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## Organic Fertilizer — Specification



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PUBLIC REVIEW DRAFT

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# Contents

Page

Foreword .....	iv
<b>1 Scope .....</b>	<b>1</b>
<b>2 Normative references .....</b>	<b>1</b>
<b>3 Terms and definitions .....</b>	<b>2</b>
<b>4 Description .....</b>	<b>4</b>
<b>5 Requirements .....</b>	<b>4</b>
5.1 Raw materials .....	4
5.2 General requirements .....	5
5.3 Specific Requirements .....	6
<b>6 Hygiene .....</b>	<b>7</b>
<b>7 Contaminants .....</b>	<b>8</b>
<b>8 Weights and measures .....</b>	<b>8</b>
<b>9 Packaging .....</b>	<b>9</b>
<b>10 Labelling .....</b>	<b>9</b>
10.1 Required information on the label .....	9
10.2 Other labelling requirements .....	9
10.2.1 Testimonials/Endorsements .....	Error! Bookmark not defined.
10.2.2 Other claims .....	9
10.2.3 Nutrient guarantees .....	10
10.2.4 Directions for use .....	10
10.2.5 Miscellaneous terms .....	10
10.2.3 Slowly available plant nutrients .....	10
10.2.4 Low leaching potential .....	10
<b>11 Sampling .....</b>	<b>10</b>
11.1 General .....	10
11.2 Sampling for solid organic fertilizers .....	10
11.3 Sampling for liquid organic fertilizers .....	10
11.3.1 General .....	10
11.3.2 Procedure for composite sampling .....	11
11.3.3 Sample preparation for laboratory analysis for organic liquid fertilizers .....	11
<b>Annex A (normative) Annex title .....</b>	<b>12</b>
<b>Annex B (informative) List of restricted and prohibited raw materials as inputs for organic fertilizer production .....</b>	<b>13</b>
B.1 General .....	13
<b>Bibliography .....</b>	<b>14</b>

## Foreword

Uganda National Bureau of Standards (UNBS) is a parastatal under the Ministry of Trade, Industry and Cooperatives (MTIC) established under Cap 327, of the Laws of Uganda, as amended. UNBS is mandated to co-ordinate the elaboration of standards and is

- (a) a member of International Organisation for Standardisation (ISO) and
- (b) a contact point for the WHO/FAO Codex Alimentarius Commission on Food Standards, and
- (c) the National Enquiry Point on Technical Barriers to Trade (TBT) Agreement of the World Trade Organisation (WTO).

The work of preparing Uganda Standards is carried out through Technical Committees. A Technical Committee is established to deliberate on standards in a given field or area and consists of key stakeholders including government, academia, consumer groups, private sector and other interested parties.

Draft Uganda Standards adopted by the Technical Committee are widely circulated to stakeholders and the general public for comments. The committee reviews the comments before recommending the draft standards for approval and declaration as Uganda Standards by the National Standards Council.

The committee responsible for this document is Technical Committee UNBS/TC 222, *Agrochemicals and Veterinary Drugs*

This **second** edition cancels and replaces the **first** edition (US 1584:2017), which has been technically revised.

This revision was undertaken to revise the moisture content in the Table 1 for Specific requirements for organic fertilizer. The revision was also under taken to address the specific requirements for the organic fertilizers and test methods

## Introduction

The crop removes large quantity of plant nutrients from soil, particularly the removal of NPK nutrients with the present level of crop production. Due to this, there is no addition of the nutrients into the soil thus resulting in depletion of the nutrient reserve of soil. The excessive reliance on chemical fertilizers and the negligence shown to the conservation and use of organic sources of nutrients have not only caused the exhaustion of soil of its nutrient reserves but also resulted in soil health problems not conducive to achieving consistent increase in agricultural production.

Organic fertilizers are natural products used by farmers to provide food (plant nutrients) for the crop plants. Organic fertilizers contain plant- or animal-based materials that are either a by-product or end-product of naturally occurring processes, such as animal manure and composted organic materials. There are a number of organic manures like farmyard manure, green manures, compost prepared from crop residues and other farm wastes, vermicompost, oil cakes, and biological wastes - animal bones, slaughterhouse refuse. Natural mineral deposits include but not limited to phosphate rock, green sand, Epsom salt, calcium, limestone flour.

