LUFFA GOURD

agriculture, land reform
& rural development

Department:
Agriculture, Land Reform and Rural Development
REPUBLIC OF SOUTH AFRICA

2030 NDP

STAY SAFE
VACCINATE TO SAVE SOUTH AFRICA
TOGETHER WE CAN BEAT CORONAVIRUS

Luffa gourd

Further information can be obtained from:

Directorate: Plant Production
Private Bag X 250
Pretoria, 0001

Tel.: + 27 12 319 6072

Fax: +27 12 319 6372

E-mail: Thabo.Ramashala@Dalrrd.gov.za

Website: www.dalrrd.gov.za

Luffa plant in the field (Source: Bodirelo-SEZ SITE)

PART I:

GENERAL ASPECTS

CLASSIFICATION

Scientific name: *Luffa*

Family: *Cucurbitaceae*

Common names: Sponge gourd; luffa; Egyptian luffa; smooth luffa; Dishrag gourd; vegetable sponge gourd; Loofah (Europe); Chinese okra; climbing okra and rag gourd.

Most common species of luffa are:

- *Luffa cylindrica* (smooth) is larger and more cylindrical, with a slightly thicker base. Its skin is smooth like that of a cucumber and non-scratching.
- *Luffa acutangula* (L.) Roxb. (ridged) is commonly cultivated and its surface is covered with ridges that run along its length.

The fruit of *Luffa acutangula* is primarily used as a vegetable but when it's dried, its fibre can also be used for sponge. However, the sponge is of low quality and therefore the species is rarely grown for its spongy characteristics.

NB. Hybrids of both *Luffa cylindrica* and *Luffa acutangula* are found in cultivation; they are inedible and only used for production of sponges.

Origin and distribution

Luffa refers to the genus name of several tropical and subtropical plants as a cultivated and naturalised plant belonging to the *Cucurbitaceae* family. On the other hand, the name "loofa" or "loofah" is derived from the plant's use as a material for sponges and dish cloths for bathing and cleaning dishware, respectively. The German anatomist and botanist, Johan Vesling (1598-1649) introduced the name "*luffa*" to the Western botany nomenclature, whereas a French botanist, Joseph Pitton de Tournefort (1656-1807), introduced the same as a formal botany genus name. The species is native to tropical Asia and Africa but has also been grown in Egypt since the late medieval era (Middle Ages). The plant occurs wild in West Africa, but this is often believed to be a result of escape from cultivation, as the plant is known as "white people's sponge" in several communities in the region. Indo-Burma is reported to be the centre of diversity for sponge gourd. The crop is widely used in Asia, particularly in China and Vietnam; the gourd has recently become an attractive commodity on United States vegetable markets, including Asian grocery stores in New York, California and Florida.

PRODUCTION LEVELS AND AREAS

Internationally

The main commercial production countries are China, Korea, India, Japan and Central America. Japan is among the primary world producers and importers of *Luffa cylindrica* sponges of superior quality and has even established a grading system for uniformity. There is luffa trade between United States and Latin America. African statistical information on luffa production is not available. Reports from India and Japan show that *Luffa cylindrica* can produce more than 62 000 fruits/ha with a plant density of 11 000 plants/ha. The number of fruits per natural stands (plants established through natural regeneration) can be much higher than 6. For instance, a report from Columbia indicated that with 53 000 plants/ha, one can produce a fruit size of 30 cm to 90 cm x 8 cm to 12 cm in a crop cycle of 15 months. A grower can expect outputs in excess of 20 000 sponges per 0,405 ha.

South Africa

No commercial production of luffa has been reported in South Africa yet, however, there are some growers scattered around the Western Cape and North West. The sponge are sold by street vendors in some of the market areas. There is no statistical information on luffa production in South Africa.

Cultivars

No cultivars have been reported in South Africa yet.

DESCRIPTION OF THE PLANT

Matured plant

Luffa is fast growing, with a vine length of up to 9 meters. The mature luffa plant can bear about six to seven fruit in ideal growing conditions.

