



CD/K/078:2010
ICS 67.080.20

EAST AFRICAN STANDARD

Fresh okra — Specification and grading



EAST AFRICAN COMMUNITY

HS 0709.90.00 [HS 0709.90.40]

Foreword

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

In order to meet the above objectives, the EAC Partner States have enacted an East African Standardization, Quality Assurance, Metrology and Test Act, 2006 (EAC SQMT Act, 2006) to make provisions for ensuring standardization, quality assurance, metrology and testing of products produced or originating in a third country and traded in the Community in order to facilitate industrial development and trade as well as helping to protect the health and safety of society and the environment in the Community.

East African Standards are formulated in accordance with the procedures established by the East African Standards Committee. The East African Standards Committee is established under the provisions of Article 4 of the EAC SQMT Act, 2006. The Committee is composed of representatives of the National Standards Bodies in Partner States, together with the representatives from the private sectors and consumer organizations. 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 procedures of the Community.

Article 15(1) of the EAC SQMT Act, 2006 provides that "Within six months of the declaration of an East African Standard, the Partner States shall adopt, without deviation from the approved text of the standard, the East African Standard as a national standard and withdraw any existing national standard with similar scope and purpose".

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.

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Introduction

In the preparation of this East African Standard, the following sources were consulted extensively:

United States Standards for Grades of Okra, Effective December 18, 1928 (Reprinted — January 1997)

CODEX STAN 193:1995 (Rev.5:2009), *General Standard for Contaminants and Toxins in Foods*

CODEX STAN 228:2001 (Rev.1:2004), *General methods of analysis for contaminants*

Codex Alimentarius website: http://www.codexalimentarius.net/mrls/pestdes/jsp/pest_q-e.jsp

USDA Foreign Agricultural Service website: <http://www.mrldatabase.com>

USDA Agricultural Marketing Service website: <http://www.ams.usda.gov/AMSV1.0/Standards>

USDA Plant Inspectorate Service website: http://www.aphis.usda.gov/import_export/plants

European Union: http://ec.europa.eu/sanco_pesticides/public

Assistance derived from these sources and others inadvertently not mentioned is hereby acknowledged.

This standard has been developed to take into account:

- the needs of the market for the product;
- the need to facilitate fair domestic, regional and international trade and prevent technical barriers to trade by establishing a common trading language for buyers and sellers.
- the structure of the CODEX, UNECE, USA, ISO and other internationally significant standards;
- the needs of the producers in gaining knowledge of market standards, conformity assessment, commercial cultivars and crop production process;
- the need to transport the product in a manner that ensures keeping of quality until it reaches the consumer;
- the need for the plant protection authority to certify, through a simplified form, that the product is fit for crossborder and international trade without carrying plant disease vectors;
- the need to promote good agricultural practices that will enhance wider market access, involvement of small-scale traders and hence making fruit and vegetable production a viable means of wealth creation; and
- the need to keep unsatisfactory produce from the market by allowing the removal of unsatisfactory produce from the markets and to discourage unfair trade practices e.g. trying to sell immature produce at the beginning of the season when high profits can be made. Immature produce leads to dissatisfaction of customers and influences their choices negatively, which disadvantages those traders who have waited until the produce is mature.

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Draft for comments only — Not to be cited as East African Standard

Fresh okra — Specification and grading

1 Scope

This standard applies to okra of varieties (cultivars) grown from *Abelmoschus esculentus* L. Moench of *Malvaceae* family to be supplied fresh to the consumer, okra for processing being excluded.

2 Normative references

The following referenced documents are indispensable for the application 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.

CAC/GL 21, *Principles for the Establishment and Application of Microbiological Criteria for Foods*

CAC/RCP 1, *Recommended International Code of Practice — General Principles of Food Hygiene*

CAC/RCP 44, *Recommended International Code of Practice for the Packaging and Transport of Tropical Fresh Fruit and Vegetables*

CAC/RCP 53, *Code of Hygienic Practice for Fresh Fruits and Vegetables*

EAS 38, *Labelling of prepackaged foods — Specification*

CD/K/378:2010, *Horticultural industry — Code of practice*

3 Definitions

For the purpose of this standard the following definition shall apply:

3.1

damage

any defect, or any combination of defects, which materially detracts from the appearance, or the edible or marketing quality of the individual pod or of the lot as a whole

3.2

serious damage

any defect, or any combination of defects, which seriously detracts from the appearance, or the edible or marketing quality of the individual pod or of the lot as a whole

4 Provisions concerning quality

4.1 General

The purpose of the standard is to define the quality requirements for okra at the market control stage, after preparation and packaging.

The holder/seller of products may not display such products or offer them for sale, or deliver or market them in any manner other than in conformity with this standard. The holder shall be responsible for observing such conformity.