Organic fertilizers increase the organic matter content in the soil. Living microorganisms in turn decompose the organic matter into the final stages of humus and in turn humus releases the plant food in available form for use by the crops. However, organic manures should not be seen only as carriers of plant food. These manures also enable a soil to hold more water and help to improve the drainage in clay soils. In addition, generally improve the soil texture and structure. They provide organic acids that help to dissolve soil nutrients from the rock particle sand and make them available for plants growth.

Organic fertilizers are of two types: solid and liquid organic fertilizers. Liquid organic fertilizers are concentrated liquids that are added to water and applied to the soil and/ or foliage. Liquid organic fertilizers provide soluble and easily available nutrient to the crops. Furthermore, they give plant nutrient in a faster-acting form than solid fertilizer. Liquid organic fertilizers consist of primary nutrient and may contain beneficial microorganisms and/or micronutrients.

Organic fertilizers are needed to maintain soil fertility. However, the improper use of organic fertilizers poses a risk of soil contamination. The amount of macro- and micronutrients involved in soil, plant, and food chain processes (precipitation, adsorption, and chelation) should be taken into account when considering the use of fertilizers. In this context, the use of organic fertilizers from municipal waste and organic waste from dairy, poultry, pigs, or horticultural activities can have a high environmental value and can be used to improve and maintain soil fertility. However, there are concerns on the quality and safety of this product to both humans and the environment.



# Organic Fertilizers — Specification

## 1 Scope

This Working Draft Uganda Standard specifies requirements, sampling and test methods for organic fertilizers.

## 2 Normative references

The following referenced documents 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.

AOAC 2006.03, *Arsenic, cadmium, cobalt, chromium, lead, molybdenum, nickel, and selenium in fertilizers — Microwave digestion and inductively coupled plasma-optical emission spectrometry*

US ISO 4831, *Microbiology of food and animal feeding stuffs — Horizontal method for the detection and enumeration of coliforms — Most probable number technique*

ISO 5318, *Fertilizers — Determination of potassium content — Potassium tetraphenylborate gravimetric method (Reference method)*

US ISO 6598, *Fertilizers — Determination of phosphorus content — Quinoline phosphomolybdate gravimetric method*

US ISO 7251, *Microbiology of food and animal feeding stuffs — Horizontal method for the detection and enumeration of presumptive Escherichia coli — Most probable number technique*

US ISO 7899-2, *Water quality — Detection and enumeration of intestinal enterococci — Part 2: Membrane filtration method*

US ISO 8157, *Fertilizers and soil conditioners — Vocabulary*

US ISO 8633, *Solid fertilizers — Simple sampling method for small lots*

US ISO 8634, *Solid fertilizers — sampling plan for the evaluation of a large delivery*

US ISO 10390, *Soil quality — Determination of pH*

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

US ISO 11047, *Soil quality — Determination of cadmium, chromium, cobalt, copper, lead, manganese, nickel and zinc — Flame and electro thermal atomic absorption spectrometric methods*

US ISO 11261, *Soil quality — Determination of total nitrogen — Modified Kjeldahl method*

US ISO 11265, *Soil quality — Determination of the specific electrical conductivity*

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

ISO 14255, *Soil quality — Determination of nitrate nitrogen, ammonium nitrogen and total soluble nitrogen in air-dry soils using calcium chloride solution as extractant*

ISO 14820-1, *Fertilizers and liming materials — sampling and sample preparation — Part 1: Sampling*

ISO 14820-2, *Fertilizers and liming materials — sampling and sample preparation — Part 2: Sample preparation*

US ISO 17318, *Fertilizers and soil conditioners— Determination of arsenic, cadmium, chromium, lead and mercury contents*

US ISO 17319, *Fertilizers and soil conditioners —Determination of water-soluble potassium content — Potassium tetraphenylborate gravimetric method Complimentary*

### 3 Terms and definitions

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

ISO and IEC maintain terminological databases for use in standardization at the following addresses:

— ISO Online browsing platform: available at <http://www.iso.org/obp>

**3.1 organic fertilizer**  
any product in solid or liquid form, of plant (except by-products from petroleum industries) or animal origin that has undergone substantial decomposition that can supply available nutrients to plants. This may be enriched by microbial inoculants and naturally occurring minerals but no chemical or inorganic fertilizer material has been added to the finished product to affect the nutrient content

**3.2 microbial inoculant**  
biologically active living cells 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: nitrogen fixation, decomposition of organic residues and enhancement of nutrient availability

