]
[1,3]Central Luzon State University (CLSU). (2023). Minimum viable cell count for phosphate solubilizer [bacteria]. [Unpublished raw data]. [2]United States (US) Food and Drug Administration (FDA). (2001). Bacteriological Analytical Manual (BAM). https://www.fda.gov/food/laboratory-methods-food/bam-chapter-3-aerobic-plate-count	

5.2.2.4 Specifications for Phosphate Solubilizer (Fungi) – Spore forming shall be in accordance with Table 5.

Table 5. Minimum requirements for Phosphate Solubilizer (Fungi) – Spore forming

Parameter	Minimum level
Spore Count	$1x10^6$ spores/mL or /g[1]
Contaminants	No microbial contamination at 10^{-5} dilution[2]
[1]Central Luzon State University (CLSU). (2023). Minimum viable cell count for phosphate solubilizer [fungi]. [Unpublished raw data]. [2]United States (US) Food and Drug Administration (FDA). (2001). Bacteriological Analytical Manual (BAM). https://www.fda.gov/food/laboratory-methods-food/bam-chapter-3-aerobic-plate-count	

5.2.2.5 Specifications for Endophytic Bacteria shall be in accordance with Table 6.

Table 6. Minimum requirements for Endophytic Bacteria

Parameter	Minimum level
Viable Cell Count	$1x10^9$ cfu/g[1]
Contaminants	No microbial contamination at 10^{-5} dilution[2]
[1]University of the Philippines Los Baños (UPLB)-National Institute of Molecular Biology and Biotechnology (BIOTECH). (2023). Minimum viable cell count for endophytic bacteria. [Unpublished	

Parameter	Minimum level
raw data]. [2]United States (US) Food and Drug Administration (FDA). (2001). Bacteriological Analytical Manual (BAM). https://www.fda.gov/food/laboratory-methods-food/bam-chapter-3-aerobic-plate-count	

5.2.2.6 Specifications for *Trichoderma* shall be in accordance with Table 7.

Table 7. Minimum requirements for *Trichoderma*

Parameter	Minimum level
Viable Spore Count	$1x10^6$ spores/mL or /g
Contaminants	No microbial contamination at 10^{-5} dilution[2]
[1]University of the Philippines Los Baños (UPLB)-National Institute of Molecular Biology and Biotechnology (BIOTECH). (2023). Minimum viable spore count for trichoderma. [Unpublished raw data]. [2]United States (US) Food and Drug Administration (FDA). (2001). Bacteriological Analytical Manual (BAM). https://www.fda.gov/food/laboratory-methods-food/bam-chapter-3-aerobic-plate-count	

5.2.2.7 Specifications for Vesicular Arbuscular Mycorrizhal (VAM) shall be in accordance with Table 8.

Table 8. Minimum requirements for VAM Fungi (UPLB-BIOTECH, 2023)

Parameter	Minimum level
Most probable number (MPN) Solid inoculant Root inoculant	65 spores/capsule/g 25 spores/g (soil-based) 3,500 Infective Propagules (IP)/g
Contamination level	Nematode-free

5.2.2.8 Specifications for Ectomycorrhizae shall be in accordance with Table 9.

Table 9. Minimum requirements for Ectomycorrhizae (BAFS-OAD, 2023)

Parameter	Minimum level
Viable Spore Count	10^8 spores/g

5.2.2.9 Specifications for *Azobacter* shall be in accordance with Table 10.

Table 10. Minimum requirements for *Azotobacter*

Base	Solid
Viable Cell Count, minimum	$1x10^6$ cfu/g[1]
Contaminants	No microbial contamination at 10^{-5} dilution[2]
pH	6.0-7.5[1]
Moisture content by weight	25-30%[1]

[1]University of the Philippines Los Baños (UPLB)-National Institute of Molecular Biology and Biotechnology (BIOTECH). (2023). Minimum viable cell count for *azotobacter*. [Unpublished raw data].
[2]United States (US) Food and Drug Administration (FDA). (2001). Bacteriological Analytical Manual (BAM). https://www.fda.gov/food/laboratory-methods-food/bam-chapter-3-aerobic-plate-count

5.2.3 For multi-strain inoculants or inoculants containing a consortium of microorganisms, claims shall be verifiable.

5.3 Contaminants

5.3.1 The pathogens in solid and liquid organic fertilizers, organic soil conditioners, and organic plant supplements shall be in accordance with the allowable levels shown in Table 11.

