ETHIOPIAN STANDARD

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Papaya Seed Candy — Specification

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Foreword

This Ethiopian Standard has been prepared under the direction of the Technical Committee for spice and condiments (TC 14) and published by the Institute of Ethiopian Standards (IES).

The standard has been developed to address observed needs and to support the local industry in order to make progress through uprising competitiveness and maintain comparative market advantage both domestically and internationally.

In preparing this standard reference has been made to the following documents:

Papaya Seed Candy — Specification

1. Scope

This Ethiopian standard specifies the requirements, sampling, and methods of test for papaya seed candy, prepared from cleaned and processed papaya (*Carica papaya L.*) seeds intended for human consumption.

2. Normative References

The following referenced documents are indispensable for the application of this standard. For undated references, the latest edition of the referenced document (including any amendments) applies.

CES 214: White sugar - Specification

ES 298: Specification for edible salt

ES 359: General standard for the labeling of pre-packaged foods

ES 577: Recommended code of practice – General principles of food hygiene

ES 982: Specification for glucose syrup

ES 988: Determination of arsenic in foods

ES 989: Determination of lead in foods

ES 990: Determination of zinc in foods

ES ISO 4831: Microbiology – General guidance for the enumeration of coliforms – most probable number technique

ES ISO 4833: Microbiology of food and animal feeding stuffs — Horizontal method for the enumeration of microorganisms — Colony-count technique at 30 degrees C

ES ISO 6579: Microbiology of food and animal feeding stuff – Horizontal method for the detection of salmonella spp.

ES ISO 7954: Microbiology – General guidance for the enumeration of Yeast and moulds – colony count technique at 25°C

Codex Alimentarius, CXS 192: General Standard for Food Additives

Codex Alimentarius, CXS 193: General Standard for Contaminants and Toxins in Food and Feed

3. Terms and Definitions

For the purpose of this Ethiopian Standard, the following definition shall apply.

3.1.
papaya seeds
refers to the small seeds found inside the fruit of papaya, *Carica papaya L.*

3.2.
papaya seed candy
a confectionery product prepared from clean, sound papaya seeds (*Carica papaya L.*) with a sugar or sugar/glucose syrup **solution, optionally** with other ingredients.

4. Ingredients

4.1. Basic Ingredients

The following basic ingredients are mandatory for the preparation of Papaya Seed Candy:

a) Papaya Seeds

b) Sugar conforming to CES 214, specification for white sugar.

c) Glucose syrup conforming to ES 982, specifications for glucose syrup.

4.2. Optional Ingredients

In addition to the basic ingredients, the product may also contain any of the following optional ingredients singly or in combination:

a) Chocolate.

b) Cocoa powder or cocoa butter; coffee and tea.

c) Edible common salt, conforming to ES 298: specification for edible salt.

d) Edible groundnut flour.

e) Fruits – fresh or dried, or fruit products.

f) Nuts and nut products.

g) Edible fats.

h) Edible starches.

i) Gelatine, food grade.

j) Protein isolates.

k) Spices.

l) Vitamins and vitamin concentrate.

m) Sugars, such as raw sugar, invert sugar, honey, malt syrup or malt extract.

n) Milk or milk products.

o) Acidulants, food grade.

p) Soya flour.

q) Menthol.

r) Oil of peppermint.

s) Permitted food additives: preservatives, antioxidants, emulsifiers, thickeners (such as sodium alginate, agar, natural gums), flavor, flavor improvers, and colors.

t) Oil of aniseed.

u) Oil of eucalyptus.

v) Cream of tartar.

5. Types

The product shall be of the following two types:

1. Plain Candied: Papaya seeds coated in a sugar-based syrup and dried.
2. Modified: Prepared from basic ingredients modified by the incorporation of any of the optional ingredients listed under section 4.2.

6. Requirements

6.1. General Requirements

The product shall

6.1.1. be from clean, sound, and mature seeds obtained from ripe *Carica papaya* fruit, which have been properly processed (washed, dried/roasted),

6.1.2. be free from mold, insects and insect infestation.

6.1.3. possess a pleasant and distinctive taste and aroma, without any unpleasant odors.

6.1.4. be in any desired shape and size and have a good appearance.

6.1.5. be free from dirt, grit, rancidity, adulterants, and harmful ingredients.

6.1.6. not stick excessively to wrappers or to each other.

6.2. Specific Requirements

The product shall also comply with the physicochemical requirements specified in Table 1.

Table 1 — Physicochemical Requirements for Papaya Seed Candy

No.	Characteristics	Requirements	Test Methods
1	Moisture, percent by mass	Max. 10.0/6	Annex A
2	Reducing Sugars, percent by mass	Min. 8.0	Annex D
3	Ash, sulphated, percent by mass	Max. 2.5/1.5	Annex B
4	Acid Insoluble Ash, percent by mass	Max. 0.5/0.2	Annex C
5	Sulphur Dioxide, mg/kg	Max. 100	Annex E

7. Food Additives

Only food additives such as preservatives, natural flavors, and natural colors conforming to the Ethiopian Food and Drug Authority (EFDA) permitted list of food additives may be used (EFDA, 2021). Their use must also be in accordance with the Codex Alimentarius General Standard for Food Additives (Codex Alimentarius Commission, 1995).