4.2 Minimum requirements

4.2.1 In all classes, subject to the special provisions for each class and the tolerances allowed, the okra must be:

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- (a) whole with peduncle and intact tip;
- (b) firm;
- (c) sound and fresh in appearance; produce affected by rotting or deterioration such as to make it unfit for consumption is excluded
- (d) tender;
- (e) clean; clean, practically free of any visible foreign matter (including parts of the flowers)
- (f) free of bruising;
- (g) free of any visible foreign matter;
- (h) free of abnormal external moisture, excluding condensation following removal from cold storage,
- (i) free from damage caused by low or high temperature;
- (j) free of any foreign smell /or taste;
- (k) free of damage caused by pests;
- (l) sufficiently developed (should be plucked before fiber formation);
- (m) free of hard seeds; and
- (n) free from harmful chemicals.

4.2.2 The development and condition of okra must be such that they are able to withstand transport and handling and to arrive in a satisfactory condition at the place of destination.

4.3 Classification

Okra shall be classified as defined below:

4.3.1 Extra Class

Okra must be of superior quality. They must be characteristic of the variety. They must be free of defects, with the exception of very slight superficial defects, provided they do not affect the general appearance of the produce, the quality, the keeping quality and presentation in the package.

4.3.2 Class I

Okra in this class must be of good quality. Class I consists of pods of okra of similar varietal characteristics which are fresh, tender, not badly misshapen, free from decay, and from damage caused by dirt or other foreign matter, disease, insects, mechanical or other means. Okra in this class may have following slight defects, provided they do not affect the general appearance of the produce, the quality, the keeping quality and presentation in the package;

- slight defects in colour;
- Slight skin defects (scar, blemishes, scratches, bruises, scraps) not to exceed 2 % of the total surface area.

4.3.3 Class II

This grade includes Okra which do not qualify for inclusion in the higher grades, but satisfy the minimum requirements. Okra may have following defects, provided they retain their essential characteristics as regards the quality, the keeping quality and presentation in the package.

- defects in colour;
- defects in shape and development;
- defects in skin (scars, blemishes, scratches, bruises, scraps) not to exceed 5 % of the total surface area.

4.3.4 Unclassified

"Unclassified" consists of pods of okra which have not been classified in accordance with the foregoing grade. The term "unclassified" is not a grade within the meaning of this standard but is provided as a designation to show that no grade has been applied to the lot.

5 Provisions concerning sizing

Size is determined by the length of the fruit (in mm. without peduncle) in accordance with the following table:

Size code	Length in mm
A	40.1 – 65.0
B	65.1 – 90.0
C	90.1 – 115.0
D	115.1 and above

6 Provisions concerning tolerances

6.1 Quality tolerances

In order to allow for variations incident to proper grading and handling, the following tolerances, by weight and size are provided as specified:

6.1.1 Extra class

5 % by number or weight of Okra not satisfying the requirements of the grade, but meeting those of Class I or, exceptionally, coming within the tolerances of that grade.

6.1.2 Class I

10 % by number or weight of Okra not satisfying the requirements of the grade, but meeting those of Class II or, exceptionally, coming within the tolerances of that grade.

6.1.3 Class II

10 % by number or weight of Okra not satisfying the requirements of the grade, but meeting the minimum requirements.

6.2 Size tolerances

For all classes, 10 % by number or weight of Okra not conforming to the size specified for the grade, but meeting the size requirement for the grade immediately below.

7 Provisions concerning presentation

7.1 Uniformity

The contents of each package must be uniform and contain only pods of the same origin, variety or commercial type and quality.

The visible part of the contents of the package must be representative of the entire contents.

7.2 Packaging

Okra pods must be packed in such a way as to protect the produce properly.

The materials used inside the package must be new¹, clean, and of a quality such as to avoid causing any external or internal damage to the produce. The use of materials, particularly paper or stamps, bearing trade specifications is allowed provided the printing or labelling has been done with non-toxic ink or glue.

Okra pods shall be packed in each container in compliance with CAC/RCP 44.

8 Marking and labelling

8.1 Consumer packages

In addition to the requirements of EAS 38, the following specific provisions apply:

8.1.1 Nature of produce

If the produce is not visible from the outside, each package shall be labelled as to the name of the produce and may be labelled as to name of the variety and/or commercial type.

8.2 Non-retail containers

Each package² must bear the following particulars in letters grouped on the same side, legibly and indelibly marked, and visible from the outside:

8.2.1 Identification

The exporter, packer and/or dispatcher shall be identified by name and physical address (e.g. street/city/region/postal code and, if different from the country of origin, the country) or a code mark officially recognized by the national authority.³

8.2.2 Nature of produce

— "Okra Pods" if the contents are not visible from the outside.

8.2.3 Origin of produce

Country of origin and, optionally, district where grown or national, regional or local place name.

8.2.4 Commercial specifications

— Class.

8.2.5 Official control mark (optional)

¹ For the purposes of this Standard, this includes recycled material of food-grade quality.

