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Coco peat — Specification

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REVISION OF KENYA STANDARDS

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Coco peat — Specification

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Foreword

This Kenya Standard was developed by the Coconut and Coconut Related Products and Services Technical Committee under the guidance of the Standards Projects Committee, and it is in accordance with the procedures of the Kenya Bureau of Standards.

Coco peat (cocopeat), also known as coir pith, coir fibre pith, coir dust, or simply coir, is made from coconut husks, which are byproducts of other industries that use coconuts. Raw coconuts are washed, heat-treated, screened and graded before being processed into coco peat products of various granularity and denseness, which are then used for horticultural and agricultural applications and as industrial absorbent.

Coco peat is used for seed starting, bedding plants, planters, gardens, container plants. Anywhere you can use peat moss. The properties of Coco Peat make it resistant to bacterial and fungal growth. So coco peat is a multipurpose growing medium that provides new opportunities for potting mix suppliers, seedling nurseries, hydroponic growers & golf green constructors.

Coco peat is a proven natural alternative to mined peat moss, therefore using it helps slow down peat extraction from environmentally sensitive swamps worldwide. Used as a growing medium coco peat outperforms most of the popular brands of peat and sphagnum peats.

Usually shipped in the form of compressed bales, briquettes, slabs or discs, the end user usually expands and aerates the compressed coco peat by the addition of water.

Due to low levels of nutrients in its composition, coco peat is usually not the sole component in the medium used to grow plants. When plants are grown exclusively in coco peat, it is important to add nutrients according to the specific plants' needs.

Being a good absorbent, dry coco peat can be used as an oil absorbent on slippery floors. Coco peat is also used as a bedding in animal farms and pet houses to absorb animal waste so the farm is kept clean and dry. Though its application in Kenya is not so widespread, the potential is there. This document is intended to offer guidelines on the quality to be marketed within our market.

This document was prepared by KEBS/TC 171/SC 01, on Coconut and Coconut related services. This Fourth edition cancels and replaces the third edition (KS 2473:2018), of which it constitutes a minor revision.

The changes compared to the previous edition are as follows:

- Test methods for parameters in Table 1 have been updated and included as appropriate;
- Method of test for pH has been updated and included in Annex B;
- Method of Test for Ash content and determination of Bulk Density have been referenced to A5TM D 2974- and ASTM D4531-86(2008), respectively;
- An exclusion clause was inserted in the scope;
- the document has been editorially revised.

During the development of this standard reference was obtained from the following document:

KNWA 2473:2014, Coco peat — Specification.

Acknowledgement is hereby made for the assistance received from this source

Coco peat — Specification

1 Scope

1.1 This Kenya Standard specifies the requirements, test methods and sampling for coco peat for agricultural and industrial applications.

1.2 Coco peat products (also known as coir pith or coir peat) for use as a growing medium in various grades and finished products for horticultural/agricultural use e.g. grow slabs, grow bags, bales, blocks, discs, pots, starter cubes and small blocks. Coco peat as used in this standard includes the products known as "chips" and "crush", derived from the wholechopped and crushed husk pieces. Product may be compressed or non-compressed.

1.3 This standard does not cover the requirements for importation of the following plant commodity classes:

- Excavated peat.
- Coco peat growing media associated with the importation of nursery stock.

2 Normative References

The following documents are referred to in the text in such a way that some or all of their content constitutes requirements of this document. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

A5TM D 2974- Standard Test Methods for Moisture, Ash, and Organic Matter of Peat and Other Organic Soils

ASTM D4531-86(2008) - Standard Test Methods For Bulk Density Of Peat And Peat Products

3 Terms and definitions

For the purposes of this standard, the following term and definition shall apply:

3.1

coco peat

is the "coir fibre pith" or "coir dust" a bi-product produced when processing the coconut husks for extraction of long fibre from the husks. Coco peat is the binding material that comes from the fibre fraction of the coconut husk.