8. Contaminants

8.1. Heavy Metals

The product shall not exceed the maximum limits for heavy metals specified in Table 2.

Table 2 — Heavy Metal Limits for Papaya Seed Candy

No.	Characteristics	Requirements	Test Methods
1	Arsenic, (As)mg/kg	1.0	ES 988:
2	Lead, (Pb)mg/kg	0.5	ES 989:
3	Copper, (Cu)mg/kg	2.0	ES 985, Annex G
4	Zinc, (Zn)mg/kg	5.0	ES 990:

8.2. Mycotoxins

The product shall not exceed the mycotoxin limits specified below:

- Aflatoxin B1: < 2 µg/kg
- Total aflatoxins (B1, B2, G1, G2): < 4 µg/kg

9. Hygiene and Microbiological Requirements

9.1. Hygiene

The product shall be prepared, processed, packed, stored, and distributed under hygienic conditions in accordance with ES 577: Recommended Code of General Principles of Food Hygiene.

9.2. Microbiological Requirements

The product shall be free from pathogenic microorganisms and shall comply with the microbiological limits specified in Table 3.

Table 3 — Microbiological Requirements for Papaya Seed Candy

No.	Characteristics	Requirements	Test Methods
1	Total plate count/g, max.	500	ES ISO 4833
2	Coliforms/g,	absent	ES ISO 4831
3	Yeast and moulds/g, max.	50	ESISO7954
4	Salmonella/g	absent	ES ISO 6579

10. Packaging and Labelling

10.1. Packaging

10.1.1. The product shall be packed in food-grade, moisture-proof, and tamper-evident packaging materials that protect it from contamination.

10.1.2. Individual wrappers may be cellulose film, waxed paper, foil, polyethylene, or other suitable flexible packaging materials. The printing ink shall not come into direct contact with the product.

10.1.3. Bulk packaging shall be in clean, sound, and reasonably airtight containers made of materials that safeguard the hygienic and quality characteristics of the product.

10.2. Labelling

In addition to the requirements of ES 359: General standard for the labeling of prepackaged foods, the following information shall be legibly and indelibly labeled on each container:

a) Name of the product: "Papaya Seed Candy"
b) Name and full address of the manufacturer, packer, or distributor.
c) List of ingredients in descending order of proportion by weight.
d) Net weight in SI units.
e) Batch or Lot number.
f) Date of manufacture and Expiry date as (dd/mm/yy)
g) Country of origin.
h) Storage conditions: "Store in a cool, dry place".
i) Allergen declaration, if applicable.
j) The statement: “Permitted natural colors and/or flavors used” (if present).

11. Sampling

11.1. General

11.1.1. Samples shall be taken in a protected place to avoid contamination.

11.1.2. The sampling instruments and containers shall be clean and dry.

11.1.3. Each sample container shall be sealed airtight and marked with full details of sampling.

11.2. Lot

In any consignment, all containers of the same size and type, containing material of one type drawn from a single batch of manufacture, shall constitute a lot.

11.3. Scale of Sampling

The number of containers to be selected for sampling shall be in accordance with Table 4.

Table 4 — Scale of Sampling

Lot size	No.of containers to be selected	
	For container of net mass 500g and above	For containers of net mass less than 500 gram
Up to25	3	6
26 to 100	4	6
101 to 300	5	9
301 to 500	7	12

11.4. Test Samples

From each selected container, take approximately equal quantities of material to form a composite sample of at least 600 g. Divide this sample into three equal parts and transfer to clean, dry, airtight containers. One part is for the testing laboratory, one for the supplier, and one is kept as a reference sample.

12. Methods of Test

Tests shall be carried out as specified in the relevant annexes and tables of this standard.

Annex A:
(Normative)
Determination of Moisture Content

A1 Apparatus

- Analytical balance
- Aluminum flat dish, with airtight lid
- Vacuum oven, maintained at 70 ± 1°C
- Desiccator

A2 Procedure

1. Grind a representative sample (approx. 50 g) to a uniform consistency.
2. Dry a flat aluminum dish and lid in the oven and weigh after cooling in a desiccator.
3. Accurately weigh about 3-5 g of the prepared sample into the dish.
4. Place the dish in the vacuum oven with the lid ajar and dry for 6 hours at 70°C at a pressure not exceeding 100 mm Hg.
5. Allow the dish to cool to room temperature in a desiccator and weigh.
6. Repeat drying and weighing cycles until a constant mass is achieved.