² Package units of produce prepacked for direct sale to the consumer shall not be subject to these marking provisions but shall conform to the national requirements. However, the markings referred to shall in any event be shown on the transport packaging containing such package units.

³ The national legislation of a number of countries requires the explicit declaration of the name and address. However, in the case where a code mark is used, the reference "packer and/or dispatcher (or equivalent abbreviations)" has to be indicated in close connection with the code mark, and the code mark should be preceded by the ISO 3166 (alpha) country/area code of the recognizing country, if not the country of origin.

9 Contaminants

9.1 Pesticide residues

Fresh okra shall comply with those maximum pesticide residue limits established by the Codex Alimentarius Commission for this commodity. The limits listed below were current as of the dates indicated. The table below provides current MRLs while Annex E provides current MRLs for the USA, EU and Codex markets.

Maximum pesticide residue limits and extraneous maximum residue limits in okra (current as at 2009-06-09)

Type	Unit symbol	Limit	Method of test	Notes
BROMIDE ION	mg/kg	200		

9.2 Heavy metals

Okra shall comply with those maximum levels for heavy metals established by the Codex Alimentarius Commission for this commodity. The current limits are as indicated below:

Metal	Unit of measurement	Maximum limit	Test method
Lead (Pb)	mg/kg wet weight	0.10	ISO 6633 (AAS)
Cadmium (Cd)	mg/kg wet weight	0.050	ISO 6561-1 or 6561-2

10 Hygiene

10.1 It is recommended that the produce covered by the provisions of this Standard be prepared and handled in accordance with the appropriate sections of CAC/RCP 1, CAC/RCP 53, and other relevant Codex texts such as Codes of Hygienic Practice and Codes of Practice.

10.2 The produce should comply with any microbiological criteria established in accordance with CAC/GL 21.



The fruit of okra is a slender green pod

Okra, or Gumbo, a garden plant closely related to the hibiscus. Okra produces a pod eaten in soups and stews and as a fried or boiled vegetable. The flavorful pods are a source of vitamin A. Old stems and pods are used for fibres to a small extent. Okra is native to tropical Africa and now grows in Europe, the West Indies, and the southern United States as well.

Okra plants grow from three to eight feet (90 to 240 cm) tall in warm, sandy loam. They have green, nonwoody stems; large, rough-edged leaves; and pale, yellowish flowers. The fruit of okra is a slender green pod that is moist and sticky. The pods are picked when they are two to seven inches (5 to 12.5 cm) in length.



Burgundy okra



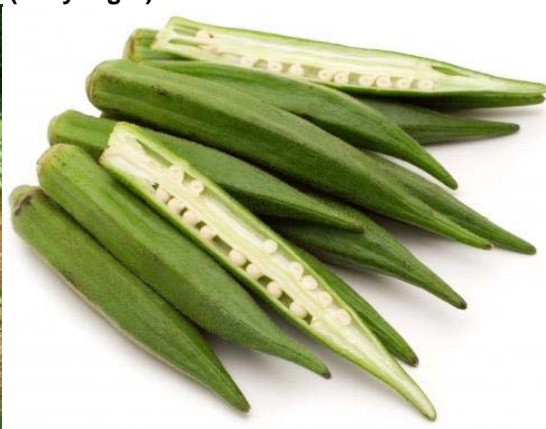
Cowhorn okra



Fresh okra (Ladyfinger)



Okra garden



Fresh okra



Growing okra (Burgandy)



Growing okra

Draft for CC



Growing okra

Annex A
(informative)

Guide to cold storage

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Annex B (informative)

Commercial production guide

This popular vegetable can be found in both home and commercial gardens. A large acreage is planted under contract for the soup and frozen food industry. Okra can be a profitable crop when recommended production practices are followed. It can return an income over a 10- to 12- week period after harvest starts.

Varieties

New okra varieties are not introduced as often as are those of some vegetables. However, plant breeders and commercial companies continue to improve existing varieties and some hybrids have been released. Varieties recommended for commercial production are listed in the table below.

Since some processors prefer a particular variety, you're urged to discuss this with the processor before buying seed. Some processors have a source of seed available for their growers.

Buyers for the fresh market generally prefer star shaped pods; soup manufacturers prefer a round pod of the Emerald type; the frozen food industry has accepted both types in the past.

Varieties and uses

Variety	Pod Shape	Days to Maturity	Main Use	Other Comments
Emerald	Round	57	Canning	Semi-cut leaf
Louisiana Green Velvet	Round	58	Freezing	Retains seed when sliced
Clemson Spineless #80	Star	60	Fresh Market	Heavy yields; also spineless
Dwarf Green Long Pod	Star	52	Fresh Market	Plant has several side branches
Hastings Improved Perkins	Star	50	Fresh Market	Deep cut leaf
Annie Oakley (Hybrid)	Star	57	Home-Local	Try on small scale to determine adaptability
Red	Star	58	Home Garden	Red pod - ornamental and home use

Field selection

Soil

A well-drained, fertile soil is best for okra production. Select a soil with good water holding capacity. Do not plant on very light, sandy soils. Soils that are poorly drained or known to have hardpans should not be planted to okra.

