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Corchorus olitorius L.

Protologue

Sp. pl. 1: 529 (1753).

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Family

Tiliaceae (APG; Malvaceae)

[show more data \(15\)](#) [comments \(0\)](#)

Chromosome number

2n = 14

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Synonyms

[show more data \(7\)](#) [comments \(0\)](#)

Vernacular names

Jew's mallow, jute mallow, krinkrin, tossa jute, bush okra, West African sorrel (En). Corète potagère, jute potager, mauve des Juifs, craincrain, krinkrin (Fr). Coreté, caruru da Bahia (Po). Mlenda (S)

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Origin and geographic distribution

The geographical origin of *Corchorus olitorius* is often disputed, because it has been cultivated since centuries both in Asia and in Africa, and it occurs in the wild in both continents. Some authors consider *Corchorus olitorius* and several other *Corchorus* species. However, the presence in Africa of more wild *Corchorus* species and the larger genetic diversity within *Corchorus olitorius* point to Africa as the centre of diversity in the Indo-Burmese region. At present *Corchorus olitorius* is widely spread all over the tropics, and it probably occurs in all countries of tropical Africa.

In tropical Africa it is reported as a wild or cultivated vegetable in many countries. It is a leading leaf vegetable in Côte d'Ivoire, Benin, Nigeria, Cameroon, Sudan, Kenya, Uganda and Zimbabwe. In the Caribbean, Brazil, India, Bangladesh, China, Japan, Egypt and the Middle East. It is cultivated for jute production in Asia (India, Bangladesh, China) together with *Corchorus capsularis* L., but in Africa it is used domestically.

[show more data \(33\)](#) [comments \(0\)](#)

Uses

Jew's mallow is used as a leafy mucilaginous vegetable. The cooked leaves form a slimy sticky sauce, comparable to okra. In Nigeria this sauce is found suitable for easy consumption of starchy food from dried leaves is used to prepare this sauce during the dry season. The immature fruits, called bush okra, are also dried and ground to a powder for the preparation of this slimy sauce. In East Africa it is used with cowpeas, pumpkin, cocoyam leaves, sweet potato, milk and butter, meat, and flavoured with peppers and lemon.

Jute has been the most widely used packaging fibre for more than 100 years because of its strength and durability, low production costs, ease of manufacturing and availability in large and uniform quantities in Africa. The types of *Corchorus olitorius* that are used as a leaf vegetable are quite distinct from the types used for jute production. Whole jute stems are suitable as raw material for paper pulp. How to cuttings from burlap manufacture, old sugar bags and wrappings. The resulting pulp is made into hard, thick paper, suitable for cards and labels. The woody central core ('stick') remaining after retting and cellulose.

Root scrapings of Jew's mallow are used in Kenya to treat toothache, a root decoction as a tonic, leafy twigs in Congo against heart troubles, an infusion from the leaves is taken in Tanzania against febrifuge.

[show more data \(30\)](#) [comments \(0\)](#)

Production and international trade

Jew's mallow is one of the leading leafy vegetables in many countries and much cultivated and traded. No statistical data on production or marketing are available. International trade with neighbouring countries is sold in powder form as a Libanese product, under its Arab name 'meloukhia'.

The world jute production (combined data from *Corchorus olitorius* and *Corchorus capsularis*) has been stable over the past 40 years. In the period 2004–2008 it averaged 2.74 million t raw fibre per year from Bangladesh (827,000 t per year from 414,000 ha) together produced more than 95% of the total. The flood plains in the lower delta of the Ganges and Brahmaputra rivers combine optimum conditions for adequate surface water for retting) with the availability of inexpensive farm labour. Other countries with noticeable jute production in 2004–2008 were China (49,000 t/year), Uzbekistan (20,000 t/year), and in tropical Africa jute was produced in Sudan (3900 t/year), Zimbabwe (2400 t) and Cameroon (100 t). Most jute fibre is processed within the producing countries. In 2004–2008 world raw jute fibre production was 2.74 million t.