Stem

The stem is glabrous and ribbed and can grow up to 7 meters tall.

Leaves

Luffa leaves are large, lobed and deep green with fine hairs on their surface. They are alternating and palmate-like, a pattern which is like squash and gourd plant foliage, or other species belonging to the cucumber family. A fully developed leaf is typically up to 26 cm wide and 13 cm long.

Flowers

Luffa inflorescences are monoecious: males have elongate racemes with 10 to 16 flowers, and females have a solitary flower. Both male and female flowers are yellow or orange and 5 cm to 7 cm in diameter.

Fruit

Fruit are sometimes elongated, straight or slightly curved. Immature, edible fruit measures about 10 cm to 18 cm in length. The interior of immature fruit in both varieties have smooth yet crunchy flesh and tiny soft seeds. If left to grow further, it quickly increases in size and develops a network of fibrous tissue and seeds become hard and inedible. One mature luffa fruit contains 30 or more seeds.

Fresh luffa fruit (Source: Bodirelo-SEZ SITE)

Roots

The root system of luffa is shallow.

Seeds

Luffa seeds are elliptic or smooth. Immature seeds are white in colour, whereas mature seeds are dark brown or black and hard, resembling watermelon seeds in size and shape. The 1 000 seed weight is 70 g to 100 g.

Organic luffa seeds (Free.carousell.sg.)

Essential parts

Fruit and flowers are essential parts.

CLIMATIC REQUIREMENTS

Temperature

Sponge gourd tolerates a wide range of climatic conditions. It is adapted to tropical and subtropical climates and requires warm summer temperatures and a long, frost-free growing season for maximum yield. Luffa is a warm climate crop and does best planted at soil temperatures between 20 °C and 30 °C. Luffa gourds need a long growing season; from about 150 to 200 successive frost-free days. Germination temperatures should be above 12 °C, and germination improves as temperatures rise to about 35 °C.

Rainfall

Well distributed rainfall during the growing season is needed for optimum crop growth. Both growth and yield are substantially reduced under water stress. Excessive rainfall during the flowering and fruiting period can damage yield and lower fruit quality.

Soil requirements

The crop prefers well drained, sandy loams and neutral to slightly alkaline soil conditions with moisture. Luffa prefers a pH of around 6 to 6.8. High levels of potassium and phosphorus is recommended for growth.

PART II:

CULTIVATION PRACTICES

Propagation

Luffa is grown from seeds.

Soil preparation

The soil should be loosened and piled up, whether in ridges or mounds prior to planting.

Field layout and design

Luffa vines need lots of room to roam or a sturdy trellis to support the climbing stem.

Planting

The best months to grow luffa are from September to November. Direct seeding is fast and saves labour, provided it is done at the recommended planting time and under suitable climate conditions. Seedlings can be transplanted once they have two or three leaves, however, this is time consuming. Nevertheless, this method can expand the growing season and provide an earlier harvest with a higher market value. Plant spacing is usually 45 cm to 75 cm apart, whereas row spacing is 1 m to 2 m apart and a plant density of 6 000 to 12 000 per hectare is recommended. Vertical trellises of 1 m to 2 m are recommended as they substantially increase fruit yield. Plant with lots of compost and allow 10 m to 15 m vines to grow off the ground.

Fertilisation

At planting, 600 kg 2:3:4 (30) fertiliser mixture per hectare may be applied in the row, reducing or increasing the amount for fertile soil or soil with low fertility, respectively. The plants should be side-dressed in 200 kg L.A.N. per hectare about six weeks later. The fertiliser programme should be based on recommendations from soil analysis. Acidic soils should be corrected with dolomitic or agricultural lime.

Irrigation

Lack of moisture is detrimental to growth and yield; therefore, regular irrigation is necessary at all growth stages. The plants should be watered deeply if there is no rain for a few days or if the leaves wilt. The soil should be allowed to dry to 10% available moisture in the early growth stage to develop a better root system. Soil should then be kept moist from the flowering stage onwards. Extremely wet weather during flowering and fruiting adversely affects yields. Excessive water is also detrimental, potentially slowing growth and increasing the risk of root disease. In addition, damping off may threaten young seedlings grown in cold and wet areas.

