

***Croton macrostachyus* Hochst. ex Delile**

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Local and common names: ብሳና Bisana (Amh); Bakkanniisa (Oro); ታግቡክ

Tambuk, እስላሚ. Islami (Tig); Broad-leaved croton (Eng)

Voucher number and identification: GA066/AHRI/2025

Synonyms: *C. macrostachyus* is known by seven synonyms, among which *C. macrostachyus* var. *mollissimus*, *C. butaguensis* and *C. guerzesiensis* are the later published names.

Family: Euphorbiaceae

Botanical and habitat distribution

C. macrostachyus is a deciduous tree with a cylindrical bole and a rounded crown that may grow up to 30 m in height, though it is commonly 6-12 m tall. The leaves are alternately arranged, broad, and ovate to elliptic. The inflorescences are born in long spikes. The species occurs in Afromontane forests, wooded grasslands, and riverine habitats at elevations of 800-2150 masl.

Conservation status

According to IUCN Red List, *C. macrostachyus* is currently classified globally as a species of Least Concern.

Propagation method

C. macrostachyus is most commonly propagated by seed or wildlings (whole plants collected from the wild). Fresh, mature seeds are sown soon after collection, as seed viability is short and declines rapidly during storage. Seeds can be stored for only a few months if kept cool, dry and free from insects. The species can also be propagated vegetatively using stem cuttings; however, this method is less commonly practiced and generally has lower success rates.

Cultivation in botanic garden

The plant was cultivated at AHRI-ALERT botanic garden in June 2024 from seedlings donated from Gulelle Botanical Garden (Accession number 0035).

Ethnomedicinal uses

C. macrostachyus has numerous traditionally claimed medicinal uses in Ethiopia. Leaves are applied to treat itchy scalp. A decoction of leafy twigs mixed with *Justicia schimperiana* is taken

for the treatment of jaundice and smallpox; this preparation is administered together with pepper, butter, and milk. An infusion prepared from leafy branches and roots is used as a mouthwash to relieve toothache. The root or stem bark is chewed for toothache and is also indicated in cases of rabies. Leaves or young shoots are eaten to treat fever and oedema, while mashed leaves are applied externally to hemorrhoids. Crushed seeds and leaves mixed with water are taken to treat tapeworm infections; the seeds are also consumed to induce abortion. A maceration of the bark is drunk as an abortifacients and uterotonic, particularly to expel a retained placenta. A decoction prepared from the fruit, bark, or root, or consumption of raw fruit is used to treat venereal diseases; however, these treatments are considered to pose serious side effects. Ripe crushed fruits mixed with butter or honey, together with ground leaves, is applied topically to treat skin diseases.

Major phytoconstituents

The phytochemical profile of *C. macrostachyus* has been investigated in several studies. It was reported that the aerial parts of the plant possess varieties of phytochemicals, including triterpenoids like betulin and lupeol, diterpenoids such as crotomaclerodane, macrostaclerodane and crotepoxide, phenolic compounds like methyl gallate and lichexanthone, and sterols like beta-sitosterol. The clerodane-type diterpenes are known for their antimicrobial, antimalarial, and cytotoxic activities.

Pharmacological and safety evidences

Preclinical evidences

Antimicrobial effect: Both *in vitro* and *in vivo* studies confirmed the traditional claim of the plant against malaria. In animal studies, various parts of *C. macrostachyus* showed antimalarial potential with significant suppression and curative effects in malaria-infected animal models. Extracts from different plant parts exhibited notable antibacterial activity, with high zones of inhibition against pathogenic bacteria, including *Staphylococcus aureus* and *mycobacterium*. These antibacterial effects were further supported by *in silico* analyses targeting bacterial molecular pathways. In addition, the stem bark of *C. macrostachyus* showed fungicidal activity against common fungal pathogens such as *Candida albicans*. Studies have also reported that bioactive compounds isolated from this plant possess inhibitory activity against the HIV-1 virus. In addition to the above effects, the plant is reported to have antileishmanial and anthelmintic effect.

Antidiabetic effect: The antihyperglycemic potential of *C. macrostachyus* has been demonstrated in experimental animal models. Administration of plant extracts significantly reduced glucose-induced hyperglycaemia in both alloxan- and streptozotocin-induced diabetic mice.

Antidiarrheal effect: Crude leaf extracts and solvent fractions of *C. macrostachyus* have exhibited notable antidiarrheal effects in animal studies, including the castor oil-induced diarrhea model.

Other pharmacological effects: Diuretic, anti-ulcer, organoprotective, cytotoxicity, and laxative.

Clinical evidences

There are no clinical trials reports.

Safety

Oral administration of 2,000 mg/kg of crude extract and solvent fractions of *C. macrostachyus* in mice produced no signs of toxicity. However, administration of whole seeds at higher doses caused mortality in goats. Ethnobotanical studies have also reported abortifacient and purgative effects of the plant

Research gaps and recommendations

The standardization of the phytochemicals has not been done. Thus, it was recommended to standardize the phytoconstituents of the plant.

References

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