Table 11. Maximum allowable level of microbial contaminants for solid and liquid organic fertilizer, organic soil conditioner, and organic plant supplement

Microbial contaminants	Maximum Allowable Level
Total coliforms	<1,000 MPN/g[1]
E. Coli	100 cfu/g[2]
Salmonella	Absent in 25 g[3]

[1]United States (US) Environmental Protection Agency (EPA). (1993). Part 503 — standards for the use or disposal of sewage sludge. Electronic Code of Federal Regulations (eCFR). https://www.ecfr.gov/current/title-40/chapter-I/subchapter-O/part-503
[2]Bureau of Agriculture and Fisheries Standards (BAFS)-Department of Agriculture (DA). (2023). Philippine National Standard (PNS) on primary and postharvest food and feed — product standard — microbiological criteria. [Unpublished raw data].
[3]European Parliament and Council. (2019). Regulation (EU) 2019/1009 of the european parliament and of the council of 5 june 2019. https://eur-lex.europa.eu/legal-

content/EN/TXT/?uri=CELEX:32019R1009

5.3.2 The heavy metals in solid and liquid organic fertilizers, organic soil conditioners, and organic plant supplements shall be in accordance with the levels shown in Table 12.

Table 12. Maximum allowable level of heavy metals for solid and liquid organic fertilizer, organic soil conditioner, and organic plant supplement (DA-BAFS, 2023, *modified*)

Heavy Metals	**Maximum Allowable Level** (mg/kg dry wt.)
Arsenic (As)	40[1] (inorganic arsenic)
Lead (Pb)	100[2]
Chromium (Cr)	50[2]
Mercury (Hg)	1[1]
Cadmium (Cd)	5[2]

[1]European Parliament and Council. (2019). Regulation (EU) 2019/1009 of the european parliament and of the council of 5 june 2019. https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX:32019R1009

[2]Food and Agriculture Organization (FAO). (2023). NSP – fertilizer specifications. https://www.fao.org/agriculture/crops/thematic-sitemap/theme/spi/plantnutrition/fertspecs/en/

5.3.3 Absence of foreign materials

Plastics, aluminum, wrappers, stones, and other materials shall be totally removed from the product.

6 Sampling Methods for Laboratory Analysis

All finished products shall be subjected to a lot sampling for laboratory analysis using the following procedures:

6.1 Composite sampling of solid products

6.1.1 The production documents containing the number of bags per batch number and bag number shall be presented to the inspector.

6.1.2 The inspector shall randomly select the bag number.

6.1.3 The selected bags shall be emptied into a clean area. All contents of the selected bags should be thoroughly mixed.

6.1.4 Three (3) kilograms of composite samples shall be collected and distributed equally to the laboratory, organic certifying body (OCB), and operator.

6.1.5 Information relative to the sample taken shall be accurate and complete to allow traceability of the sample back to the lot from which it was sampled.

6.1.6 The required number of samples shall be in accordance with the number of bags per batch as shown in Table 13.

Table 13. Required number of samples for solid products (FPA, 2019, *modified*)

Number of bags per batch	Bags to be sampled
2-8	3
9-27	4
28-64	5
65-100	6
101-300	7
301-500	8
501 to 1000	20
More than 1000	20 per 1000

6.2 Composite sampling of liquid products

6.2.1 The production documents containing the number of containers per batch number and container number shall be presented to the inspector.