Weed control

Weeds should be kept under control by pulling them out or covering the area with organic mulch.

PEST AND DISEASES CONTROL

Red spider mites

Dry foliage, particularly in dry summers when drip irrigation is practised, is a favourable condition for this pest. The symptoms include chlorosis and silver upper surfaces caused by the mites on the underside of leaves. Registered pesticides should be used to control mites.

Pumpkin flies

The immature fruit is attacked. The pest penetrates skin and tissue around the puncture mark dries and the area becomes darker and slightly sunken. Registered pesticides should be used to control flies.

Damping-off

This disease can be problematic with young seedlings if grown in cool wet conditions. Such conditions should be avoided during planting to prevent the disease.

Fruit rot

This is a common disease that can lead to losses if fruit are grown near the ground. Trellises should be erected to prevent fruit from touching the ground.

Downy mildew

Periods of moderate temperatures with high humidity and free moisture promote this disease. Symptoms such as a greyish fungal growth down on lower leaf surfaces that have corresponding chlorotic spots on the upper surfaces may occur.

Fruit set and flavour may be impaired. Registered contact and systemic fungicides may be used.

Powdery mildew

This disease is dominant in warm, dry areas. White powdery mildew affects areas such as leaf surfaces, petioles and young stems. Infection proceeds from older to younger leaves. Infected leaves dry and fruit ripens prematurely. Registered contact and systemic fungicides may be used.

Other cultivation practices

The crop is compatible to be grown with peas, beans, onions and sweetcorn. Growing it close to potatoes should be avoided.

HARVESTING

Harvest maturity

Harvesting for consumption: Only young, immature fruit of about two to three months can be harvested. A young fruit must be picked before fibrous vascular bundles harden and before the purging compounds develop. They must be harvested while they are still tender, e.g., one should be able to pierce the skin easily with a finger nail. Gourds harvested too early will have thin, fragile fibres that will just break when peeled or in use.

Harvesting sponges: Dry fruit can be harvest in 16 to 20 weeks (four to five months) after planting. Home gardeners may leave fruit on the vine until the outer shell has dried, then it is cracked and peeled. Fruit are harvested when they turn yellow in a commercial operation.