4 General requirements

4.1 Coco peat shall be kept clean and free of seeds, pests, soil, animal material and any other contamination. Where possible;

4.1.1 No imported coco peat shall to be produced from the traditional method of retting husks in open troughs or ponds.

4.1.2 Washing or rinsing of coco peat, chips or crush shall be carried out with bore water, not pond or dam water.

4.1.3 Coco peat drying areas shall be buffered underneath from contact with soil.

KS 2473:2023

4.1.4 A plant free buffer zone of 3 metres shall be maintained around the coco peat drying areas unless concrete walls are built on the perimeter of concrete pads.

5 Transport requirements

All consignments shall be packed and shipped in a manner to prevent contamination by regulated pests.

6 Documentation

All documentation shall be inspected to ensure compliance with the requirements of this standard and any additional requirements specified on an import permit. Documentation shall be in the English language, and can be bilingual.

It is the importer's/exporter's responsibility to ensure that any documentation presented is made in accordance with the requirements of this standard and is clearly legible. Failure to do so may result in delays in obtaining authorised movement and/or biosecurity clearance, or the rejection of consignments.

7 Treatment

7.1 Coco peat shall be treated in accordance to Annex A in order to enhance biosecurity.

7.2 Alternative official procedure for the killing, inactivation or removal of pests, or for rendering pests infertile or for devitalization shall be in accordance to FAO, 1990, revised 1995.

8 Microbiological limits

When tested in accordance with relevant Kenya Standard, the microbiological requirements shall be such that;

- a) E Coli / gm: Absent
- b) Salmonella / 25 gm: Absent

9 Chemical requirements

The chemical requirements for coco peat shall be as given in Table 1.

Table 1 — Chemical requirements for coco peat

Parameter	Limit	Test Method
pH	5 – 6.8	Annex B
E.C (min)	0.488 ms/cm	Annex C
Moisture content at 105 °C(min.)	10.82 %	Annex D
Ash at 900 °C	5.96 %	A5TM D 2974-87
Organic matter at 900 °C (on dried basis) (min.)	93.32 %	Annex E
Bulk density (min.)	157 kg/m ³	ASTM D4531-86(2008)
Sodium (min.)	142 mgr/l	Flame photometer (Jackson, 1973) Atomic Absorption Spectrophotometer (Make: Varian Techtron, Model Spectrometer AA 10/20 BQ)
Potassium (min.)	710 mgr/l	
Iron (min)	1004 mgr/l	
Manganese (min.)	-	
Zinc (min)	219 micrograms/l	
Copper (min.)	181 micrograms/l	Kjeldahl digestion (Humphries, 1956)
Nitrogen (min.)	0.40 %	

Parameter	Limit	Test Method
Phosphorus	8 – 40 mg/l-1	Vanado molybdate phosphate yellow colour method (Jackson, 1973)
Magnesium (min.)	15 mg-1	EDTA titration method (Derderian, 1961).
Calcium (min.)	50	EDTA titration method (Derderian, 1961).
Ca/Mg ratio	1.5 – 10.0	
N Drawdown Index	0.2 min.	As appropriate

10 Sampling of coco peat

For every consignment, samples will be randomly taken by an Inspector and sub-samples sent for a grow out test in accordance set national procedure (compressed samples shall be destructively broken down). Consignments will be randomly sampled at rates in accordance with Table 2:

Table 2 — Sampling for coco peat

Test sample size (per container or part container)				
Number of items per lot type	Bales	Blocks (30 x30 x15cm), slabs (1 metre) and uncompressed bags	Half slabs	Smaller items e.g. starter blocks, gerbera discs
1 – 50	1	2	2	4
51 – 100	1	3	4	8
101 – 200	2	4	6	16
210 – 350	3	6	12	20
351 – 500	3	8	16	24
501 – 750	3	8	20	24
751 – 1200	3	10	20	32
Over 1200	3	10	20	32
Over 4000	4	12	24	40
Over 10000	4	15	30	60

All consignments awaiting results of the grow out test are to be held at a transitional facility until such time as insecurity clearance is given. All costs associated with the grow out test are to occur at the importer's expense.

11 Packaging

Coco peat shall be packed in materials that safeguard its integrity and environmentally friendly.