A3 Calculation

Moisture (% by mass) = $[(M_1 - M_2) / m] \times 100$

Where:

- m = mass in grams of the sample taken for the test
- M_1 = mass in grams of the sample and dish before drying
- M_2 = mass in grams of the sample and dish after drying

Annex B:

(Normative)

Determination of Sulphated Ash

The method shall be based on the principles outlined in AOAC 942.05, Ash of Animal Feed.

Annex C
(Normative)
Determination of Acid Insoluble Ash

C1 Reagent

- Dilute hydrochloric acid, approximately 10% (v/v).

C2 Procedure

1. Use the total ash obtained from the sulphated ash determination (Annex B).
2. To the ash in the dish, add 25 ml of dilute hydrochloric acid, cover with a watch glass, and heat on a water bath for 10 minutes.
3. Allow to cool and filter through an ashless filter paper (e.g., Whatman No. 42).
4. Wash the filter paper with hot water until the washings are free from chlorides.
5. Return the filter paper and residue to the original dish.
6. Dry in an oven at 105 ± 2°C for about 3 hours.
7. Ignite in a muffle furnace at 600 ± 20°C for one hour.
8. Cool the dish in a desiccator and weigh. Repeat until a constant weight is achieved.

C3 Calculation

Acid-insoluble ash (% by mass) = $[(M_2 - M_1) / m] \times 100$

Where:

- m = mass in grams of the sample taken for the ash test
- M_1 = mass in grams of the empty dish
- M_2 = mass in grams of the dish and acid-insoluble ash

Annex D
(Normative)
Determination of Reducing Sugars

The method shall be based on the Lane and Eynon titrimetric method.

Annex E
(Normative)
Determination of Sulphur Dioxide

The method shall be based on the optimized Monier-Williams method for Sulphur Dioxide determination.

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Annex F
(Normative)
Determination of Copper

The method shall be based on Atomic Absorption Spectrophotometry (AAS) or Inductively Coupled Plasma Mass Spectrometry (ICP-MS).

Annex G
(Normative)
Determination of Papaya Seed Content

G1 Principle

The sugar and other soluble components of the candy are dissolved in hot water. The insoluble papaya seeds are then separated by filtration, dried, and weighed.

G2 Apparatus

- Analytical balance
- Beaker, 600 ml
- Hot plate with magnetic stirrer
- Sieve, 1 mm mesh, pre-weighed
- Drying oven, maintained at 105 ± 2°C
- Desiccator

G3 Procedure

1. Weigh accurately about 50 g of the candy sample (W_sample) into a 600 ml beaker.
2. Add 400 ml of distilled water.
3. Heat the beaker on a hot plate at approximately 80°C and stir until the candy matrix is completely dissolved.
4. Pour the contents through a pre-weighed, clean, dry 1 mm sieve (W_sieve).
5. Rinse the beaker and the seeds on the sieve with hot distilled water to remove any residual soluble material.
6. Place the sieve with the papaya seeds in a drying oven at 105 ± 2°C for at least 4 hours, or until a constant weight is achieved.
7. Cool the sieve and seeds in a desiccator and weigh (W_final).

G4 Calculation

Papaya Seed Content (% by mass) = [(W_final - W_sieve) / W_sample] x 100

Where:

- W_sample = mass in grams of the candy sample taken
- W_sieve = mass in grams of the empty, dry sieve
- W_final = mass in grams of the sieve and dried papaya seeds

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INSTITUTE OF ETHIOPIAN STANDARDS

Organization and Objectives

The Institute of Ethiopian Standards (IES) is the national standards body of Ethiopia. IES is re-named by the proclamation number 1263/2021, from Ethiopian Standards Agency (ESA) to Institute of Ethiopian standards, with the mandate given by the regulation Number, 193/2010 and proclamation number, 1263/2021.

IES's objectives are:

- Develop Ethiopian standards and establish a system that enable to check whether goods and service are in compliance with the required standards,
- Facilitate the country's technology transfer through the use of standards,
- Develop national standards for local products and services so as to make them competitive in the international market.
- Conduct standards related research and provide training and technical support.

Ethiopian Standards

The Ethiopian Standards are developed by national technical committees which are composed of different stakeholders consisting of educational and research institutes, governmental organizations, certification, inspection, and testing organizations, regulatory bodies, consumer association etc. The requirements and/or recommendations contained in Ethiopian Standards are consensus based that reflects the interest of the TC representatives and also of comments received from the public and other sources. Ethiopian Standards are approved by the National Standardization Council and are kept under continuous review after publication and updated regularly to take account of latest scientific and technological changes.

Orders for all Ethiopian Standards, International Standard and ASTM standards, including electronic versions, should be addressed to the Documentation and Publication Team at the Head office and Branch (Liaisons) offices). A catalogue of Ethiopian Standards is also available freely and can be accessed from our website.

 International Involvement IES, representing Ethiopia, is a member of the International Organization for Standardization (ISO), International Electro-technical Commission (IEC) and Codex Alimentarius Commission (CODEX). It also maintains close working relations with the American Society for Testing and Materials (ASTM). It is a founding member of the African Regional Organization for standardization (ARSO).

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