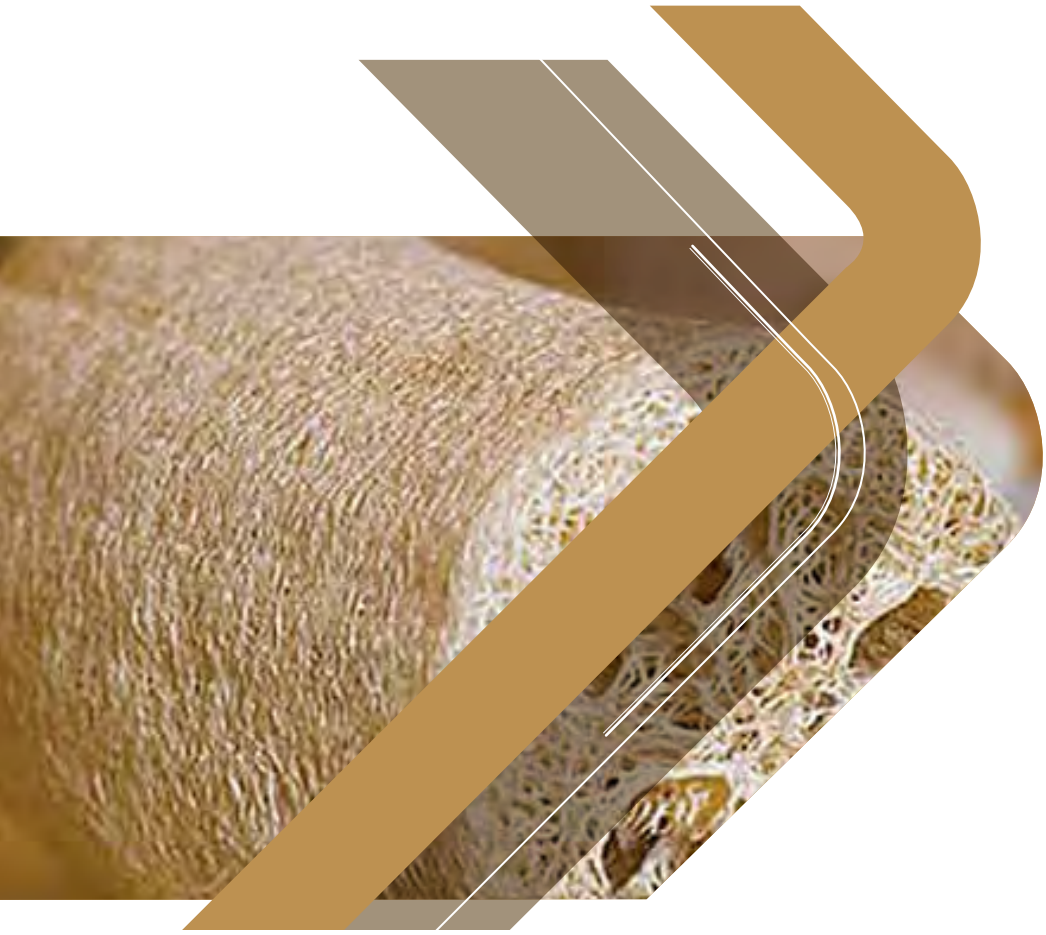
Harvesting method

Harvesting for consumption: A sharp knife or hand pruner may be used to cut the stem between the vine and the young luffa gourd.

Harvesting sponges: Dry fruit may be handpicked.

Harvesting seeds

Seeds can be collected from mature fruit and laid onto paper to dry.



PART III:

POST-HARVEST HANDLING

Sorting

For vegetable production, oversized, limp and also soft fruit must be avoided as they indicate old stock and are flavourless. Cracked, bruised or broken fruit and those with cuts should be avoided in sponge production. Luffa with black patches or those which smell musty should be rejected as they could trigger mould symptoms.

Grading

Commercial grade sponges are preferably between 15 cm and 40 cm long, free of seeds and have a pale, uniform colour.

Storage

Fresh fruit do not last long and therefore they should be stored in the vegetable compartment of refrigerator and should be used within two or days of purchase or as soon as they are harvested. The fruit of angled luffa have a longer shelf life than those of smooth luffa.

Collected dried seeds can be kept in mason jars with tight-fitting lids or in glass canisters with gasketed lids and stored in cool, dark and dry conditions for the next cropping.

Dried sponges should be stored in a cloth bag to prevent them from getting dusty for them to be kept for years.

Processing (how to reveal luffa sponge?)

- Peel of the tough outer layer or pull it off in pieces if already cracked
- Fruit should be soaked in water for a few minutes if the skin is very dry
- Remove the skin and shake out the seeds
- Wash the sap from the sponge with water
- Treat a sponge with non-chlorine laundry bleach or lemon juice if dark spots are visible for a uniform colour
- Dry the washed sponges in the sun, turning them frequently until they are completely dry.

***Luffa* sponge (Source: Bodirelo SEZ-SITE)**

Transport

The fruit of angled luffa are more tolerant to shipping than those of smooth luffa.

Marketing

Luffa sponges can be sold in gift shops and health food stores. It was reported that they can sell at a range of R15 to R70 per unit and can bring up to 40 cents at wholesale. A grower can expect outputs in excess of 20 000 sponges per 0,405 ha**,** reaching sizeable profits. There is currently a definite niche market to be satisfied as many luffa products are imported. It is evident that the fruit can create a market and food diversity and also expands the competitiveness of South Africa's vegetable industry.

