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DRAFT EAST AFRICAN STANDARD

Harvesting, handling, processing and storage of Gum Arabic —
Code of practice

EAST AFRICAN COMMUNITY

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Foreword

Development of the East African Standards has been necessitated by the need for harmonizing requirements governing quality of products and services in the East African Community. It is envisaged that through harmonized standardization, trade barriers that are encountered when goods and services are exchanged within the Community will be removed.

The Community has established an East African Standards Committee (EASC) mandated to develop and issue East African Standards (EAS). The Committee is composed of representatives of the National Standards Bodies in Partner States, together with the representatives from the public and private sector organizations in the community.

East African Standards are developed through Technical Committees that are representative of key stakeholders including government, academia, consumer groups, private sector and other interested parties. Draft East African Standards are circulated to stakeholders through the National Standards Bodies in the Partner States. The comments received are discussed and incorporated before finalization of standards, in accordance with the Principles and procedures for development of East African Standards.

East African Standards are subject to review, to keep pace with technological advances. Users of the East African Standards are therefore expected to ensure that they always have the latest versions of the standards they are implementing.

The committee responsible for this document is Technical Committee EASC/TC 005, *Food Additives*.

Attention is drawn to the possibility that some of the elements of this document may be subject of patent rights. EAC shall not be held responsible for identifying any or all such patent rights.

Introduction

This Code of practice establishes standards and guidelines to ensure the safe, sustainable, hygienic, and high-quality production of Gum Arabic from tapping at the farm to final industrial processing. It aims to:

- a) Preserve product purity and functional properties
- b) Protect harvests and the environment
- c) Promote product traceability, transparency, and market compliance

DRAFT EAST AFRICAN STANDARD ON PUBLIC REVIEW

Harvesting, handling, processing and storage of Gum Arabic — Code of practice

1 Scope

This draft Code of practice recommends appropriate hygienic practices for harvesting, processing, handling, packaging, storage, transport, distribution of Gum Arabic from *Acacia senegal* (L) Wild, *Acacia seyal* (L) Wild, or of related species of *Acacia* (Family. *Leguminosae*) raw material collection at the farm level to the final product intended for food application.

This Code guarantees a safe, hygienic and wholesome product. These hygienic practices are particularly important, because hygiene control measures apply to Gum Arabic of different species from the farm to industry. It establishes practices to ensure product safety, quality traceability and compliance with relevant standards across the entire value chain

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.

EAS 12, *Potable water — Specification*

EAS 38, *Labelling of pre-packaged foods — General requirements*

EAS 39, *Hygiene in the food and drink manufacturing industry — Code of practice*

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>

— IEC Electropedia: available at <http://www.electropedia.org/>

3.1 food grade material

material made of substances which are safe and suitable for their intended use and which will not impart any toxic substance or undesirable odour or flavour to the product

3.2 Gum Arabic/Acacia Gum

dried gummy exudates nodules obtained from the stems and branches of *Acacia senegal* (L) Wild, *Acacia seyal* (L) Wild, or of related species of *Acacia* (Family. *Leguminosae*).

Note 1 to entry: Gum Arabic consists chiefly of a high molecular weight polysaccharides and their calcium, potassium and magnesium salts which on hydrolysis yield arabinose, galactose, rhamnose and glucuronic acid.

3.3 Tapping
careful process of inserting a tool to the stem and branches and controlled incision removing sections of bark from acacia trees to stimulate Gum Arabic exudation/production

3.4 Primary Processing:
cleaning, sorting, grading, and sun-drying at collection centers

3.5 Raw Materials
inputs used during the health food production process, including processing aids and food additives

3.6 Intermediate Product
substance or compound that still requires an additional step of processing

3.7 Product
finished product that has been pre-packaged and ready for sales and distribution

4 Pre-harvest practices

4.1 Tree farm and preparations

Gum Arabic should be harvested from;

- a) selected mature trees (5+ years for Senegal; 4+ years for Seyal)
- b) natural or plantation forest/trees from maintained tree density that supports regeneration

Note: Avoid deforestation and overgrazing

5 Harvesting Practices

Gum Arabic should be tapped at the start of the dry season, avoid tapping during rainy periods to prevent microbial contamination.

During tapping make small, shallow incisions (3–5 cm) without damaging cambium, ensure cut spacing allows tree recovery and do not tap the same area more than once per season.