Crop Rotation

Since okra is very susceptible to damage by nematodes, follow a crop rotation, using such crops as grasses and small grains, which prevent a buildup of nematode populations. Okra should not follow vine crops, such as squash and sweet potatoes. These crops tend to increase nematode population.

Land preparation

Seedbed

Early land preparation is an important step in growing a good crop. Turning the soil in the fall or early spring will give crop residues time to decompose before okra is planted. Early land preparation also allows for many weed seed to germinate. These seedlings should be killed as you disk the soil before planting.

Fumigation

Since okra is very susceptible to nematodes, it is important to fumigate the soil if nematodes are present. You can determine if nematodes are present by sampling the soil. Your extension worker can advise you on how to take a nematode soil sample. He can also advise you on soil fumigation.

Fertilizer

Okra grows best on soils that have a pH of 5.8 to 6.5. A soil test will indicate if lime is required and will specify the amount of fertilizer to apply. If lime is recommended, use *dolomitic* lime. Apply it 3 or 4 months before the crop is seeded.

Research indicates that okra should respond to additional phosphate when the soil test indicates *medium* to *low* phosphate. If your soil test indicates low phosphate, broadcast 182 kg per acre of 20 percent superphosphate and disk it in. If the soil test indicates medium phosphate, apply 91 kg per acre of 20 percent superphosphate and disk it in.

If a soil test is not available, general recommendations are to apply 272 kg to 363 kg per acre of a complete fertilizer such as 6-12-12 or 5-10-15. This can be mixed under the row or applied in a band to the side.

The okra plant has a sensitive balance between vegetative (foliage production) and reproduction (pod production). The use of additional nitrogen should be avoided on vigorous plantings until fruiting begins to check plant growth.

Two or more sidedressings with a high analysis nitrogen material may be needed, however, depending on rainfall. It is important to supply additional nitrogen late in the season at the time the "forms" or "blooms" are concentrated in the top of the plant. Put down 15 kg of additional nitrogen per acre at each application.

Planting

Seed the okra after the soil has warmed enough to allow good seed germination. Space rows 71 cm to 96 cm inches apart. These spacings will require 5.5 to 7 kg of seed per acre. Plant 4 cm to 5 cm deep, 4 to 6 seed per foot. Thin to 20 cm to 30 cm between plants.

Plant pest control**Weeds**

Weeds can be controlled by cultivation or by use of herbicides. Early weeds can be controlled by preplant herbicide applications. Later in the season, shallow cultivations can be used to control weeds.

Insects

At times it will be necessary to control insects that attack okra. Check your crop on a regular schedule, especially early in the season. This is the time that aphids usually appear. Later on, the plants and pods may be attacked by green stink bugs, cabbage loopers, corn earworms, European corn borers, and the leaf-footed plant bug. Consult with your local extension worker for control measures.

Diseases

Nematodes can cause serious losses in okra. Root-knot nematodes can be controlled by the use of approved nematocides. Nematocides are very essential if soil is infested with nematodes. Consult with your local agricultural extension worker for approved control measures.

The incidence of Fusarium wilt is much greater when root-knot nematodes are present. Nematode control is a major practice in reducing Fusarium wilt presence.

Harvesting

The most important step in any okra operation is harvesting the pods correctly and at the proper time. Harvesting methods vary according to the market type.

Harvesting for processing

Most varieties grown for processing produce pods on a brittle stem. These pods can be broken or snapped in a manner that leaves the stem on the plant and not on the pod. Okra grown for processing should be allowed to get as long as possible without becoming fibrous or hard. As long as the pod tip will snap off evenly the pod is usually still tender.

Processing

Pods 5 cm to 10 cm left to mature 1 to 2 days longer will yield about 2 1/3 times more weight. If left to mature 3 to 4 days longer, they will yield about 3 1/2 times more weight.

Usually three harvests a week are required with process type of okra. Train your picking crews to grade okra as it is being harvested, discarding tough and damaged pods. Do not gather pods under 4 inches long. If left to reach maximum length, these pods will return a much greater weight per acre.

Harvesting for fresh market

Greater care is necessary in harvesting okra for the fresh market. Grading standards are more exact and the pods must usually be cut with a knife (see Clause 4).