**3.3 Natural mineral fertilizer**  
mineral nutrients include phosphate rock, greensand, Epsom salt, calcium, limestone flour and many other natural mineral deposits. Materials that are directly mined from mineral deposits and only subjected to physical processes such as crushing and drying. Examples of these materials may include: phosphate rock; gypsum; sulphate of potassium-magnesia that has been derived from ores that have been crushed, washed in water, dried and screened

**3.4 biosolids**  
organic material from sewage and related materials recycled and treated for use as a fertilizer

**3.5 Green manure**  
plants which are mainly succulent and leafy legume crop which are grown for a short duration and then ploughed in the same field and incorporated by ploughing



**3.6****Compost**

Well decomposed organic wastes like plant residues, animal dung and urine, earth from livestock sheds or waste fodder

**3.7****Vermicomposting**

type of compost making in which earthworms are used to convert organic wastes into valuable materials to supply nutrients for crops

**3.8****Bone meal**

fertilizer made from degreased bone which may be degelatinized and has been ground or crushed

**3.9****guano**

well decomposed accumulated and mined excrements of birds, bats and seals valued as fertilizers

**3.10****fish emulsion fertilizer**

a partially decomposed blend of finely pulverized fish

**3.11****blood meal**

dried, powdered blood collected from livestock slaughter houses used as fertilizer

**3.12****farmyard manure**

decomposed mixture of livestock dung and urine with straws and litter used as bedding material and residues from the fodder fed to livestock

**3.13****night soil**

human urine and faeces collected separately from each other or mixed with flush water and amendments such as soil, ash and other organic matter

**3.14****soil conditioner**

organic material added to soils to improve the physical and/ or chemical properties, and/ or the biological activity of soils without a declarable content of nutrients

**3.15****liquid organic fertilizers**

any product in liquid form, of plant (except by-products from petroleum industries) or animal origin, which has undergone substantial decomposition that can supply available nutrients to plants. This may be enriched by microbial inoculants and naturally occurring minerals

**3.16****liquid form**

suspension and/or a solution, where a suspension is a two-phase dispersion in which solid particles are maintained in suspension in the liquid phase, and a solution is a liquid that is free of solid particles, or a gel and includes pastes

NOTE:

The suspension should be solubilized after further dilution

### 3.17

#### **raw manure**

undecomposed animal excreta used to fertilize the land

## **4 Description**

Organic fertilizers are naturally available mineral sources that contain moderate amount of plant essential nutrients. They are capable of mitigating problems associated with synthetic fertilizers. They reduce the necessity of repeated application of synthetic fertilizers to maintain soil fertility.

Organic fertilizers comprise a variety of plant-derived materials that range from fresh or dried plant material to animal manures and litters to agricultural by-products. The nutrient content of organic fertilizers varies greatly among source materials, and readily biodegradable materials make better nutrient sources. Nitrogen and phosphorus content is lower, often substantially lower, in organic fertilizers compared to chemical fertilizers.

Commonly used organic fertilizers include composted animal manure, compost, sewage sludge, food processing wastes, and municipal biosolids. They improve soil health and release nutrients to soils gradually. Examples of naturally occurring organic fertilizers include manure, slurry, worm castings, peat, seaweed and guano. Green manure crops are also grown to add nutrients to the soil. Naturally, occurring minerals such as mine rock phosphate, sulfate of potash and limestone are also considered as Organic Fertilizers. Examples of manufactured organic fertilizers include compost, blood meal, bone meal and seaweed extracts. Other examples are natural enzyme digested proteins, fishmeal, and feather meal.

Organic fertilizers are considered an excellent source of nutrients, providing plants with vital vitamins, and soil acts as a medium between crops and fertilizers. Fertilizers can be divided into several types, depending on their components, shape, and various other properties.

Meat and bone meal is an industrial by-product obtained by treating animal carcasses with heat, removing the fat, and finally drying and mincing them. Due to the high levels of total nitrogen (8%), phosphorus (5%), and calcium (10%) in meat and bone meal, these organic matters can be considered as useful fertilizers for soil improvement.

Manure is an organic fertilizer used for soil fertilization after animal waste decomposes due to bacteria and fungi. Composting manure takes a relatively long time. This decomposed manure is later used in agriculture to increase and promote soil productivity. Well-decomposed manure contains N (0.5%), P<sub>2</sub>O<sub>5</sub> (0.3%), and K<sub>2</sub>O (0.5%). Manure is used as a fertilizer, improves soil productivity by providing practically all the elements needed by plants, but not always in the right amounts, and proportions. Slurry and solid manure are traditionally spread directly on the soil surface as fertilizers

organic fertilizers are an alternative to minimize the environmental pollution that may be due to excessive use of inorganic fertilizers.