Gum Arabic must be harvested in accordance with 5 rules:

- a) Pure: no blending of products of different types or from different tree species.
- b) Clean: no contact with the ground under the tree (use of the gum collecting tool), transport in a new or clean fabric sack, no contact with the floor or other products in the building where the gum is stored for drying (gum placed on an impermeable sheet). Gum Arabic has the ability to absorb a variety of odours and water; to ensure its quality and integrity, it should be protected from water and odours during transportation, by using an impermeable, and clean sheet.

- c) Polymerised or dried: when harvested or collected the gum is still viscous inside the nodules. It should be placed in a dry, well-aerated location, but protected from dust and light for at least two weeks. The gum hardens so it can be bagged, without the formation of compact blocks.
- d) The harvesting of the Gum Arabic shall be done in a hygienic manner and shall be carried out three times between mid-January to early March (summer season). Gum Arabic picking should be carried out during morning hours since the gum tends to melt with rise in temperature. It helps preserve gum quality, reduces contamination from dust and makes collection easier.
- e) There should be a container for collecting gum to avoid it dropping on the ground and the tool for harvesting shall have a handle and harvester should have a clean cloth sack for collecting the Gum Arabic. Harvesting should be done every 10 days (that is 6 to 8 times) and wait 2 to 4 weeks.

5.1 Techniques and equipment used in Gum Arabic harvesting

5.1.1 Gum Arabic harvesting process should be carried out either traditionally or using modern techniques.

5.1.2 Care should be taken when using traditional methods to avoid damages to the tree because of bad tapping and the workers should be well trained on the techniques of tapping.

5.1.3 The equipment/tool should be food-grade, clean, sharp and not be limited to a cleaver tool such as an axe and when used shall not cause harm to the plant.

5.1.4 No use of chemicals or bark stimulants unless certified safe.

6 Harvesting of Gum Arabic

Gum Arabic should be collected two (2) to four (4) weeks after tapping, depending on the exudation rate.

Gum Arabic should not be collected when it is wet or heavily contaminated and separate *Acacia Senegal* from *Acacia Seyal* gum at the field level.

6.1 Gum Exudation

6.1.1 The gum trees shall be pruned to prepare them for the harvesting of Gum Arabic. This operation occurs just before tapping and allows evaluating whether the leaves are ready to fall during dry season. The gum harvest begins a month later. Pruning shall be carried out using secateurs for pruning.

6.1.2 Gum exudation shall be either initiated naturally because of natural stress such as insufficient soil moisture and nutrients or through mechanical injury to the bark, or invasion of the plant by microorganism, leading to gum secretion from the tree as sticky syrup. Gum exudation shall take place three weeks after tapping.

6.1.3 The Exudate shall be allowed to dry to form a clear yellow or brown glass like gum nodule and when drying the following must be taken into consideration:

- a) drying of Gum Arabic should be done on dry and clean surfaces in a manner that prevents direct contact of Gum Arabic with soil.
- b) moisture content of dried Gum Arabic should be monitored using a moisture meter to measure appropriate moisture content of not more than 15 %.
- c) measures should be taken to prevent rewetting of the Gum Arabic.
- d) conditioning bins should be covered and well aerated.

- e) drying tables and conditioning bins should be labelled to facilitate traceability and records maintained; measures should be taken to ensure hygienic handling and storage of dried Gum Arabic.
- f) in case driers are used for this purpose, cleaning procedures should be established and records maintained.

6.2 Gum Tapping

6.2.1 Tapping, if applicable, begins when the leaves fall, indicating lack of water and the start of gum formation. The first nodules form after 3 to 4 weeks, then every 10 days, until all the ground water is used up, or the rains return. The nodules are harvested at regular intervals, at least every 10 days, and at most every two weeks.

6.2.2 Gum tapping shall be categorised into Early tapping and late tapping. Early and late gum tapping should be practiced every year during the dry season. Early tapping should be preferred as the yield for late tapping is very low.

6.2.3 The tapping of acacia tree shall be done using a clean blade of a small axe or Sonki (bayonet) and this shall be done by pushing it under the bark of the branch of the Acacia tree.

6.2.4 The blade should be pulled back causing a wound about 2 – 5 centimetres wide and up to 50 Centimetres long.

6.2.5 The farmer should avoid excessive tapping of the acacia tree to avoid weakening of the tree and subsequent death following strong winds or animal grazing.

6.2.6 Tapping Acacia tree should be carried out during dormancy period, following the growing season after the end of the rainy season. And this should preferably be done at the time the tree is shedding off its leaves and at the time of change in the colour of the bark. The tapping should be done one to two incisions per branch > 5 cm in diameter.