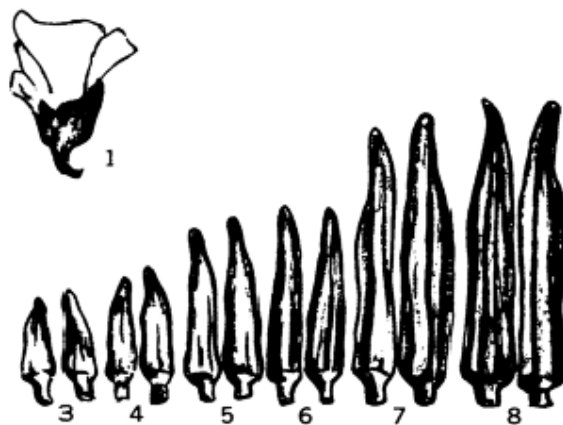
Be sure your picking crews are careful to neatly trim the stem end; this can be done as the pod is cut from the plant. To keep pods small enough to grade as Extra/Fancy or Class I it will be necessary to harvest every day during periods of rapid growth.

Caution

Any mature pods left on the plant will reduce future yield. It is very important that all mature pods be removed from the plants as soon as possible. The practice of cuffing off (cropping) leaves during harvest does not influence future yields as long as leaves are not cut above where pods have not developed.

Fresh market


Pods develop extremely fast. From bloom to *Jumbo* size takes only about 8 days. To get a maximum of *Fancy and Choice* pods (groups 3 & 4), you must harvest every day.



Trade and brand names are for information. No endorsement is intended.

Annex C
(informative)

Model certificate of conformity with standards for fresh fruits and vegetables

1. Trader:	Certificate of conformity with the Community marketing standards applicable to fresh fruits and vegetables No. (This certificate is exclusively for the use of inspection bodies)		
2. Packer identified on packaging (if other than trader)	3. Inspection body		
	4. Place of inspection/country of origin ⁽¹⁾	5. Region or country of destination	
6. Identifier of means of transport	7. <input type="checkbox"/> Internal <input type="checkbox"/> Import <input type="checkbox"/> Export		
8. Packages (number and type)	9. Type of product (variety if the standards specifies)	10. Quality Class	11. Total net weight in kg
12. The consignment referred to above conforms, at the time of issue, with the Community standards in force, vide: <u>CD/K/078:2010, Fresh okra — Specification and grading</u> <hr/> Customs office foreseen Place and date of issue Valid until (date): Signatory (name in block letters): <div style="display: flex; justify-content: space-around;"> Signature Seal of competent authority </div>			
13. Observations:			
<small>(1) Where the goods are being re-exported, indicate the origin in box 9.</small>			

Annex D (informative)

Okra — Fact sheets

D.1 *Abelmoschus esculentus*



Authority	(L.) Moench
Family	Magnoliopsida:Dilleniidae:Malvales:Malvaceae
Synonyms	Hibiscus esculentus L.
Common names	abelmoskus, america-neri, bakhua mun, bamia, bamija, bamyia, bandakai, bende', bhindee, bhindi, bindi, bumbo, bunga depros, calulu', cantarella, chaucha turca, dau bap, Eibisch, frutto d'ibisco, gobbo, gombaut, gumbo, Gombo, haluyoy, huang qiu kui, ibisco, kacang bendi, kacang lender, kembang dapros, ketmie comestible, kopi arab, krachiap man, krachiapkhieo, lady fingers, lady's finger, mesta, ocra, okay, oker, okra, okro, okura, quiabo, quimbambo, quingombó, quingombo, ramturai, rosenapfel, saluyota bunga, sayur bendi, tori, buah lek, vendakai, yong kok dau
Editor	
Ecocrop code	289

Description

Okra is an upright, annual, tropical, often much branched, herbaceous to slightly woody plant. Dwarf varieties reach about 90 cm in height while other varieties may reach 200-240 or even up to 400 cm. The herbaceous portions of the plant are clothed with sharp bristles, and often bear purplish spots. It is grown for its fruits that are harvested for food consumption while still tender and immature. The fruits at maturity dry to a longitudinally dehiscent capsule, 25 cm long or more.

Uses

The young immature fruits are eaten fresh, cooked or fried as vegetables and the can be frozen, canned or dried. Fruits have medicinal properties. Ripe seeds contain 20% edible oil and they can be used as a substitute for coffee. In India, mucilage from the roots and stems has industrial value for clarifying sugarcane juice in gur manufacture. Dried okra powder is used in salad dressings, ice creams, cheese spreads, and confectionery. The stems provide a fiber of inferior quality.

Growing period

Annual. May require 50-90 days to first harvest and the harvest period may continue up to 180 days.

Common names

Okra, Ochro, Lady's Finger, Gumbo, Gombo, Cantarella, Quingombo, Rosenapfel, Bindi, Bhindee, Bhindi, Mesta, Vendakai, Kachang bendi, Kachang lender, Sayur bendi, Kachieb, Grajee-ap morn, You-padi, Ch'aan K'e, Tsau Kw'ai, Ila, Ilasha, Ilashodo, Quimbambo, Kopi arab, Khua ngwang, Krachiap mon, Dau bap.