Liquid fertiliser contains nutrient compounds that could be applied as plant enhancer and are used in foliar application, as it does not require soil medium and environmentally friendly. An organic liquid fertilizer can be produced from bio-wastes composting as it contains more organic nutrients that are essential to promote healthy plant growth.

## **5 Requirements**

### **5.1 Raw materials**

**5.1.1** Raw materials used for production of organic fertilizer shall include:

- a) farm animal manure, slurry, and urine;
- b) vermi compost;

- c) compost produced from organic residues;
- d) green manure and green leaf manure;
- e) Azolla;
- f) mulches from sugar cane trash, straw, etc.;
- g) kitchen waste;
- h) coir pith, plantation by-products and wastes
- i) mushroom beds;
- j) oil cakes, milled by-products, etc.;
- k) tea/coffee grounds;
- l) fish and fish products without preservatives;
- m) meat and bone meal
- n) seaweed;
- o) crop residues (straw, peanut hulls, etc.);
- p) natural mineral deposits and
- q) plant growth promoting microbes such as, Rhizobia, Mychorrizae and others of non-genetically modified origin (GMO).

**5.1.2** Those restricted as listed in Annex B should be used after having undergone recommended treatment or quality control.

**5.1.3** Those prohibited as listed in Annex B should not be used under any circumstances.

## **5.2 General requirements**

**5.2.1** Organic fertilizers shall:

- a) be free from foul odour;
- b) not contain substances that are likely to be detrimental or injurious to vegetation, animals, public health or the environment when used according to the directions provided by the manufacturer;
- c) not contain substances that would, when applied in amounts commonly used or as specified in the directions for use, leave in the tissues of a plant, a residue of a poisonous or harmful substance;
- d) homogenous in texture;
- e) free from contaminants which include but not limited to residual hormones, antibiotics, pesticides and disease organism;
- f) Raw manures shall not be used as pre plant or side dress fertilizers on vegetables that are eaten raw;

- g) Untreated dog, cat or pig manures and those derived from equines (donkey and horse family) shall not be used as these species share many parasites with humans; and
- h) Raw manure may not be applied to food crops within 120 days of harvest where edible portions have soil contact.

**5.2.2** Organic fertilizer in solid form shall be:

- a) fine enough for 100 % thereof to pass through a 5-mm standard sieve;
- b) For organic fertilizer with microbial inoculants, the genus shall be verifiable by the competent Authority as natural source and be indicated on the label;
- c) No chemical or inorganic materials should be added to organic fertilizers;
- d) be fully composited during which the compost shall be turned at least once;
- e) be based on composted livestock and/or plant materials supplemented with only natural products; and
- f) Raw manure may NOT be applied to food crops within 90 days of harvest where edible portions do not have soil contact (i.e., grain crops, and most tree fruits.) contaminants.

**5.2.3** Organic fertilizer in liquid form shall be:

- a) biodegradable;
- b) not contain any artificial colours;
- c) not contain substances that are likely to be harmful or injurious to vegetation, animals, soil health, public health or the environment when used according to its intended use specified by the label; and
- d) not contain any poisonous residues, when applied in amounts commonly used or as specified in the directions for use.

**5.3 Specific Requirements**

**5.3.1** Organic fertilizer shall comply with the requirements given in Table 1 when tested in accordance with the methods specified therein.

**Table 1 — Specific requirements for organic fertilizers**

S/N	Characteristic	Limit	Test method
i.	Total NPK, %	5 - 7	ISO 11261 ISO 6598 ISO 5318
ii.	C:N	12:1 - 15:1	-
iii.	Soluble salts (conductivity), mmhos/cm, max.	5	ISO 11265
iv.	Total nitrogen, % m/m, min.	1	ISO 11261
v.	Organic carbon, % m/m, min.	12	ISO 10694
vi.	Moisture content (solid organic fertilizer), %, m/m	10-30	ISO 11465

vii.	Dry matter content (solid), %, m/m, min	70	ISO 11465
viii.	pH	6.0 - 10.0	ISO 10390
ix.	Stones >5 mm size, % m/m, max	5	
x.	Seed, number/kg, max	5	

5.3.2 Liquid Organic fertilizers shall comply with the requirements given in Table 2 when tested in accordance with the methods specified therein.