6.2.2 The inspector shall randomly select the container number and subject the selected containers for analysis.

6.2.3 Three (3) containers of liquid samples shall be collected and distributed equally to the laboratory, OCB, and operator.

6.2.4 Information relative to the sample taken shall be accurate and complete to allow traceability of the sample back to the lot from which it was sampled.

6.2.5 The required number of samples shall be in accordance with the number of containers per batch as shown in Table 14.

Table 14. Required number of samples for liquid products (Sri Lanka Standards Institution [SLSI], 2021, *modified*)

Number of containers per batch	Containers to be sampled
≤300	3
301 to 500	4
More than 500	5
NOTE 1 1 container should be at least 1 L **NOTE 2** If the container has less than 1 L of the liquid product, an equivalent of 1 L composite sample will be collected per batch	

7 Methods of Analysis

7.1 The methods of analysis to test the organic fertilizer, organic soil conditioner, and organic plant supplement shall be in accordance with the methods listed in Annex A (Methods of analysis for organic fertilizer, organic soil conditioner, and organic plant supplement).

7.2 The methods of analysis for the microbial inoculants shall be in accordance with the methods listed in Annex B (Methods of analysis for the microbial inoculants).

8 Labeling

8.1 Label shall be of such design and material that does not deteriorate easily, become illegible, or get separated from the container under the rigors of transport, storage, and use. It shall withstand extreme weather conditions.

8.2 The following is the minimum information on the label of organic soil amendments and plant supplements:

8.2.1 Name of product;

8.2.2 Name of distributor/manufacturer;

8.2.3 Address and contact number of distributor/manufacturers;

8.2.4 Date manufactured;

8.2.5 Net content;

8.2.6 Product information;

a) Major raw materials/ingredients;

b) Genus name (microbial inoculants);
c) Nutrient content (Total N-P_2O_5-K_2O and total N content);
d) Moisture content (for solid organic fertilizer, organic soil conditioner, and microbial inoculants); and
e) Product description and type.

8.2.7 Lot/Batch number;

8.2.8 Best before (for liquid fertilizers and microbial inoculants);

8.2.9 Compatibility with bio-pesticides (optional);

8.2.10 Directions for use;

8.2.11 Storage and disposal;

8.2.12 Warning/precaution; and

8.2.13 List of microbial inoculants used for enrichment (as applicable).

Annex A
(Normative)

Methods of analysis for organic fertilizer, organic soil conditioner and organic plant supplement

Table A.1. Methods of analysis for the specifications of solid and liquid organic fertilizers, organic soil conditioner, and organic plant supplements

Specifications	Methods of Analysis
Total Nitrogen	Kjeldahl Method[1] Indophenol Method[2]
Phosphorus	Molybdovanado Phosphoric Acid[3] Modified Walkley-Black Method[4]
Potassium	Atomic Absorption Spectrophotometry[5] Ammonium Acetate Method[6] Dry Ashing/Acid Digestion – Atomic Absorption Spectrometry/Inductively Coupled Plasma[7] Sodium Tetraphenyl Borate (STPB) Titration Potassium tetraphenylborate gravimetric method[8]
Total Organic Carbon	Modified Walkley-Black Method[9]
Organic Matter	Modified Walkley-Black Method[9]
Moisture content	Gravimetric Method[10]

[1]Food and Agriculture Organization (FAO) of the United Nations. (2021). Standard operating procedure for soil nitrogen. https://www.fao.org/3/cb3642en/cb3642en.pdf

[2] Liu, X., Wu, D., Abid, A. A., Liu, Y., Zhou J., & Zhang, Q. (2022). Determination of paddy soil ammonia nitrogen using rapid detection kit coupled with microplate reader. https://pubmed.ncbi.nlm.nih.gov/36548558/

[3]American Chemical Society. (1957). Photometric determination of phosphorus as molybdovanadophosphoric Acid. https://doi.org/10.1021/ac60121a017