12 Labelling

The following information shall be legibly and indelibly marked in the labels:

- Name and physical address of the manufacturer;
- Name of the product;
- Weight of the product;

KS 2473:2023

- iv) Instructions for use;
- v) Storage instructions;
- vi) Net weight;
- vii) Country of origin; and
- viii) Treatment method used.

Public Review Draft - 2024

Annex A (normative)

Treatment for coco peat

A.1 Treatment options

Any treatment completed prior to shipment shall comply with the requirements of this standard. All treatments will be carried out at the importer's risk and expense. MPI accepts one or more of the following treatment options:

A.1.1 Treatment with ethylene oxid

One of the following rates shall be used:

Under initial minimum vacuum of 50 kilopascals at 1500 g/m³ for 4 h at 50 °C; or 1500 g/m³ for 24 h at 21 °C. Ethylene oxide treatment shall be given within 21 days of arrival.

A.1.2 Heat treatment with low humidity heat

The following rate shall be used:

85 °C core temperature for 15 continuous h with 40 % relative humidity.

A.1.3 Autoclaving

The following rate shall be used:

118 °C for 30 min at 100KPa.

Other rates of steam, other fumigants or other treatments that can be proven to devitalise seeds will be given consideration on application.

NOTE Any treatment should be given before insertion of a product into grow slabs/grow bags if the treatment will not permeate the bags.

A.2 Equivalence

Coco peat and coir fibre products may also be allowed entry into Kenya if, in the opinion of the Chief Technical Officer, the measures applied to the goods are considered to be equivalent to the measures taken for managing the risks associated with the importation of those goods.

Annex B
(Normative)

pH (Potential Hydrogen):

Principle: pH is measured in the same method as EC using hand held pH meter. The most popular method for pH measurement, however, is 1:5 dry method. But 1:1.5 wet method gives a more realistic pH reading. Ensure the water used for measuring pH is neutral (7.0). The pH reading of the solution directly gives the pH of the cocopeat.

Another method of measuring pH would be to add pH neutral water 5 times the weight of the cocopeat (500 ml to 100 grams). This quantity of water would completely soak the cocopeat imitating growing conditions. Allow to soak for 15 mins, squeeze the material and measure the pH of the solution. This method usually gives a lower pH reading than other methods.

Annex C (Normative) Coco Peat electrical conductivity and gypsum requirement

C.1 Principle

Coco Peat with a pH value higher than 8.0–8.5 may have the following special features:

- presence of excessive amounts of soluble salts;
- presence of excessive amounts of Na on the exchange complex.

Table C.1 summarizes the chemical properties of salt-affected soils.

Table C.1. Chemical characteristics of saline, non-saline sodic and saline sodic soil

Coco Peat	EC (dS/m)	Exchangeable Sodium percentage	pH
Saline	> 4	< 15	< 8.5
Sodic (Non-saline)	< 4	> 15	> 8.5
Saline (Non-Sodic)	> 4	< 15	< 8.5

Such Peats are generally not considered suitable for growing most crops unless treated with suitable amendment materials. However, there are salt-tolerant crops that can grow on these Peats.

To determine the quality of these peats, the following estimations are required:

- pH (as described above);
- salt content or EC;
- exchangeable Na or gypsum requirement.

C.2 Electrical conductivity

Electrical conductivity is a measure of the ionic transport in a solution between the anode and cathode. This means, EC is normally considered to be a measurement of the dissolved salts in a solution. Similar to a metallic conductor, they obey Ohm's law.

As EC depends on the number of ions in the solution, it is important to know the peat/water ratio used. The EC of a peat is conventionally based on the measurement of the EC in the soil solution extract from a saturated soil paste, as it has been found that the ratio of the soil solution in saturated soil paste is about 2–3 times higher than that at field capacity.

As determining the EC of coco peat solution from a saturated coco peat paste is cumbersome and requires 400–500 g of peat sample for the determination, a less complex method is normally used. Generally, a 1:2 peat/water suspension is used.

C.2.1 Apparatus

- an EC meter;
- some beakers (25 ml), Erlenmeyer flasks (250 ml) and pipettes;
- filter paper.

To prepare the reagent (0.01M potassium chloride solution), dry a small quantity of AR-grade potassium chloride at 60 °C for 2 hours. Weigh 0.7456 g of it, dissolve it in freshly prepared distilled water, and make the volume up to 1 litre.