6.2.7 The farmers shall carryout the tapping during hot dry weather as this will provide a good yield of Gum Arabic. The tapping should be carried out on 2 - 4 branches to minimise damage. Each stem and branches of Acacia tree shall be tapped once every four years, considering its four sides.

7 Handling at Farm and Collection Points

7.1 Sorting and Cleaning

7.1.1 Bark pieces, sand, insects, and any other foreign matter should be removed by hand or mechanically.

7.1.2 Gum Arabic raw material should be sorted, and cleaned under dust-free collection areas and preferably on a raised clean platform .

7.2 Drying

7.2.1 Gum Arabic should be dried in a shade on raised clean platforms/materials.

7.2.2 Gum Arabic should not have a direct contact with soil while at the farm.

7.2.3 Gum Arabic should be dried at an appropriate temperature that preserves its functional properties.

7.3 Traceability

The main traceability record on Gum Arabic should be maintained on the farm by the farmer/processor/distributor for record purposes. In addition, records for each lot of Gum Arabic should be maintained on the following:

- a) farm location
- b) plot identification
- c) harvest date
- d) species
- e) quantity
- f) batch number

8 Transport

8.1 General

Gum Arabic shall be transported in a hygienic manner and shall not be exposed to direct rain to avoid moisture absorption. The vehicle transporting Gum Arabic shall be properly covered during shipping.

The following measures should be established, implemented, monitored and documented to ensure that transportation maintains quality and integrity of the Gum Arabic:

- a) transporters should be prequalified based on their ability to provide services in a manner that does not compromise product safety, quality and package integrity; and
- b) c) vehicles should be checked prior to loading, and during unloading to verify that the quality and safety of the material or product is assured.

Note: Avoid overloading to prevent crushing or powdering.

- a) measures should be taken to prevent rewetting and contamination.
- b) inspection procedures should be established to assess suitability of the vessel for transportation and a checklist maintained; and
- c) Gum Arabic consignment should be accompanied by the serialized relevant documents to facilitate identification and traceability including but not limited to:
 - i. booking slip; and
 - ii. growers' delivery note.

9 Primary Processing

9.1 Inspection

9.1.1 Check incoming Gum Arabic raw material for quality, contaminants, and compliance with farm level good agricultural practice standards before processing.

9.1.2 Visual inspection for color, appearance, Odour, Moisture content, foreign matter and other quality/microbial standards should be done before the product is packed for further processing

9.2 Grading

Gum Arabic should be graded based on particle size (diameter) and foreign matter expressed as percentage by mass (m/m). The grading system is defined as follows:

- a) Grade 1-Gum Arabic consists of large, clean nodules with minimal foreign matter
- b) Grade 2-Gum Arabic consists of medium sized particles with allowable foreign matter.
- c) Grade 3-Gum Arabic consists of small particles with allowable foreign matter

10 Industrial Processing of Gum Arabic

Processing and handling of Gum Arabic should be in accordance with EAS 39.

10.1 Processing of Gum Arabic

10.1.1 To ensure that Gum Arabic are safe for used in the food industry, upon arrival to the processing plant, the gum shall be cleaned and free from dirt, bark, sand and impurities such as small branches, , thorns, grass, plastic bags.

10.1.2 Processing Gum Arabic shall include sorting based on uniform pieces of various sizes, granulating, and powdering. In addition, Gum Arabic processing shall be accompanied by proper packaging and labelling.

10.1.3 Sorting Gum Arabic should be carried out by well trained workers and process shall be carried out in a hygienic manner.

10.1.4 After processing, proper record and reference sample for the process batch of the received Gum Arabic from the production areas, shall be kept and maintained for the purpose of traceability.

10.1.5 Mechanical crushing (kibbling) under hygienic conditions and dust control systems should prevent cross-contamination

10.2 Hygiene facilities

Gum Arabic processing premises should have appropriate internal design, equipment layout and location that ensure maintenance of good hygiene throughout the plant and prevention of cross contamination and the following should be provided with:

- a) washrooms, changing rooms, and handwashing facilities supplied with water, disinfectants, liquid soap, sanitizer, disposable towels and/or hot air hand driers, as appropriate.
- b) potable water complying with EAS 12;
- c) adequate lighting;
- d) clean compressed air for dry cleaning.
- e) food grade quality lubricants;
- f) appropriate storage facilities for packaging materials, finished products (unpackaged and packaged), lubricants, fumigants among others;
- g) stairs in close proximity to production lines should be appropriately designed and maintained;

