



DRAFT TANZANIA STANDARD

Organic fertilizer — Specification

PUBLIC COMMENT ONLY

Organic fertilizer — Specification

0 Foreword

Organic fertilizers are natural products used by farmers to provide plant nutrients for the crop plants. There are a number of organic fertilizers like farmyard manure, green manures, compost prepared from crop residues and other farm wastes, vermicompost, oil cakes, and biological wastes - animal bones, slaughter house refuse.

Organic fertilizers increase plant nutrients when decomposed by soil microorganisms and increase organic matter in the soil. Organic matter enables the plant nutrients to be in available form for use by the crops. The organic matter improves the soil structure hence enable a soil to hold more water and also help to improve the drainage in soils.

In the preparation of this Tanzania Standard, considerable assistance has been derived from:

EAS 456:2007 Organic products standard.

KS 2290: 2011 Organic fertilizer — Specification

In reporting the results of a test or analysis made in accordance with this Tanzania Standard, if the final value observed or calculated, is to be rounded off, it shall be done in accordance with TZS 4

1 Scope

This Tanzania Standard specifies requirements, methods of sampling and test for organic fertilizers.

2 Normative references

The following referenced documents are indispensable for the application of this standard. 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*

TZS 4 *Rounding off numerical values*

TZS1108, *Fertilizers — Determination of phosphorus content — Quinoline phosphomolybdate gravimetric method*

TZS 156, *Fertilizers and soil conditioners — Vocabulary*

TZS 1014, *Solid fertilizers and soil conditioners — Test sieving*

[ISO 10390](#), *Soil quality — Determination of pH*

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

TZS 119 – *Microbiology – General guidance for the enumeration of coliforms – Most Probable Number technique (MPN).*

TZS 122 – *Microbiology of food and animal feeding stuffs – Horizontal method for the detection of Salmonella spp.*

TZS 731 – *Microbiology of food and feeding stuffs – Horizontal method for detection and enumeration of presumptive Escherichia coli – Most Probable Number Technique.*

TZS 1015 *Fertilizers – Determination of Total Nitrogen Content – Titrimetric method after distillation*

TZS 990 *Solid fertilizers – Determination of moisture content*

ISO 17184, *Soil quality — Determination of carbon and nitrogen by near-infrared spectrometry (NIRS)*

3 Terms and definitions

For the purpose of this standard, the terms and definitions in TZS 156 and the following apply.

3.1

biosolids

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

3.2

blood meal

dried, powdered blood collected from livestock slaughterhouses used as a fertilizer

3.3

bone meal

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

3.4

compost

well decomposed organic wastes obtained from composted livestock and/or plant materials supplemented with only natural products.

3.5

cottonseed meal

milled cotton seeds used as a fertilizer

3.6

farmyard manure

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

3.7

fertilizer

A substance that increases soil fertility by supplying plant nutrients or by conditioning the soil with organic matter.

3.8

fish emulsion fertilizer

a partially decomposed blend of finely pulverized fish

3.9

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.

3.10

guano

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

3.11

manure

mixture of litter and/or dung in process of biological decomposition

3.12

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.

3.13

night soil

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

3.14

organic based product

a product that contains at least 70% organic material

3.15

organic fertilizer

fertilizer in solid or liquid form, naturally occurring and originating from organic material. These may include: farmyard manure, green manure, compost, guano, alfalfa meal, bone meal, blood meal, feather meal and sea weed meal, night soil, biogas slurry, urine based, and other materials found in nature.

3.16

organic matter

biomass of animals and plants. For this reason, only products that are solely derived from plant and animal biomass may be identified or described as "organic".

3.17

sewage sludge

a recycled product of sewage treatment plants

3.18

vermicompost

product or process of composting using various worms such as earthworms to create a heterogenous mixture of decomposing vegetable or food waste, bedding materials

3.19

raw manure

Undecomposed animal excreta used to fertilize the land

4 REQUIREMENTS

4.1 General requirements

4.1.1 Manure

organic fertilizer shall be:

- of uniform colour
- homogenous in texture
- free from foul smell
- free from pathogens.
- free from contaminants which include but not limited to residual hormones, antibiotics, pesticides, heavy metals shall not exceed the permitted levels.