**Table 2 — Specific requirements for liquid organic fertilizers**

S/N	Characteristic	Limit	Test method
i.	Total NPK, %	2	ISO 11261 ISO 6598 ISO 5318
ii.	Electrical conductivity, dS/m, max.	20	ISO 11265
iii.	Total nitrogen, % m/m, min.	1	ISO 11261
iv.	Organic carbon, % m/m, min.	5	ISO 10694
v.	pH	6.0-8.5	ISO 10390
vi.	Total Potassium content as K <sub>2</sub> O, % m/m, min.	0.5	ISO 5318
vii.	Total Phosphorus content as P <sub>2</sub> O <sub>5</sub> , % m/m, min	0.5	ISO 6598

## 6 Hygiene

Organic fertilizers shall comply with the limits for microorganisms specified in Table 3 when tested in accordance with the methods specified therein.

**Table 3 — Microbiological limits for organic fertilizer**

S/N	microorganisms	Limit	Test method
i.	Total coliforms, cfu/g	5 x 10 <sup>2</sup>	US ISO 4831
ii.	<i>Salmonella</i> in 25 g fresh mass	Absent	AOAC 967.26 US ISO 6579-1
iii.	<i>Escherichia coli</i> cfu/g	Absent	US ISO 7251
iv.	<i>Enterococci</i> cfu/g	Absent	US ISO 7899-2

v.	<i>Faecal streptococci cfu/g</i>	<500	-
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## 7 Contaminants

7.1 The maximum limits for heavy metal contaminants in organic fertilizer shall comply with the requirements given in Table 4 when tested in accordance with the methods specified therein.

**Table 4 — Heavy metal limits for organic fertilizer**

S/N	Heavy Metal	mg/kg dry wt.	Test method
i.	<i>Arsenic (As)</i>	10	ISO 17318
ii.	<i>Lead (Pb)</i>	100	AOAC 2006.03
iii.	<i>Mercury (Hg)</i>	2	
iv.	<i>Cadmium (Cd)</i>	5	
v.	<i>Chromium(Cr)</i>	50	
vi.	<i>Copper(Cu)</i>	300	ISO 11047

7.2 The maximum limits for heavy metal contaminants in liquid organic fertilizers shall comply with the requirements given in Table 5 when tested in accordance with the methods specified therein.

**Table 5 — Heavy metal limits for organic fertilizer**

S/N	Heavy Metal	mg/kg dry wt.	Test method
i.	<i>Arsenic (As)</i>	0.5	ISO 17318
ii.	<i>Lead (Pb)</i>	1.0	AOAC 2006.03
iii.	<i>Mercury (Hg)</i>	0.5	
iv.	<i>Cadmium (Cd)</i>	0.5	
v.	<i>Chromium(Cr)</i>	0.5	

## 8 Weights and measures

The weight and volume of the package of the product shall comply with the Weights and Measures Act.

## 9 Packaging

The containers, including packaging materials, used to package organic fertilizers shall be made only of materials, which are safe and suitable for their intended uses. They shall not impart any toxic substance or undesirable odour or flavour to the product.

## 10 Labelling

### 10.1 Required information on the label

In addition to the requirements in US EAS 38, the following specific labelling requirements shall apply and shall be legibly and indelibly marked:

- a) name of the product as “Organic fertilizer”;
- b) active ingredient shall appear in close proximity to the name of the product by specifying the genus and species of microbial inoculants;
- c) name and physical address of manufacturer/producer, exporter, packer or distributor;
- d) type of carrier;
- e) batch or code number;
- f) crops for which it is intended;
- g) storage instructions;
- h) disposal instructions;
- i) date of manufacture;
- j) expiry date;
- k) net content in metric units;
- l) nutrient content
- m) product registration number;
- n) risk warning
- o) rate of application;
- p) directions/instructions for use; and
- q) country of origin.

### 10.2 Other labelling requirements

#### 10.2.1 Other claims

Any reference to the activity of a product containing plant nutrients that is not generally associated with its nutritional value shall be substantiated with statistically significant efficacy data derived from field trials.

## 10.2.2 Nutrient guarantees

Any reference to the activity of a product containing plant nutrients that is not generally associated with its nutritional value shall be substantiated with statistically significant efficacy data derived from field trials.