Further information

Scientific synonym: *Hibiscus esculentus*. Most varieties grow well in the lowland humid tropics up to elevations of 1000 m. Adapted to moderate to high humidity. Okra is a short-day plant, but it has a

wide geographic distribution, up to latitudes 35-40°S and N. Yields of green pods are often low, about 2-4 t/ha owing to extreme growing conditions, but up to 10-40 t/ha may be produced.

Morphology

Stems

It has a thick, coarse, semiwoody stem with few branches. 90-240 cm tall and 7.5-10 cm in diameter.

Leaves

Leaves are alternate, of 3 varieties, spiny, cordate, angular, palmate in shape, and lobed or divided.

Flowers

The flowers are large, showy, hibiscus (cotton)-like about 5 cm across with a wide corolla usually made up of five yellow to pale yellow or cream coloured petals and purplish hearts. The erect sexual parts consist of a five to nine part style, each part with a capitate stigma, surrounded by the staminal tube bearing numerous filaments. The flower opens shortly after sunrise and remains open until about noon. The petals wilt in the afternoon and usually fall the following day. The anthers dehisce 15 to 20 minutes after the flower opens, and some of the pollen comes in contact with the stigma. Okra blooms and produces over an extended season, usually until first frost.

Fruits: The fruit is a long, pentagonal, narrow, cylindrical capsule, generally ribbed, and spineless in cultivated kinds. It attains lengths of 5-30 cm, usually 15-25 cm and up to 2.5 cm or more in diameter, tapering at the base. It is often curved, and is covered with hairs, especially along the ridges. The pods contain several roundish or kidney-shaped smooth seeds in each of the several cells. The dry mature capsule is longitudinally dehiscent.

Environment

Latitude

It has a wide geographic distribution, up to latitudes 35-40°S and N.

Altitude

Most varieties grow well in the lowland humid tropics up to elevations of 1000 m.

Temperature

It requires warm growing conditions. Seeds show no germination activity at temperatures below 12-13°C while the optimum temperature for germination is 35°C. Best growth occurs when soil temperatures are above 18-20°C. Reported temperature range for growth is 12-35°C with the optimum between 20-30°C. Okra does not tolerate frosts.

Water

Adapted to moderate to high humidity. Reported annual rainfall range for growth is 300-2500 mm with the optimum between 600-1200 mm. Well distributed rainfall is best for production.

Radiation

Range & intensity

Full sun for best production.

Photoperiodism

Most cultivars need a short daylength to initiate flowering, but there are long day and day neutral cultivars. Day neutral cultivars will continue flowering from flower initiation until the first frost.

Soil

Physical

Sandy loam soils are preferred, but okra can be grown on a wide range of soils with good drainage and can also grow in shallow soils.

Chemical

Salinity effects are detectable above 4 dS/m but are more pronounced at 8 dS/m, and can be partially offset by higher N application. Reported soil pH range for growth is 4.5-8.7 with the optimum between 5.5-7.

Distribution

Okra is native to West Africa and has become established in the wild in some tropical American areas. It is generally believed that it first reached America during the days of slave trafficking. It is a popular and important food in Third World tropical countries. It is widely used in India, Africa and western Asia, but less known in Europe and North America.

Pollination

The okra pollen grain is large with many pores, and every pore is a potential tube source, therefore, many tubes can develop from one pollen grain. Okra is self-fertile, and, when the anthers come in contact with the stigmas, self-pollination may result. However, cross-pollination also occurs. If the anthers deposit an adequate number of pollen grains on the stigmas to fertilize all of the ovules, and outside agency is not needed to transfer the pollen. However, if an inadequate amount of pollen contacts the stigmas leading to each carper, and some of the ovules are not fertilized, that area around the unfertilized ovule is less well developed.

Okra is not wind pollinated. It is freely visited by honey bees and bumble bees, but the value of insect pollinator visitation is unknown.

Status

Found both wild and cultivated.

Ethnobotany

1. Infusion of the fresh fruit capsules gives a refreshing drink.
2. The above-mentioned drink is also emollient, useful against urinary tract infections, urine retention and constipation.
3. The flower decoction yields a tea which is used against diabetes.
4. A seed decoction is used as a diuretic and is also used in the treatment of dysentery (Gurib-Fakim et al, 1996).

D.2 *Abelmoschus manihot*



Authority	(L.) Medic.
Family	Magnoliopsida:Dilleniidae:Malvales:Malvaceae
Synonyms	Hibiscus manihot L. (1753), Abelmoschus manihot ssp. manihot [(L)]; Medikus
Common names	neka (Simbo), bele (Fiji), pele (Tonga, Tuvalu), aibika, island cabbage, baera, bush spinach, peli, slippery cabbage (Solomon Is.), bush cabbage, slipery kabis
Editor	
Ecocrop code	290

Description

A shallow rooted shrub reaching 1-7.5 m in height, with an erect, woody, branching stem, simple leaves and large, pale yellow flowers, 7-15 cm in diameter.