This solution gives an EC of 1.4118×10^{-3} , i.e., 1.412 mS/cm at 25 °C. For best results, select a conductivity standard (KCl solution) close to the sample value.

KS 2473:2023

C.2.2 Procedure for determining EC

C.2.2.1. Place 40 g of coco peat in a 250-ml Erlenmeyer flask, add 80 ml of distilled water, stopper the flask, and shake on a reciprocating shaker for 1 hour. Filter through No. 1 filter paper.

C.2.2.2. Wash the conductivity electrode with distilled water, and rinse with standard KCl solution.

C.2.2.3. Pour some KCl solution into a 25-ml beaker and dip the electrode in the solution. Adjust the conductivity meter to read 1.412 mS/cm, corrected to 25 °C.

C.2.2.4. Wash the electrode, and dip it into the coco peat extract.

C.2.2.5. Record the digital display corrected to 25 °C. The EC reading is a measure of the soluble salt content in the extract, and an indication of salinity status of the coco peat sample (Table C.2).

Table C.2. General interpretation of EC values

Coco Peat	EC	Total salt content	Crop reaction
(1)	(2) (mS/cm)	(3)	(4)
Salt-free	0 – 2	< 0.15	Salinity effect negligible, except for more sensitive crops
Slightly saline	4-8	0.15-0.35	Yield of many crops restricted
Moderately saline	8.5-15	0.35-0.65	Only tolerant crops yield satisfactorily
Highly saline	> 15	< 0.65	Only very tolerant crops yield satisfactorily

C.3 Gypsum requirement

In the estimation of gypsum requirement of saline-sodic/sodic coco peat (Schoonover, 1952), the attempt is to measure the quantity of gypsum (calcium sulphate) required to replace the Na from the exchange complex. The Na so replaced with the Ca of the gypsum is removed through leaching of the peat. The coco peat treated with gypsum become dominated with Ca in the exchange complex.

When the Ca of the gypsum is exchanged with Na, there is a reduction in the Ca concentration in the solution. The quantity of Ca reduced is equivalent to the Ca exchanged with Na. It is equivalent to the gypsum requirement of the coco peat when “Ca” is expressed as CaSO₄.

C.3.1 Apparatus required consists of:

- a mechanical shaker;
- a burette (50 ml);
- some pipettes (100 ml and 5 ml).

C.3.2 The reagents required are:

i) *Saturated gypsum* (calcium sulphate) solution: Add 5 g of chemically pure CaSO₄·2H₂O to 1 litre of distilled water. Shake vigorously for 10 minutes using a mechanical shaker and filter through No. 1 filter paper.

ii) *0.01N CaCl₂ solution*: Dissolve exactly 0.5 g of AR-grade CaCO₃ powder in about 10 ml of 1:3 diluted HCl. When completely dissolved, transfer to a 1-litre volumetric flask and dilute to the mark with distilled water. Do not use CaCl₂ salt as it is highly hygroscopic.

iii) *0.01N versenate solution*: Dissolve 2.0 g of pure ethylenediamine tetraacetic acid (EDTA) – disodium salt and 0.05 g of magnesium chloride (AR-grade) in about 50 ml of water and dilute to 1 litre. Titrate a portion of this against 0.01N of CaCl₂ solution to standardize.

iv) *Eriochrome Black T (EBT) indicator*: Dissolve 0.5 g of EBT dye and 4.5 g of hydroxylamine hydrochloride in 100 ml of 95-percent ethanol. Store in a stoppered bottle or flask.

v) *Ammonium hydroxide-ammonium chloride buffer*: Dissolve 67.5 g of pure ammonium chloride in 570 ml of concentrated ammonium hydroxide and dilute to 1 litre. Adjust the pH to 10 using dilute HCl or dilute NH₄OH.

C.3.3 Procedure:

C.3.3.1. Weigh 5 g of air-dry soil in a 250-ml conical flask.

C.3.3.2. Add 100 ml of the saturated gypsum solution. Firmly insert a rubber stopper and shake for 5 minutes.