## 10.2.3 Directions for use

**10.2.3.1** All organic fertilizers shall carry instructions for use. These instructions shall specify both the rate and time and frequency of application based on the growth stage and crop. Suggested rates of application shall provide an adequate quantity of nutrients to the plants concerned.

**10.2.3.2** Where the product does not contain all three major plant nutrients, the label should carry a statement indicating that some plants may require an additional source of the nutrient(s) that are lacking.

**10.2.3.3** Any product containing composted materials or plant nutrients may represent a potential hazard when misused. In order to avoid giving the impression that reasonable precautions are unnecessary, blanket statements suggesting that the product is completely safe and non-toxic to humans, animals or the environment shall not appear on the label.

## 10.2.4 Miscellaneous terms

**10.2.4.1** Words, such as balanced and healthy, shall be avoided, as they are often misunderstood and consequently misleading.

**10.2.4.2** Also objectionable and comparatives such as best, superior, and greener, shall be avoided as they imply a comparison without indicating the basis of this comparison.

## 10.2.5 Slowly available plant nutrients

Only products providing at least 70 % of a plant nutrient in a slowly available form may indicate this on the label. Such a claim shall be accompanied by the associated guarantee.

## 10.2.6 Low leaching potential

Only products containing at least 70 % of a nutrient in a slowly available form may indicate that nutrient will be slowly available and thus unlikely to leach when used in accordance with label instructions.

# 11 Sampling

## 11.1 General

- a) If the consignment is declared to consist of different batches of manufacture, containers of the same batch shall be grouped together and each group so formed shall constitute a separate lot; and
- b) Samples shall be tested from each lot for ascertaining conformity to the requirements of this standard.

## 11.2 Sampling for solid organic fertilizers

Sampling shall be done in accordance with ISO 8633 and ISO 8634.

## 11.3 Sampling for liquid organic fertilizers

### 11.3.1 General

All finished liquid products shall be subjected to lot sampling for laboratory analysis in accordance with Table 5:



Table 3 — Contaminant limits for organic fertilizer

S/No	Number of containers* per batch	Containers to be sampled per batch
i.	<50	1
ii.	51 to 100	2
iii.	101 to 300	3
iv.	301 to 500	4
v.	More than 500	5
NOTE 1 container = 1 L		

### 11.3.2 Procedure for composite sampling

**11.3.2.1** Present to the inspector and any Authorised person the production documents containing the number of containers per batch number and container number.

**11.3.2.2** The inspector and / or Authorised person shall randomly select the container number and subject the selected containers for analysis.

**11.3.2.3** 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.

NOTE if the samples analysed do not conform to the standards, the Certification Body should review the production process, which may include bulk sampling.

### 11.3.3 Sample preparation for laboratory analysis for organic liquid fertilizers

**11.3.3.1** For liquid fertilizers without suspended particles, stir the sample until it is thoroughly mixed, before taking a sample.

**11.3.3.2** For liquid fertilizers with suspended particles, take a sample while mixing the material in order to obtain a representative sample.

**Annex A**  
(normative)

**Annex title**

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## Annex B (informative)

### List of restricted and prohibited raw materials as inputs for organic fertilizer production

#### B.1 General

S/N	Input	Status	Limitations/Rationale
1.	Raw / undecomposed human excrement, including urine	P	Risk of contamination
2.	Sewage sludge	R	Only sludge from farms/bio-digesters is allowed
3.	Saw dust, bark, wood chips, wood ash	R	Wood not chemically treated after felling
4.	Blood meal, bone, and other meal brought in from other sources	R	Origin of materials should be disease - free and without preservatives
5.	Guano	R	Concerns on environmental sustainability - rate of extraction is subject to regulations
6.	Segregated biodegradable market waste	R	Has undergone proper segregation, and does not contain hazardous materials
7.	Sedimentary rocks (limestone, dolomite, rock phosphate)	R	May contain elevated levels of trace elements. Detailed chemical analysis is necessary.
8.	Igneous rocks (andesite, basalt, gabbro, diorite)	R	May contain elevated levels of trace elements. Detailed chemical analysis is necessary.
9.	Metamorphic rocks (slate, schist)	R	May contain elevated levels of trace elements. Detailed chemical analysis is necessary.
NOTE1 If in case there are raw materials not listed in this Standard, the requirements of the National Organic Agriculture Standards shall be followed			
NOTE 2 P and R stands for prohibited and restricted respective			

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- [22] Characterization of Liquid Fertilizer from Different Types of Bio-Waste Compost and its Correlation with the Compost Nutrients

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