- h) facilities for appropriate waste disposal;
- i) personal Protective Equipment such as gloves, boots, masks for dusty environments and
- j) workers should be trained on the tool safety use, hygienic and other practices

10.3 Maintenance and sanitation

Maintenance and sanitation procedures and programmes should be established to cover all areas of the manufacturing premises to prevent cross contamination. The following should be taken into account:

- a) efficient operation programmes are in place for all plant machinery and equipment;
- b) effective cleaning and disinfection programs for all facilities and equipment are undertaken;
- c) use of approved solvents, oils, lubricants, detergents and disinfectants;
- d) monitoring to establish effectiveness of maintenance, cleaning and sanitation; and
- e) calibration and preventive maintenance programmes are in place.

10.4 Personal hygiene

A personal hygiene policy should be established and implemented to ensure that Gum Arabic is not contaminated by food handlers as follows:

- a) written instructions for acceptable personal hygiene should be visibly displayed at appropriate areas and enforced;
- b) visitors to manufacturing and storage areas should be sensitized on hygiene practices and wear protective clothing as appropriate; and
- c) documented and effective training manual and program should be in place to ensure that employees, contractors and sub-contractors are competent in assigned duties, and are conversant with hygiene, accidents, and emergency procedures and any other issue critical to food safety

10.5 Washing, Disinfection and Cleaning of Packaging Containers

10.5.1 Food containers, packaging materials, washing reagent and disinfecting reagent that comply with hygiene standards and specifically approved by hygiene administration regulations should be used.

10.5.2 Cleaning and disinfection should be done in a manner that will safeguard the package integrity and product quality

10.5.3 Product packaging and internal packaging materials that have direct contact with the products should be all washed, dried and disinfected using appropriate methods then placed into a clean chamber to be chilled and prepared for later uses. If stored time exceeds the stipulated time period, packaging should be rewashed and disinfected a second time

10.5.4 Effective disinfection or sterilization equipment and methods should be used for the disinfection of all types of products. Methods such as precise filtration, microwave, irradiation in accordance to the requirements of EAS 39 and food hygiene requirements, can be used to achieve the purpose of disinfection if such products are required to undergo disinfection but are not heat resistant. Dosage of radiation absorbed and radiation time should be strictly controlled in accordance to the requirements of the Irradiated Food Hygiene Management Measures during the irradiation process.

10.5.5 Reliability inspection on aspects such as uniformity of temperature within the disinfection or sterilization equipment and repeatability should be regularly conducted and inspection equipment for aspects

such as temperature and pressure should also be regularly calibrated. Key indices such as temperature, pressure, time should be accurately recorded throughout the disinfection or sterilization operations.

11 Packaging and labelling

11.1 Consumer packages should be designed in compliance with relevant standards;

11.2 Processed Gum Arabic should be packaged in moisture-proof and food-grade packaging material

11.3 The packaging material should be clearly labelled with batch number, grade, country of origin, and production date, Grade or type (e.g., *Acacia Senegal*), net weight, Manufacturer/exporter name, Handling and storage instructions.

11.4 Packaging materials and labels for Gum Arabic should be kept safely and objects that are unrelated to the food should not be included in the internal packaging of finished products.

11.5 Product external packaging should indicate the maximum resistance to pressure (weight) and should be designed in a manner that minimizes damage and prevents contamination;

11.6 Unprocessed Gum Arabic should be packaged in a clean packaging material that is permeable to air in preparation for further processing.

11.7 Gum Arabic should be properly packaged in food grade packaging material preferably biodegradable bags and when packed, the material must not cause any contamination to the Gum Arabic. The package should be clearly labelled and stored in a specifically designated stores prior to any shipping. The packages for Gum Arabic shall be stored in high stacks

11.8 pallets used should be constructed and treated in a manner that preserves Gum Arabic quality and integrity of packages; and

11.9 Packaging materials and labels for Gum Arabic should be safe kept safely, and the packaging materials for product labels of every batch released, received and destroyed according to orders should maintain proper records.

12 Storage and Transportation

12.1 Storage

Gum Arabic should be stored in facilities that maintain the safety and quality of the product while assuring traceability. Gum Arabic in the warehouse should be accompanied by documents prescribed by regulations in the respective Partner States.