[show more data \(1\)](#) [comments \(0\)](#)

Properties

The composition of *Corchorus olitorius* leaves per 100 g fresh edible portion is: water 80.4 g (74.2–91.1), energy 243 kJ (58 kcal), protein 4.5 g, fat 0.3 g, carbohydrate 12.4 g, fibre 2.0 g, Ca 360 mg, riboflavin 0.53 mg, niacin 1.2 mg, ascorbic acid 80 mg (Leung, Busson & Jardin, 1968). This composition is in line with other dark green leafy vegetables, but the dry matter content of fresh Jew's mallow and especially the micronutrient content are strongly influenced by external factors such as soil fertility and fertilization. Nitrogen fertilizer greatly improves the micronutrient content, e.g. Fe, P, Ca. The mucilaginous polysaccharide in the leaves is rich in uronic acid (65%) and consists of rhamnose, galactose, glucose, galacturonic acid and glucuronic acid in a molar ratio of 1.0:0.2:0.2:0.9:1.7. Jute fibres are obtained from the bast. The use is limited to coarse fabrics, because the length:diameter ratio of jute filaments is only 100–120, much below the minimum of 1000 required for fine spinning. Jute fibres have a diameter of (9–)15–20(–33) µm. The length of the fibre cells decreases from the top to the bottom of the stem, whereas the width increases. The lumen width varies greatly through the length of the fibre. Fibre cells are cemented together into filaments of up to 250 µm long. The tensile strength, elongation at break, and Young's modulus of jute fibre are 187–775 N/mm², 1.4–3.1% and 3C (Young's modulus of jute fibre are 187–775 N/mm², 1.4–3.1% and 3C). Jute has a low ignition temperature of 193°C, posing a considerable fire hazard in warehouses. Jute fibre contains 45–84% α-cellulose, 12–26% hemicelluloses, 5–26% lignin, 0.2% pectin and 1–8% (woolienization), resulting in a reduced fibre length, a softer feel and a crimp or waviness, giving the fibre a wool-like appearance. The woody central core is of medium durability under exposed conditions and 29–42 µm wide.

Corchorus olitorius leaves contain antioxidative phenolic compounds, of which 5-caffeoylquinic acid is the most important. Some irone glucosides have also been isolated from the leaves; they show peritoneal exudate cells induced by antigen-antibody reaction. The seeds are poisonous to mammals and insects. They contain cardiac glycosides.

[show more data \(4\)](#) [comments \(0\)](#)

Alterations and substitutes

As ingredient of slimy sauces *Corchorus olitorius* can be replaced by other *Corchorus* species (also called Jew's mallow): the wild and cultivated *Corchorus tridens* L. and the wild species *Corchorus trilocularis* L. and *Corchorus aestuans* L.

The fibres of kenaf (*Hibiscus cannabinus* L.) and roselle (*Hibiscus sabdariffa* L.) are coarser and cheaper than jute. They are acceptable substitutes for jute in the manufacture of coarse packaging fibre. Jute include those from Congo jute (*Urena lobata* L.) and devil's cotton (*Abroma augusta* (L.) L.f.). Since the second half of the 20th Century jute has faced substitution as sack-making material by polypropylene.

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Description

Erect annual herb up to 2(–4) m tall, usually strongly branched; stems reddish, fibrous and tough. Leaves alternate, simple; stipules narrowly triangular with long point; petiole (0.5–)1–7 cm long; blade (–11) cm, cuneate or obtuse and with setaceous appendages up to 2.5 cm long at base, acuminate to acute at apex, margin serrate or crenate, almost glabrous, usually shiny dark green, 3–7-veined from the base. Flowers bisexual, regular, usually 5-merous, shortly stalked; sepals free, narrowly obovate, 5–7 mm long; petals free, obovate, 5–7 mm long, yellow, caducous; stamens numerous; ovary: capsule up to 7(–10) cm long, ribbed, with a short beak, usually dehiscent by 5 valves, many-seeded. Seeds angular, 1–3 mm long, dark grey. Seedling with epigeal germination; hypocotyl 1–2 cm long, 8 mm long.