[4]Wakarera, P. W., Ojola, P., & Njeru, E. M. (2022). Characterization and diversity of native azotobacter spp. isolated from semi-arid agroecosystems of Eastern Kenya. https://www.ncbi.nlm.nih.gov/pmc/articles/PMC8941396/#RSBL20210612C11

[5]Temperli, A.T., Misteli, H. (2004). Determination of potassium in soil extracts by atomic absorption spectrophotometry. https://doi.org/10.1016/0003-2697(69)90046-3

[6]Rees, G.L., Pettygrove, G. S., & Southard, R. J. (2013). Estimating plant-available potassium in potassium-fixing soils. https://doi.org/10.1080/00103624.2013.748129

[7]Incorporated Administrative Agency (IAA)-Food and Agricultural Materials Inspection Center (FAMIC). Testing methods for fertilizers. http://www.famic.go.jp/ffis/fert/obj/TestingMethodsForFertilizers2018.pdf

[8]International Organization for Standardization (ISO). (1983). Fertilizers — determination of potassium content — potassium tetraphenylborate gravimetric method (reference method). https://www.iso.org/standard/11325.html

[9]FAO. (2019). Standard operating procedure for soil organic carbon. https://www.fao.org/3/ca7471en/ca7471en.pdf

[10]FAO. (2020). Soil testing methods. https://www.fao.org/3/ca2796en/CA2796EN.pdf

Table A.2. Methods of analysis for the level of pathogens for solid and liquid organic fertilizers, organic soil conditioners, and organic plant supplements

Pathogens	Methods of Analysis
Total coliforms	MPN Method/ Pour Plate/ Viable plate count[1]
E. Coli	MPN Method/ Pour Plate/ Viable plate count[1]
Salmonella	Conventional/ Selective enrichment method[1]

[1]American Public Health Association (APHA). (2017). Standard Methods for the Examination of Water and Wastewater, 23rd edition. https://scholar.google.com/scholar_lookup?title=Standard+Methods+for+the+Examination+of+Water+and+Wastewater&author=APHA-AWWA-WEF&publication_year=2017

Table A.3. Methods of analysis for the level of heavy metals for solid and liquid organic fertilizers, organic soil conditioners, and organic plant supplements

Heavy Metals	Methods of Analysis
Arsenic (As)	Acid Digestion and Quanitation by HG-AAS or Inductively Coupled Plasma-Optical Emission Spectrometer (ICP-OES)[1]
Lead (Pb)	
Chromium (Cr)	
Mercury (Hg)	
Cadmium (Cd)	

[1]Madjar, R. M., Moţ, A., Scăeţeanu, G. V., & Mihalache, M. (2020). Methods used for heavy metal determination in agricultural inputs. https://rjas.ro/download/paper_version.paper_file.ae233ec5016c1105.31392 e2d34362e204d61646a6172204d4554484f44532055534544204 64f522048454156592020204d.pdf

Annex B
(Informative)

Methods of analysis for the microbial inoculants

Table B.1. Methods of analysis for the microbial inoculants

Microbial inoculant	Methods of Analysis
Rhizobia	Viable plate count and determination of phenotypic characteristics/Glucose-peptone test[1]
Azospirillum	Viable plate count and determination of phenotypic characteristics/Plating on nitrogen-free medium and Gram stain[2]
Phosphate solubilizer (Bacteria)	Viable plate count and determination of phenotypic characteristics[3] Quantification of phosphate-solubilizing microbes[3] Plating on Pikovskaya medium and Gram Stain[4]
Phosphate solubilizer (Fungi)-Spore forming	Viable plate count and determination of phenotypic characteristics[3] Quantification of phosphate-solubilizing microbes[3]
Endophytic bacteria	Plating on the medium-specific for the isolate and Gram Stain[5]
Decomposer and Microbial Inoculant (*Trichoderma*)	Viable plate count and determination of phenotypic characteristics[3]
Vesicular Arbuscular Mycorrizhal (VAM) Fungi	Wet sieving, decanting method and microscopic determination[6]
Azotobacter	Viable plate count and determination of phenotypic characteristics[3] Plating on Burks medium and Gram Stain[7]