12.1.1 General hygiene requirements for storage and transportation should comply with the requirements of EAS 39.

12.1.2 Keep stored gum in cool, dry rooms with Relative humidity, RH < 60%, appropriate temperature warehouses and transported in vehicles free from contaminants.

12.1.3 Storage methods and environment of finished products should avoid light exposure, rain and ensure that temperature and humidity are controlled within appropriate ranges, as well as prevent shock and vibration.

12.1.4 Warehouses should have receipt and delivery inspection systems established. Raw materials should be implemented with "first-in-first-out" principles to prevent the over stay of first in materials.

12.1.5 Warehouses should maintain records of quantity stored; such warehouses should also maintain shipping, out-factory records, of which contents such as batch numbers, tapping dates, shipping date, locations, receiving end, quantity, so as to facilitate timely recalls when issues arise.

12.1.6 The incoming raw material for Gum Arabic should be stored on pallets, away from walls, pests, and sunlight.

12.2 Transportation

Gum Arabic shall be transported in a hygienic manner and shall not be exposed to direct rain to avoid moisture absorption. The vehicle transporting Gum Arabic shall be properly covered during shipping.

12.2.1 The following measures should be established, implemented, monitored and documented to ensure that transportation maintains quality and integrity of the Gum Arabic:

- a) transporters should be prequalified based on their ability to provide services in a manner that does not compromise product safety, quality and package integrity; and
- b) vehicles should be checked prior to loading, and during unloading to verify that the quality and safety of the material or product is assured.

12.2.2 The following should be done during transportation of Gum Arabic:

- a) vehicles for transporting Gum Arabic should be covered, clean, dry and free from oils, chemicals, moisture and foreign odour
- b) measures should be taken to prevent rewetting and contamination.
- c) inspection procedures should be established to assess suitability of the vessel for transportation and a checklist maintained; and
- d) Gum Arabic consignment should be accompanied by the serialized relevant documents to facilitate identification and traceability including but not limited to:
 - i. booking slip; and
 - ii. growers' delivery note.

13 Quality Management of Finished Products

13.1 Product sorting and testing

13.1.1 Gum Arabic should be pure, clean and polymerised

13.1.2 Sorting of impurities and rejection of gums in blocks, non-polymerised should be carried out manually or mechanically

13.1.3 Organoleptic analysis should be done in accordance with relevant standards and protocols to ascertain quality of Gum Arabic

13.1.4 The analytical tests for each batch for Gum Arabic should be carried out on for example; moisture content, microbial load (yeasts, moulds and bacteria), purity and foreign matter, viscosity, pesticide and heavy metal residues.

13.2 Product control

The finished product should be stored, packaged, labelled, dispatched and transported in a manner that maintains its quality, safety and complies with relevant standards and customer contractual agreements. The following should be observed:

- a) contractual agreements for supplies should be honoured by both parties;
- b) recycled materials for use should not be in direct contact with the product;
- c) pallets for product storage should not compromise product safety and quality;
- d) dispatch procedure and criteria should be established to ensure that only clean vehicles capable of preserving safety and quality of the product are used;
- e) Gum Arabic transportation containers should be dry, clean and free from holes, odours, leak proof and designated only for Gum Arabic transport at a time;
- f) transport personnel and drivers should be sensitized and aware of food safety requirements, and appropriate vehicle and security conditions for transporting finished products;
- g) the producer/exporter should establish a documented system to ensure that every unit or batch of the products is traceable
- h) a procedure should be established to ensure that Gum Arabic samples are representative of the offered lot and that non-conforming products are disposed of appropriately; and
- i) monitoring should be undertaken to identify processing points and products that are out of specification; identify non-conforming products as appropriate for isolation, rework, release and /or disposal and records of actions taken maintained.

14 Safety and Environmental Requirements

14.1 Environmental Sustainability

- a) Avoid over-tapping and allow tree recovery cycles
- b) Replant Acacia seedlings annually
- c) Protect against wildfire and uncontrolled grazing

15 Documentation and Recordkeeping

- a) Gum Arabic value chain actors should document and keep record of the best practices along the value chain including; harvest logs
- b) transport records
- c) processing batch sheets
- d) quality testing certificates
- e) storage records/batches
- f) export documentation

- g) batch released/received/destroyed

Continuous Improvement

Gum Arabic operations should be followed up with a review of documentation on the following to check on the consistency in applicability of the best practices;

- a) Annual review of practices
- b) Training programs for harvesters and processors
- c) Adoption of new sustainable technologies
- d) Stakeholder feedback system

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