Uses

Young leaves and stem tips are used as cooked green vegetables. It has medicinal properties and plants are also grown as ornamentals.

Growing period

Perennial. Harvest starts about 80-90 days after planting and the bush remains productive for at least a year. Shoots approximately 15 cm in length and with several leaves attached are harvested when the lower leaves have fully developed.

Common names

Sunset hibiscus, Aibika, Gedi, Degi, Lagikuway, Barakue, Glikway, Po-fai.

Further information

Scientific synonym: *Hibiscus manihot*. Sunset hibiscus is native of continental South-West Asia. It is best grown at elevations below 500 m, between 500-1200 m yields may be reduced and the plant may develop an annual habit. It require relative high air humidity and irrigation is necessary during dry periods. Yields of leaves may vary from 10-60 t/ha or 1-6 kg/m².

D.3 *Abelmoschus moschatus*



Authority	Medic.
Family	Magnoliopsida:Dilleniidae:Malvales:Malvaceae
Synonyms	<i>Hibiscus abelmoschus</i> L. (1753).
Common names	abelmosk, musk mallow, mushkdan, muskdana, kasturi bhendi, gukhia korai, kasturi bhenda, kattukasturi, varttilai kasturi, lalkasturika, musk okra, ambrette, abelmosco, ambreta, rosa almiscarada, quiabo cheiroso, kasturi, gombo musqué, ketmie musquée, graine de musc, kamang, kaEmang, karereon, karereon nikapwerik nik, kareron, likonokon, gongul, metei, mety, methey, hathongethong, kamwayang, nikapwerik, setmwechin, sotumo, wakiwaki, wakewake, wakeke, vakeke, aukiki, oEeEe, fou ingo, fau ingo, Eaute toga, fau tagalao, fua samasama, loa, fauEingo, tropical jewel-hibiscus
Editor	
Ecocrop code	291

Description

It is a coarse herb or prostrate creeper reaching 30-150 cm in height with an underground tuber. Plants die back to the tuber in the dry season but may produce new growth during the following wet season. Leaves ovate-suborbicular, usually 3-5-lobed, to 15 cm long. Calyx greenish, spathe-like, caduceus, corolla in colours from red with a white eye to bright yellow with a darker or purplish eye, 8-10 cm wide. Fruit a hirsute capsule 6-8 cm long, ovoid-cylindric.

Uses

Grown as an ornamental. The oil obtained from seeds possess an odour similar to that of musk and its aromatic constituents have long been used in perfumery industry. In India, the bitter, sweet, acrid, aromatic seeds are used as a tonic and are considered cooling, aphrodisiac, ophthalmic, cardiogenic, digestive, stomachic, constipating, carminative, pectoral, diuretic, stimulant, antispasmodic, and deodorant, intestinal complaints, stomatitis, and diseases of the heart, allays thirst and checks vomiting. Seeds allay thirst, cure stomatitis, dyspepsia, urinary discharge, gonorrhoea, leucoderma and itch. Roots and leaves are cures for gonorrhoea.

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Growing period

Annual, biennial or perennial.

Common names

Musk mallow.

Further information

It can be found in India, southern China and tropical Asia, into the Pacific and northern Australia. It prefers open forests in areas of seasonal rainfall and can become weedy in open and disturbed areas.

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Annex E (informative)

Okra — Codex, EU and USA pesticide residue limits

Users are advised that international regulations and permissible Maximum Residue Levels (MRL) frequently change. Although this International MRL Database is updated frequently, the information in it may not be completely up-to-date or error free. Additionally, commodity nomenclature and residue definitions vary between countries, and country policies regarding deferral to international standards are not always transparent. This database is intended to be an initial reference source only, and users must verify any information obtained from it with knowledgeable parties in the market of interest prior to the sale or shipment of any products. The developers of this database are not liable for any damages, in whole or in part, caused by or arising in any way from user's use of the database.

Results Key

MRL values in *{Italics}* are more restrictive than US

--- indicates no MRL value is established.

Cod, EU, etc. indicates the source of the MRL and EXP means the market defers to the exporting market.