[1]Olsen, P. E., Sande, E. S., & Keyser, H. H. (1996). The enumeration and identification of rhizobial bacteria in legume inoculant quality control procedures. https://www.ctahr.hawaii.edu/bnf/Downloads/Inoculant/Perry%27s%20QC%20Manual.PDF

[2]Casaan, F.D., Penna, C., Creus, C., & Radovancich, D. (2015). Protocol for the quality control of azospirillum spp. inoculants. https://www.researchgate.net/publication/283734697_Protocol_for_the_Quality_Control_of_Azospirillum_spp_Inoculants

[3]Forum for Nuclear Cooperation in Asia (FNCA). (2014). FNCA Guideline for biofertilizer quality assurance and control. https://www.fnca.mext.go.jp/bf/guideline.pdf

[4]Pande, A., Pandey, P., Mehra, S., Singh, M., & Kaushik, S. (2017). Phenotypic and genotypic characterization of phosphate solubilizing bacteria and their efficiency on the growth of maize. https://doi.org/10.1016/j.jgeb.2017.06.005

[5]Duhan, P., Bansal, P., & Rani, S. (2020). Isolation, identification and characterization of endophytic bacteria from medicinal plant tinospora cordifolia. https://doi.org/10.1016/j.sajb.2020.01.047

[6]Centurion University of Technology and Management. (2021). Wet sieving method [PowerPoint slides]. https://courseware.cutm.ac.in/wp-content/uploads/2021/01/3.-Isolation-of-AM-fungi-by-wet-seiving-and-sucrose-gradient-method.pptx

[7]Samal, D. P. K., Ray, P., Sukla, L. B., & Shukla, V. (2020). Isolation and screening of Azotobacter Spp. for plant growth promoting properties and its survival under different environmental stress conditions. https://doi.org/10.33263/BRIAC102.188192

Bibliography

American Chemical Society. (1957). Photometric determination of phosphorus as molybdovanadophosphoric Acid. https://doi.org/10.1021/ac60121a017

American Public Health Association (APHA). (2017). Standard methods for the examination of water and wastewater, 23rd edition. https://scholar.google.com/scholar_lookup?title=Standard+Methods+for+the+ Examination+of+Water+and+Wastewater&author=APHA-AWWA-WEF&publication_year=2017

An act to strengthen the food safety regulatory system in the country to protect consumer health and facilitate market access of local foods and food products, and for other purposes or the Food Safety Act of 2013. Republic Act No. 10611. https://www.officialgazette.gov.ph/2015/02/20/implementing-rules- and-regulations-of-republic-act-no-10611/

Association of Southeast Asian Nations (ASEAN). (2014). ASEAN Standard for Organic Agriculture (ASOA). https://asean.org/wp-content/uploads/2021/08/ASEAN-STANDARD-FOR-ORGANIC-AGRICULTURE-ASOA.pdf

Bureau of Agriculture and Fisheries Standards (BAFS)-Department of Agriculture (DA). (2019). Code of practice for the production of organic soil amendments (PNS/BAFS 291:2019). http://www.bafs.da.gov.ph/bafs_admin/admin_page/pns_file/PNS%20291%20COP%20OSA.pdf

Bureau of Agriculture and Fisheries Standards (BAFS)-Department of Agriculture (DA). (2023). Philippine National Standard (PNS) on primary and postharvest food and feed — product standard — microbiological criteria. [Unpublished raw data].

Bureau of Agriculture and Fisheries Standards (BAFS)-Department of Agriculture (DA). (2023). Philippine National Standard (PNS) on Organic Bio-Control Agents (OBCA) — product standard — specifications. [Unpublished raw data].