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Other botanical information

The genus *Corchorus* comprises an uncertain number of species, with estimates ranging from 40–100. Two important cultivar-groups of *Corchorus olitorius* exist. The vegetable types are combined into two groups, early and late flowering, and with differences in plant habit and leaf shape. In Nigeria, the popular 'Amugbadu' is reputed to be suitable for transplanting and harvest by repeated cutting. 'Oniyaya' has smaller and coarsely serrate leaves, is strongly branched and more suitable for direct sowing and once-over harvest. 'Géant de Bertoua' from Cameroon has very large, broadly ovate leaves ('Incisifolius') can be found in Benin and Cameroon.

Corchorus capsularis ('white jute'), an erect annual herb up to 2(–4) m tall with globose fruits, probably originates in southern China and was brought from there to India and Bangladesh where, till the 19th century the crop was brought to many other tropical countries, but only in Brazil has the introduction been successful. Trials have been done in Gambia, Sierra Leone, Ghana, Nigeria, Sudan, Kenya and other countries than Brazil has been attributed to a wrong choice of cultivars and labour constraints. A new attempt to introduce *Corchorus capsularis* as a crop into tropical Africa would require handling (e.g. ribboning, retting, washing), as without these, the production is unlikely to be economical. The fibre of *Corchorus capsularis* is less fine, soft and lustrous than that of *Corchorus olitorius*.

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Growth and development

Growth of *Corchorus olitorius* seedlings is fast. In short day conditions flowering starts about a month after emergence and continues for 1–2 months, depending on type and conditions. The flower occurs. After about 3–4 months, the fruits are ripe, the leaves drop and the plant dies.

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Ecology

Wild plants of *Corchorus olitorius* grow in grassland and fallow or abandoned fields, often close to marshes, rivers and lakes, at up to 1250(–1750) m altitude. Jew's mallow thrives best under hot a performs best during the hot rainy season. It is cultivated where annual rainfall averages 600–2000 mm. The optimal temperature is 25–32°C. Growth stops below 15°C. Jew's mallow is a short-day much stronger vegetative growth expressed in weight of roots, stems and leaves than a day length of 11.5 hours, but the fruit and seed production was higher at a photoperiod of 11.5 hours. Jew's m grows poorly on heavy clay.

[show more data \(11\)](#) [comments \(0\)](#)

Propagation and planting

In general farmers have no access to improved seed, but harvest their own. They keep a few plants for that purpose in their garden or field until fruit maturity. For a good seed yield of 25 g per plant recommended. Commercial seed production may be 600 kg/ha. The seed is ripe when all the leaves have dropped. For own on-farm seed production, the stems with fruits are harvested, and after dry villages in the north of Côte d'Ivoire, the women conserve the fruits in the kitchen above the fireplace. Fruits on abandoned plants in the field also still contain viable seed until the next rainy season spread. Well-dried seed keeps a high germination capacity for several years. One g contains about 470 seeds. Fresh and sometimes old seed shows dormancy caused by impermeability of the seed coat. To suppress the dormancy, it is recommended that the seed tied in a piece of cotton cloth be immersed for 5 seconds in almost-boiling water before sowing. Another method is scarification with sand. In traditional field cultivation, the farmers broadcast seed without any consideration concerning the optimal density. They often grow Jew's mallow in association with other vegetables or food crop. Peri-urban vegetable farmers produce Jew's mallow on beds in monoculture. Direct sowing is mainly applied for once-over harvest by uprooting or low cutting at soil level. Sowing is done in lines: the more common harvesting by repeated cuttings. 10–20 g seed per 10 m² is sown in a nursery in well-loosened soil. When the seedlings are 5–10 cm tall, they are transplanted at a spacing of 10–2 Ghana the highest yield, 50 kg of marketable shoots or 29 kg of edible leaves per 10 m², was obtained with a spacing of 10 cm × 45 cm.

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Management

Jew's mallow is usually grown as a rainfed crop without much care. In peri-urban production the growers practise manual irrigation during the dry season, at least 6 mm daily. Organic fertilizer may (e.g. 15–15–15 at 400 kg/ha) and a side dressing with nitrogen are recommended for an optimal yield. Nitrate fertilizer gives better results than ammonium-based ones.