4.1.2 Raw manures

All Raw manures shall be subjected to appropriate treatment. However, where they are used, the following conditions shall apply:

- Raw manures shall not be used as preplant or side dress fertilizers on vegetables that are eaten raw.
- 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.
- Raw manure may NOT be applied to food crops within 120 days of harvest where edible portions have soil contact.
- 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.
- Untreated human wastes shall not be used as fertilizer

4.2 Specific requirements

Organic fertilizers shall conform to the composition requirements set out in Table 1

| S/No. | Parameter | Limit | Method of test |
|-------|---|-----------|-------------------|
| I | pH in H ₂ O | 6.5 – 8.5 | ISO 10390 |
| li | Carbon: Nitrogen ratio | ≤ 20:1 | ISO 17184 |
| lii | Moisture content, (solid) %, m/m | 15-25% | TZS 990 |
| Iv | Temperature, °C | 20-30 | |
| V | Total Nitrogen, %, m/m, min. | 1 | TZS 1015 |
| Vi | Dry matter content (solid), %, m/m, min. | 70 | TZS 990 |
| Vii | Organic carbon, %, m/m, min. | 12 | ISO 10694 |
| viii | Total primary nutrients — N+P ₂ O ₅ +K ₂ O (solid and liquid organic fertilizer), %, m/m, min. | 5 | TZS 1015, TZS1108 |

5 Contaminants

5.1 Heavy metal contamination in Organic fertilizers shall not exceed the limits given in table 2 when determined by the methods prescribed in AOAC 2006.03.

Table 2 — Heavy metal contaminants limits

| SL No. | Parameter | Requirement in ppm | Test methods |
|--------|--------------------|--------------------|--------------|
| i) | Arsenic, As, max. | 10.0 | AOAC 2006.03 |
| ii) | Cadmium, Cd, max. | 5.0 | |
| iii) | Mercury, Hg, max. | 0.1 | |
| iv) | Chromium, Cr, max. | 50.0 | |
| v) | Lead, Pb, max. | 30.0 | |

6 Hygiene

The fertilizer shall be free from pathogenic organisms. Where applicable, organic fertilizer shall also comply with the following limits;

Table 3. — Pathogenic organism requirements

| Microorganisms | Requirements | Method of test |
|--|--------------|----------------|
| <i>E. coli</i> MPN/g, | Absent | TZS 731 |
| <i>Salmonella</i> spp in 25 g fresh mass | Absent | TZS 122 |
| Faecal streptococci cfu/g | <500 | Annex B |
| Total coliforms cfu/g | Nil | TZS 119 |

7 Sampling and Testing

7.1 Sampling for laboratory analysis

All finished products should be subjected to lot sampling for laboratory analysis using the following procedure:

For composite sampling of solid products:

- (1) Present to the inspector the production documents containing the number of bags per batch number and bag number.
- (2) The inspector will randomly select the bag number (See Table 4).
- (3) The selected bags will be emptied into a clean area. All contents of the selected bags will be thoroughly mixed.
- (4) Submit five kilograms (5 kg) of the composite sample to the laboratory.
- (5) Information relative to the sample taken must be accurate and complete to allow traceability of the sample back to the lot from which it was sampled.

Table 4 — Required Number of Samples for Solid Products

| Number of bags* per batch | Bags to be sampled |
|---------------------------|--|
| ≤50 | 2 |
| 51 to 100 | 3 |
| 101 to 300 | 8 |
| 301 to 500 | 15 |
| 501 to 1000 | 20 |
| More than 1000 | For every extra 100 bags sample 1 additional bag from 20 |
| * NOTE 1 bag = 50 kg | |

For composite sampling of liquid products:

- (1) Present to the inspector the production documents containing the number of containers per batch number and container number.
- (2) The inspector will randomly select the container number and subject the selected containers for analysis.
- (3) Information relative to the sample taken must be accurate and complete to allow traceability of the sample back to the lot from which it was sampled.

Table 5 — Required number of samples for liquid products

| Number of containers* per batch | Containers to be sampled |
|---|--------------------------|
| ≤ 50 | 1 |
| 51 to 100 | 2 |
| 101 to 300 | 3 |
| 301 to 500 | 4 |
| More than 500 | 5 |
| *NOTE: 1 container should be at least 1 L | |

7.2 sample preparation for laboratory analysis

(a) For solid samples with uniform fineness

Place sample on a clean piece of paper and mix thoroughly. Reduce sample to a quantity sufficient for analysis by quartering. Mix and store in air-tight container.

(b) For organic liquid fertilizers

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

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

7.3 Testing

Testing of the fertilizer shall be done as prescribed in the methods of analysis indicated in respective test methods standards.

8 Packaging, Marking and labelling

8.1 Packaging

The fertilizer shall be packaged in materials that are clean and non-defective that protects the product from physical, chemical and moisture contamination and withstand multiple stages of handling (transportation and storage).