Bureau of Agriculture and Fisheries Standards (BAFS)-Department of Agriculture (DA). (2023). Specifications for organic fertilizers, organic microbial inoculants, organic plant supplements, and organic soil conditioners. [Unpublished raw data].

Bureau of Agriculture and Fisheries Standards (BAFS)-Department of Agriculture (DA). (2023). List of registered microbial inoculants. [Unpublished raw data].

Bureau of Soils and Water Management (BSWM)-Department of Agriculture (DA). (2023). Specifications for organic fertilizers and organic plant supplements.

[Unpublished raw data].

Casaan, F.D., Penna, C., Creus, C., & Radovancich, D. (2015). Protocol for the quality control of azospirillum spp. inoculants. https://www.researchgate.net/publication/283734697_Protocol_for_the_Quality_Control_of_Azospirillum_spp_Inoculants

Central State University (CLSU). (2023). Specifications for microbial inoculants. [Unpublished raw data].

Centurion University of Technology and Management. (2021). Wet sieving method [PowerPoint slides]. https://courseware.cutm.ac.in/wp-content/uploads/2021/01/3.-Isolation-of-AM-fungi-by-wet-seiving-and-sucrose-gradient-method.pptx

Codex Alimentarius Commission (CAC). (2022). The proposed layout for standards for fresh fruits and vegetables. https://www.fao.org/fileadmin/user_upload/codexalimentarius/committee/docs/INF_CCFFV_7e.pdf

Department of Agriculture (DA). (2015). Revised rules and regulations on the registration of organic fertilizer producers (Department Circular No. 05 series of 2015). https://www.da.gov.ph/wp-content/uploads/2022/05/dc05_s2015.pdf

Department of Agriculture (DA). (2020). National list of permitted substances for organic agriculture (Department Circular No. 09, series of 2020). http://bafs.da.gov.ph/bafs_admin/admin_page/laws_files/DC.No.09%20s%202020%20National%20List%20of%20Permitted%20Substances%20for%20OA.pdf

European Parliament and Council. (2019). Regulation (EU) 2019/1009 of the european parliament and of the council of 5 june 2019. https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX:32019R1009

Duhan, P., Bansal, P., & Rani, S. (2020). Isolation, identification and characterization of endophytic bacteria from medicinal plant Tinospora cordifolia. https://doi.org/10.1016/j.sajb.2020.01.047

Fertilizer and Pesticide Authority (FPA)-Department of Agriculture (DA). (2019). Fertilizer regulatory policies and implementing guidelines. https://fpa.da.gov.ph/NW/images/FPAfiles/DATA/Regulation/Pesticide/Book2020/PoliciesandImplementingGuidelines2020.pdf

Fertilizer and Pesticide Authority (FPA)-Department of Agriculture (DA). (2023). List of registered biofertilizers. [Unpublished raw data].

Food and Agriculture Organization (FAO) of the United Nations. (2019). Standard operating procedure for soil organic carbon. https://www.fao.org/3/ca7471en/ca7471en.pdf

Food and Agriculture Organization (FAO) of the United Nations. (2020). Soil testing methods. https://www.fao.org/3/ca2796en/CA2796EN.pdf

Food and Agriculture Organization (FAO) of the United Nations. (2021). Standard operating procedure for soil nitrogen. https://www.fao.org/3/cb3642en/cb3642en.pdf

Food and Agriculture Organization (FAO). (2023). NSP – fertilizer specifications. https://www.fao.org/agriculture/crops/thematic-sitemap/theme/spi/plantnutrition/fertspecs/en/

Forum for Nuclear Cooperation in Asia (FNCA). (2014). FNCA Guideline for biofertilizer quality assurance and control. https://www.fnca.mext.go.jp/bf/guideline.pdf

Global Soil Partnership (GSP)-Food and Agriculture Organization (FAO) of the United Nations. (2019). Fertilizer training aid and modules. [Unpublished raw data].