C.3.3.3. Filter the contents through No. 1 filter paper.

C.3.3.4. Transfer 5 ml of aliquot of the clear filtrate into a 100 or 150-ml porcelain dish.

C.3.3.5. Add 1 ml of the ammonium hydroxide-ammonium chloride buffer solution and 2–3 drops of EBT indicator.

C.3.3.6. Place 0.01N versenate solution in a 50-ml burette and titrate the contents in the dish until the wine red colour starts to change to sky blue. Volume of versenate used = B.

C.3.3.7. Run a blank using 5 ml of saturated gypsum solution in place of sample aliquot. Volume of versenate solution used = A.

The gypsum requirement (in tonnes per hectare) is given by: $(A - B) \times N \times 382$.

where:

A = millilitres of EDTA (versenate) used for blank titration;

B = millilitres of EDTA used for coco peat extract;

N = normality of EDTA solution

Annex D
(Normative)
Determination of Coco Peat moisture

D.1 Principle. The gravimetric method of moisture estimation is most widely used where the Coco peat sample is placed in an oven at 105 °C and dried to a constant weight. The difference in weight is considered to be the water present in the soil sample.

The apparatus required in order to determine the soil moisture consists of:

- i. an aluminium moisture box;
- ii. an oven;
- iii. a desiccator.

D.2 Procedure for determining the coco peat moisture

D.2.1. Put 100 g of coco peat sample in the aluminium moisture box and place in the oven after removing the lid of the box.

D.2.2. Keep the sample at 105 °C until it attains a constant weight. This may take 24–36 hours.

D.2.3. Cool the sample, first in the switched-off oven and then in a desiccator.

D.2.4. Weigh the cooled sample. The loss in weight is equal to the moisture contained in 100-g coco peat sample.

D.3 Results

The percentage of moisture is calculated as:

$$\text{Moisture percent} = \frac{\text{Loss in wt}}{\text{Oven-dry wt of soil}} \times 100$$

The corresponding moisture correction factor (mcf) for analytical results or the multiplication factor for sample to be weighed for analysis is:

$$\text{Moisture correction factor} = \frac{100 + \% \text{ moisture}}{100}$$

Annex E (Normative)

Determination of Organic Matter

E.1 Principle. There are various methods for estimating Organic Matter in soil/peat. Loss of weight on ignition can be used as a direct measure of the Organic Matter contained in the soil/peat. It can also be expressed as the content of organic Carbon in the soil/coco peat. It is generally assumed that, on average, Organic Matter contains about 58 percent organic Carbon. Organic matter / organic Carbon can also be estimated by volumetric and colorimetric methods. However, the use of potassium dichromate ($K_2Cr_2O_7$) involved in these estimations is considered a limitation because of its hazardous nature. Soil/coco peat organic matter (SOM) content can be used as an index of N availability (potential of a soil to supply N to plants) because the N content in SOM is relatively constant.

E.2 Loss of weight on ignition Method

E.2.1 Apparatus:

- a sieve;
- a beaker;
- an oven;
- a muffle furnace.

E.2.2 Procedure

E.2.2.1. Weigh 5.0–10.0 g (to the nearest 0.01 g) of sieved (2 mm) coco peat into an ashing vessel (50-ml beaker or other suitable vessel).

E.2.2.2. Place the ashing vessel with coco peat in a drying oven set at 105 °C and dry for 4 hours.

E.2.2.3 Remove the ashing vessel from the drying oven and place in a dry atmosphere. When cooled, weigh to the nearest 0.01 g.

E.2.2.4 Place the ashing vessel with coco peat into a muffle furnace and bring the temperature to 900 °C. Ash in the furnace for 4 hours.

E.2.2.5 Remove the ashing vessel from the muffle furnace, cool in a dry atmosphere, and weigh to the nearest 0.01 g.

E.3 Results

The percentage of OM is given by:

$$\text{Percent organic matter (OM)} = \frac{w_1 - w_2}{w_2} \times 100$$

where:

W_1 is the weight of soil at 105 °C;

W_2 is the weight of soil at 900 °C.

The percent of organic C is given by: % OM × 0.58.