8.2 Labelling

8.2.1 The following shall be legibly and indelibly marked on the package in either Kiswahili or Kiswahili and English

- i. Name of the fertilizer i.e. Organic fertilizer (only if it conforms to this standard)
- ii. Name and address of the manufacturer/packer/importer
- iii. Nutrient content
- iv. Carbon/Nitrogen ratio
- v. Organic matter content
- vi. Moisture content
- vii. Batch number
- viii. Production date and Expiry Date
- ix. Handling instructions
- x. Directions for Use

- x. Storage instructions
- xi. Country of origin

8.3 Marking

The containers/bags may also be marked with the TBS Standards Mark of Quality.

NOTE – The TBS Standards Mark of Quality may be used by the manufacturers only under license from TBS. Particulars of conditions under which the licenses are granted, may be obtained from TBS.

8.4 Other labelling guidelines

- a) **Testimonials/endorsements** — The public has no way of evaluating the status of the endorser in relation to a product. For this reason, testimonials and endorsements will be viewed as claims and evaluated accordingly.
- b) **Other claims** — Any reference to the activity of a product containing plant nutrients that is not generally associated with its nutritional value must be substantiated with statistically significant efficacy data derived from field trials.
- c) **Nutrient guarantees** — Any product represented as a source of plant nutrients must carry a guaranteed analysis.
- d) Any product containing organic materials or plant nutrients may represent a potential hazard when misused. Thus, unnecessary blanket statements suggesting that the product is completely safe and non-toxic to humans, animals or the environment must not appear on the label.
- e) **Miscellaneous terms** — Words, such as balanced and healthy, should be avoided as they are often misunderstood and consequently misleading.

Also objectionable are comparatives such as best, superior, and greener, as they imply a comparison without indicating the basis of this comparison

h) **Environmentally beneficial** — Any product represented as "environmentally sound", etc. must identify the rationale for the claim and list all ingredients in order to allow the consumer to determine the validity of the statement.

Annex A

(Informative)

Substances that May be Used as Fertilizers or Soil Conditioners

| Substance | Description; Compositional requirements; Conditions of use |
|---|--|
| Plant and animal origin | |
| Farmyard and poultry manure | <p>Products comprising a mixture of animal excrements and vegetable matter (animal bedding).</p> <p>Indication of animal species.</p> <p>Coming from extensive farming, but if sourced from intensive farming or not sourced from organic production systems, need recognition by the approved certifying organisation and shall be composted.</p> |
| Slurry or urine (not from human origin) | <p>If not from organic farming sources, need recognition by the approved certifying organisation.</p> <p>Use after controlled fermentation and/or appropriate dilution.</p> <p>Factory farming sources not permitted.</p> <p>Indication of animal species.</p> |
| Composted animal excrements, including poultry manure | <p>Need recognition by the approved certifying organisation.</p> <p>Indication of animal species.</p> |

| Substance | Description; Compositional requirements; Conditions of use |
|--|--|
| Dried farmyard manure and dehydrated poultry manure | <p>Need recognition by the approved certifying organisation.</p> <p>Indication of animal species.</p> <p>Coming from extensive farming, but if from intensive farming sources it must be composted.</p> |
| Guano | Need recognition by the approved certifying organisation. |
| Straw | Need recognition by the approved certifying organisation. |
| Composts from spent mushroom and dejecta of worms and insects (vermiculture substrates) | The initial composition limited to products on this list. |
| Composted or fermented organic household refuse | <p>Organic vegetable and animal waste separated from household waste, which has been subjected to composting or anaerobic fermentation for biogas production.</p> <p>Need recognition by the approved certifying organisation.</p> |
| Composted or fermented plant residues | <p>Need recognition by the approved certifying organisation.</p> <p>Mixtures of plant matter which has been subjected to composting or anaerobic fermentation for biogas production.</p> |
| <p>Products and by-products of animal origin from slaughterhouses & fish industries:</p> <ul style="list-style-type: none"> — blood meal — hoof meal — horn meal — bone meal or degelatinized bone meal — fish meal — meat meal — feather, hair and "chiquette" meal — wool — fur | <p>Need recognition by the approved certifying organisation.</p> <p>—</p> <p>—</p> <p>—</p> <p>Heavy metal contamination monitoring necessary</p> <p>—</p> <p>—</p> |