Production schedule

ACTIVITIES	JANUARY	FEBRUARY	MARCH	APRIL	MAY	JUNE	JULY	AUGUST	SEPTEMBER	OCTOBER	NOVEMBER	DECEMBER
Soil sampling						SS	SS					
Soil preparation							SP	SP				
Planting									P	P	P	
Fertilisation	F								F	F	F	
Irrigation	I	I							I	I	I	I
Pest control	PC										PC	PC
Disease control	DC										DC	DC
Weed control	WC									WC	WC	WC
Pruning											P	P
Leaf sampling											LS	LS
Harvesting	H		H	H	H							H
Marketing	M			M	M	M	M	M				M

PART IV:

UTILISATION

The use of luffa fruit is dependent on its growth stage. Luffa has a mild, delicate flavour and a soft texture; very similar to that of bottle gourd. The flowers can be stuffed and fried and the young fruit (immature gourds) can be eaten in stir fries. It goes particularly well with lentil curry and mixed vegetable stews. Peeled, freshly harvested ridge gourd may be eaten raw in a similar way like peeled pumpkin, squash, or calabash. However, the whole or partly peeled luffa should always be cooked as its skin contains unpleasant smelling compounds which make it unappetising raw. Take note, the leaves and vines should be not eaten.

The dried fruit fibres are used as abrasive/scrubbing sponges in skin care to remove dead skin and to stimulate the circulation. The sponges can also be used for cleaning purposes and as back scratcher.

The pulp of the whole plant is used as a suppository against constipation in traditional African medicine. Zulu people South Africa take a leaf decoction to treat stomach pain.

Ridge curry (Source: custerdhaba.com) & stir fry (Source: m.dragonrest.net)

Health and nutritional benefits of eating fresh and raw luffa

- Both cultivars compose of phenolic anti-oxidants such as carotenes, etc.
- Luffa is rich in dietary fibres and smooth flesh, which facilitates easy digestion and easy movement of food through bowels to relieve indigestion and constipation problems.

Table 1. Nutritional composition of raw and fresh luffa per 100 g.

Nutrient	Nutritive value per 100 g
Energy	20 Kcal
Vitamin A	410 IU
Vitamin C	12 mg
Folate	7 µg
Potassium	139 mg

Acknowledgements

The Department of Agriculture, Land Reform and Rural Development (DALRRD) would like to acknowledge the influence from the luffa farmer, Ms Florah Selebi (Farm: Bodirelo SEZ-SITE, Mobile: 082 792 8485 or 065 851 2073), on the development of this production guideline through her luffa produce market challenges. This material aims to create awareness of the potential value of luffa to the food and nutrition security and economy thereof.

References

Achigan-Dako, E. G. & N'danikou, S. & Vodouhê R. S., 2011. Luffa cylindrica (L.) M. Roem. Resources of Tropical Africa/Ressources végétales de 1'Afrique tropicale, Wageningen, Netherlands.

http://gardenate.com>plant>luffa: Growing Luffa in South Africa: Accessed 27 May 2021

https://getcollagen.co.za/grow-your-own-loofah-sponge-yes-you-really-can-2: Accessed 27 May 2021

https:livingseeds.co.za/loofah-european.html: Accessed 27 May 2021

http://ndb.nal.usda.gov/ndb/foods/show/luffa, 2016: Accessed 26 July 2021

https://www.bidorbut.co.za/Luffa cylindrica: Accessed 27 July 2021

https://www.nutrition-and-you.com/luffa.html. Accessed 27 July 2021

Oboh[1] I. O. and Aluyor[2]*, 2009. Luffa cylindrica – an emerging cash crop. African Journal of Agricultural Research Vol. 4 (8), pp. 684-688, August 2009.

Yucong Xie, Guodong Liu, Yuncong Li and Kati Migliaccio[2] (2019). Luffa - an Asian Vegetable Emerging in Florada[1]. UF/IFAS Extension.

www.goodhousekeeping.com/how to grow own Luffa: Accessed 27 May 2021

www.motherearthliving.com/grow own Luffa sponges: Accessed 27 May 2021

www.kzndard.gov.za>veg_prod/Luffa-KZN-Agriculture & Rural Development: Accessed 27 May 2021

Notes

Notes


UFFA GOUR