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Diseases and pests

Jew's mallow is rather resistant to diseases and pests. *Sclerotium rolfsii* causing foot rot and wilting is sometimes a problem. *Curvularia* species cause black leaf spots, and *Cercospora* circular leaf : cultivation on well-drained beds and wide spacing. A virus disease transmitted by leaf hoppers and causing leaf deformation and retarded growth was reported from Nigeria.

The most damaging pests are grasshoppers (*Zonocerus variegatus*), caterpillars (*Acraea* spp.), army worm (*Spodoptera littoralis*) and flea beetles (*Podagrica* spp.). During the dry season, red spider m Control by spraying with recommended pesticides is rarely applied.

Jew's mallow is very susceptible to root-knot nematodes (*Meloidogyne* spp.). Methods of control include crop rotation, avoiding other crops susceptible to root-knot nematodes for at least one year, the soil.

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Harvesting

The first harvest by cutting shoots 20–30 cm long may take place 4–6 weeks after transplanting at a height of 10–20 cm above the ground. This cutting stimulates the development of side shoots. Su total 2–8 cuttings. For a once-over harvest from a direct sown crop the plants are uprooted or cut at ground level when they are 30–40 cm tall, 3–5 weeks after emergence and before development of intercropping systems farmers tend to harvest at irregular intervals. Wild Jew's mallow is picked from the vegetation when required, usually for home consumption.

A crop planted for jute production is generally harvested 100–120 days after sowing when the plants are in the early fruit stage.

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Yield

In Nigeria a yield of 20–25 kg per 10 m² bed may be expected from 3–9 cuttings of 'Amugbadu' during a period of 3–4 months. In an experiment in Cameroon a yield of 38 t/ha was obtained from : however, usually obtain average yields of 5–15 t/ha.

The world average jute yield is about 2.2 t of raw fibre per ha, but yields of 5 t/ha have been obtained in Bangladesh with improved cultivars grown under optimal agronomic conditions.

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Handling after harvest

Jew's mallow leaves cannot be kept long. Mostly the product is sold on the harvest day, and it is constantly kept wet. If cooled to 20°C it can be kept for about 1 week, in cold storage for several we product can be kept for at least half a year.

Jute stems are retted in water for a period of (8–)15–20(–30) days to free the fibres from the bark. When retting is complete, the fibres are stripped manually from the stems, subsequently washed an Pulping of waste material such as burlap pieces and old bags is primarily done with chemical processes such as the soda process. Retted fibre can be satisfactorily pulped with the refiner mechanical fungus *Ceriporiopsis subvermiformis* prior to refining results in considerable energy savings and increased strength properties. Unretted bast fibre has been experimentally pulped using the neutral st low and the input of chemicals high, compared to the pulping of retted fibre. The central cores can be pulped with various chemical and chemi-mechanical processes. Pulping experiments with whol with amines as additives) gave higher yields and better physical properties than the soda and kraft processes.

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Genetic resources and breeding

The risk of genetic erosion is negligible because there is almost no commerce of seed of improved cultivars. At the Nigerian Horticultural Research Institute NIHORT at Ibadan, a collection of local Research Institute in Dhaka has the mandate of world repository for germplasm of jute. It has a collection of almost 1500 *Corchorus olitorius* accessions through various germplasm collection proje

[show more data \(1\)](#) [comments \(0\)](#)

Breeding

Farmers select the most vigorous plants with the best mucilaginous properties. When smaller leaves are required, farmers select for profuse branching. At NIHORT in Ibadan selections have been m leaves and late flowering. Hand crossing appeared difficult because of flower drop after emasculation.

Jute selection with the objectives of higher yield, finer fibre quality, disease resistance, early crop maturity and low photosensitivity has been practised for many years in Bangladesh and India and h cultivars.

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Prospects

Jew's mallow is a high quality leafy vegetable in market value, consumers' preference and nutritional value. Reliable seed of improved cultivars should become commercially available. It is recomn characteristics including adaptation to various environments, resistance to diseases and yield. It seems impossible for Africa to compete in export markets for jute, in view of the excellent conditions

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