All numeric values listed are in parts per million (ppm), unless otherwise noted

	US	Cod	EU 1
Azoxystrobin	2	---	2
	1. European Union does not maintain a specific MRL for the Azoxystrobin/Okra combination, but does maintain an MRL of 2 PPM for its "Solanacea" group.		
	US	Cod	EU
Bifenazate	2		<i>{0.01}</i>
	US	Cod	EU 2
Bifenthrin	0.5	---	<i>{0.2}</i>
	2. European Union does not maintain a specific MRL for the Bifenthrin/Okra combination, but does maintain an MRL of 0.2 PPM for its "Solanacea" group.		
	US	Cod	EU
Buprofezin	4	---	<i>{0.5}</i>
	US	Cod	EU
Captan	0.05	---	<i>{0.02}</i>
	US	Cod	EU
Carbaryl	4	---	<i>{0.05}</i>
	US	Cod	EU 3
Carfentrazone-ethyl	0.1	---	<i>{0.01}</i>
	3. European Union does not maintain a specific MRL for the Carfentrazone-ethyl/Okra combination, but does maintain an MRL of 0.01 PPM for its "Vegetables Fresh or Frozen" group.		
	US	Cod	EU 4
Chlorothalonil	6	---	<i>{2}</i>
	4. European Union does not maintain a specific MRL for the Chlorothalonil/Okra combination, but does maintain an MRL of 2 PPM for its "Solanacea" group.		
	US	Cod	EU
Flonicamid	0.4	---	<i>{0.05}</i>
	US	Cod	EU
Flubendiamide	0.3	---	<i>{0.01}</i>
	US	Cod	EU 5
Flumioxazin	0.02	---	0.05
	5. European Union does not maintain a specific MRL for the Flumioxazin/Okra combination, but does maintain an MRL of 0.05 PPM for its "Vegetables Fresh or Frozen" group.		
	US	Cod	EU
Gamma Cyhalothrin	0.2	---	---

	US	Cod	EU 6
Glyphosate	0.5	---	{0.1}
	6. European Union does not maintain a specific MRL for the Glyphosate/Okra combination, but does maintain an MRL of 0.1 PPM for its "Fruiting vegetables" group.		
	US	Cod	EU
Imidacloprid	1	---	{0.5}
	US	Cod	EU
Indoxacarb	0.5	---	{0.02}
	US	Cod	EU 7
Inorganic bromide resulting from fumigation	30	200	30
	7. European Union does not maintain a specific MRL for the Inorganic bromide resulting from fumigation/Okra combination, but does maintain an MRL of 30 PPM for its "Solanacea" group.		
	US	Cod	EU 8
Lactofen	0.02	---	{0.01}
	8. European Union does not maintain a specific MRL for the Lactofen/Okra combination, but does maintain an MRL of 0.01 PPM for its "Vegetables Fresh or Frozen" group.		
	US	Cod	EU 9
Malathion	8	---	{0.02}
	9. European Union does not maintain a specific MRL for the Malathion/Okra combination, but does maintain an MRL of 0.02 PPM for its "Solanacea" group.		
	US	Cod	EU
Mandipropamid	1	---	{0.01}
	US	Cod	EU 10
Mesotrione	0.01	---	0.05
	10. European Union does not maintain a specific MRL for the Mesotrione/Okra combination, but does maintain an MRL of 0.05 PPM for its "Vegetables Fresh or Frozen" group.		
	US	Cod	EU
Methoxyfenozide	2	---	{0.02}
	US	Cod	EU 11
Metolachlor	0.5	---	{0.05}
	11. European Union does not maintain a specific MRL for the Metolachlor/Okra combination, but does maintain an MRL of 0.05 PPM for its "Vegetables Fresh or Frozen" group.		
	US	Cod	EU
Myclobutanil	4	---	{0.02}
	US	Cod 12	EU 13
Paraquat dichloride	0.05	0.05	{0.02}
	12. Codex does not maintain a specific MRL for the Paraquat dichloride/Okra combination, but does maintain an MRL of 0.05 PPM for its "Fruiting vegetables, other than Cucurbits" group.		
	13. European Union does not maintain a specific MRL for the Paraquat dichloride/Okra combination, but does maintain an MRL of 0.02 PPM for its "Vegetables Fresh or Frozen" group.		
	US	Cod	EU 14
Phosphine	0.01	---	0.05
	14. European Union does not maintain a specific MRL for the Phosphine/Okra combination, but does maintain an MRL of 0.05 PPM for its "Fruiting vegetables" group.		
	US	Cod	EU 15
Pyriproxyfen	0.02	---	1
	15. European Union does not maintain a specific MRL for the Pyriproxyfen/Okra combination, but does maintain an MRL of 1 PPM for its "Solanacea" group.		
	US	Cod	EU
Sethoxydim	2.5	---	{0.5}

	US	Cod	EU 16
Spinetoram	0.4	---	0.5
	16. European Union does not maintain a specific MRL for the Spinetoram/Okra combination, but does maintain an MRL of 0.5 PPM for its "Solanacea" group.		
	US	Cod	EU
Spinosad	0.4	---	1
	US	Cod	EU
Tebuconazole	1.2	---	(0.05)
	US	Cod	EU 17
Trifluralin	0.05	---	0.5
	17. European Union does not maintain a specific MRL for the Trifluralin/Okra combination, but does maintain an MRL of 0.5 PPM for its "Fruiting vegetables" group.		
	US	Cod	EU 18
Zeta-Cypermethrin	0.2	---	0.5
	18. European Union does not maintain a specific MRL for the Zeta-Cypermethrin/Okra combination, but does maintain an MRL of 0.5 PPM for its "Solanacea" group.		

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