Incorporated Administrative Agency (IAA)-Food and Agricultural Materials Inspection Center (FAMIC). Testing methods for fertilizers. http://www.famic.go.jp/ffis/fert/obj/TestingMethodsForFertilizers2018.pdf

International Organization for Standardization (ISO). (1983). Fertilizers — determination of potassium content — potassium tetraphenylborate gravimetric method (reference method). https://www.iso.org/standard/11325.html

Liu, X., Wu, D., Abid, A. A., Liu, Y., Zhou J., & Zhang, Q. (2022). Determination of paddy soil ammonia nitrogen using rapid detection kit coupled with microplate reader. https://pubmed.ncbi.nlm.nih.gov/36548558/

Madjar, R. M., Moţ, A., Scăeţeanu, G. V., & Mihalache, M. (2020). Methods used for heavy metal determination in agricultural inputs. https://rjas.ro/download/paper_version.paper_file.ae233ec5016c1105.31392e2d34362e204d61646a6172204d4554484f44532055534544204 64f522048454156592020204d.pdf

National Institute for Molecular Biology and Biotechnology (BIOTECH)-University of the Philippines Los Baños (UPLB). (2023). Specifications for microbial inoculants. [Unpublished raw data].

Olsen, P. E., Sande, E. S., & Keyser, H. H. (1996). The enumeration and identification of rhizobial bacteria in legume inoculant quality control procedures. https://www.ctahr.hawaii.edu/bnf/Downloads/Inoculant/Perry%27s%20QC%20Manual.PDF

Organic Certification Center of the Philippines (OCCP)- Inspection and Certification Services. (2023). Specifications for organic fertilizers, organic plant supplements, and organic soil conditioners. [Unpublished raw data].

Pande, A., Pandey, P., Mehra, S., Singh, M., & Kaushik, S. (2017). Phenotypic and genotypic characterization of phosphate solubilizing bacteria and their efficiency on the growth of maize. https://doi.org/10.1016/j.jgeb.2017.06.005

Rees, G.L., Pettygrove, G. S., & Southard, R. J. (2013). Estimating plant-available potassium in potassium-fixing soils. https://doi.org/10.1080/00103624.2013.748129

Samal, D. P. K., Ray, P., Sukla, L. B., & Shukla, V. (2020). Isolation and screening of Azotobacter Spp. for plant growth promoting properties and its survival under different environmental stress conditions. https://doi.org/10.33263/BRIAC102.188192

Sorosoro Ibaba Development Cooperative (SIDC). (2023). Specifications for organic fertilizers. [Unpublished raw data].

Temperli, A.T., Misteli, H. (2004). Determination of potassium in soil extracts by atomic absorption spectrophotometry. https://doi.org/10.1016/0003-2697(69)90046-3

Traunfeld, J. (2023). Organic matter and soil amendments. University of Maryland Extension. https://extension.umd.edu/resource/organic-matter-and-soil-amendments

United States (US) Environmental Protection Agency (EPA). (1993). Part 503 — standards for the use or disposal of sewage sludge. Electronic Code of Federal Regulations (eCFR). https://www.ecfr.gov/current/title-40/chapter-I/subchapter-O/part-503

United States (US) Food and Drug Administration (FDA). (2001). Bacteriological Analytical Manual (BAM). https://www.fda.gov/food/laboratory-methods-food/bam-chapter-3-aerobic-plate-count

Wakarera, P. W., Ojola, P., & Njeru, E. M. (2022). Characterization and diversity of native Azotobacter spp. isolated from semi-arid agroecosystems of eastern kenya. https://www.ncbi.nlm.nih.gov/pmc/articles/PMC8941396/#RSBL20210612C11

Yadav, A. K. & Chandra K. National Centre of Organic Farming, Department of Agriculture and Cooperation. (2014). Mass production and quality control of microbial inoculants. https://web.archive.org/web/20180602065513id_/http://www.insa.nic.in/writereaddata/UpLoadedFiles/PINSA/Vol80_2014_2_Art29.pdf

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