| Substance | Description; Compositional requirements; Conditions of use |
|--|---|
| <ul style="list-style-type: none"> — hair — dairy products | <ul style="list-style-type: none"> — — |
| By-products of food & textile industries | Not treated with synthetic additives. Need recognition by the approved certifying organisation. |
| Seaweeds and seaweeds products | Need recognition by the approved certifying organisation. Directly obtained by — physical processes; extraction with water or acid and/or alkaline solution; and fermentation. |
| Sawdust, bark and wood waste | From wood not chemically treated after felling. |
| Wood ash | From wood not chemically treated after felling. |
| | |
| Calcium lignosulfate | Recognized by the competent authority |
| Naturally occurring biological organisms e.g. worms | |
| Peat | Should not be extracted or treated using inorganic chemicals; permitted for seed, potting module composts. |
| By-products of industries processing ingredients from organic agriculture | Need recognition by the approved certifying organisation. |
| Night soil-faeces and material containing faecal matter | Subjected to either of the following treatments: composting, incineration/drying, anaerobic digestion and ammonia treatment |
| Sewage Sludge | Subjected to anaerobic digestion/fermentation, composting or long-time treatments |
| Human urine | Proper storage (based on the action of ammonia in combination with temperature. |
| Stillage and stillage extract | Ammonium stillage excluded. |

Annex B

1. Materials and Culture Media

Preferably use commercially available medium. Follow manufacturer's instructions for storing and discarding after preparation. If the medium must be prepared from basic ingredients, follow directions below.

a. Azide dextrose broth:

| | |
|--------------------------------------|--------|
| Beef extract | 4.5 g |
| Tryptone or polypeptone | 15.0 g |
| Glucose..... | 7.5 g |
| Sodium chloride, NaCl | 7.5 g |
| Sodium azide, NaN ₃ | 0.2 g |
| Reagent-grade water | 1 L |

CAUTION: *Sodium azide is a dangerous chemical requiring special attention and care. It is toxic and mutagenic. Take precautions to avoid contact with this compound. Azide also can form explosive compounds if it contacts metal pipes.*

Adjust pH so it is 7.2 ± 0.2 at 25°C after sterilization. If pH is out of range, adjust and retest pH; discard if pH remains out of range. The media described in this section are available commercially; follow manufacturer's instructions for storage and disposal after preparation.

b. Bile esculin azide agar:

| | |
|-------------------------------|--------|
| Yeast extract..... | 5.0 g |
| Proteose peptone No. 3..... | 3.0 g |
| Tryptone | 17.0 g |
| Oxgall | 10.0 g |
| Esculin..... | 1.0 g |
| Ferric ammonium citrate | 0.5 g |
| Sodium chloride | 5.0 g |
| Sodium azide..... | 0.15 g |
| Agar..... | 15.0 g |
| Reagent-grade water | 1 L |

CAUTION: *Sodium azide is a dangerous chemical requiring special attention and care. It is toxic and mutagenic. Take precautions to avoid contact with this compound. Azide also can form explosive compounds if it contacts metal pipes.*

2. Presumptive Test Procedure

Inoculate a series of tubes of azide dextrose broth with appropriate graduated quantities of sample. Use sample volumes of 10 mL or less. Use double-strength broth for 10-mL inocula. The sample portions used will vary in size and number with the sample character. Use only decimal multiples of 1 mL. Incubate inoculated tubes at $35 \pm 0.5^\circ\text{C}$. Examine each tube for turbidity at the end of 24 ± 2 h. If no definite turbidity is present, reincubate, and read again at the end of 48 ± 4 h.

3. Confirmed Test Procedure

After 24 or 48 h incubation, subject all azide dextrose broth tubes showing turbidity to the confirmed test for streptococci. Streak a portion of growth from each positive azide dextrose broth tube on bile esculin azide agar (BEA). Invert and incubate the dish at $35 \pm 0.5^\circ\text{C}$ for 24 ± 2 h. Brownish-black colonies with brown halos confirm the presence of fecal streptococci. Then, transfer brownish-black colonies with brown halos to two tubes of brain– heart infusion (BHI) broth: one with 6.5% NaCl and one without NaCl. If growth is observed when tube is incubated at $35 \pm 0.5^\circ\text{C}$ after 48 ± 4 h (BHI broth with 6.5% NaCl) or 24 ± 2 h (BHI broth without NaCl), the colony is confirmed as a member of the *Enterococcus* genus. The aforementioned procedure is expected to offer an acceptably accurate confirmation of the presence of the *Fecal Streptococci*. However, more accuracy ($\geq 90\%$) can be achieved by doing all of the following: observing gram-positive cocci, a catalase-negative reaction, growth on BHI agar at $10 \pm 0.5^\circ\text{C}$, positive pyrrolidonylarylamidase (PYR) activity, and positive leucine aminopeptidase (LAP) reaction 3,4 using a commercially available test kit.

4. Computing and Recording MPN

Calculate the total fecal streptococci density from the number of confirmed positive cultures on bile esculin azide agar and corresponding positive tubes of BHI broth with 6.5% NaCl at $35 \pm 0.5^\circ\text{C}$ after 48 ± 4 h. Compute the combination of positive and negative tubes and record as the most probable number (MPN).