



Compendium of Ethiopian Medicinal Plants

Volume I



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Addis Ababa, Ethiopia

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Preamble

The Compendium of Ethiopian Medicinal Plants – Volume I represents a major milestone in the ongoing initiative by the Armauer Hansen Research Institute (AHRI) to document, conserve, and advance the scientific understanding and use of medicinal plant resources in Ethiopia. This volume integrates two complementary parts:

- **Part I:** This section provides an overview of AHRI-ALERT Medicinal Plants Botanic Garden, which is named after the sisterly institutions of Armauer Hansen Research Institute and ALERT Comprehensive Specialized Hospital (ALERT), which are located within the same compound. It presents a synthesized inventory of about 200 medicinal plant species cultivated in the garden, the specimens of which have been deposited in the AHRI Herbarium of Medicinal Plants, and highlights activities related to their conservation, education, research, and public engagement.
- **Part II:** This section presents a detailed compendium of 24 medicinal plant species cultivated in the botanic garden. It also includes one additional widely used medicinal plant species that is not currently cultivated in the garden, selected because its traditional use in

Ethiopia aligns with its formal recognition in major pharmacopoeias and its registration in herbal medicinal products for the same health condition in other countries. The compendium summarizes the botany and habitat distribution, ethnomedicinal uses, major phytoconstituents, and pharmacological evidence (efficacy and safety) for each species based on preclinical and clinical studies. Moreover, the global regulatory status of herbal products derived from selected species is also highlighted, illustrating how these products are standardized, registered, and regulated internationally, which may in turn inform similar efforts for the same or other species. Finally, key knowledge gaps are identified, and species specific recommendations are provided.

By integrating indigenous knowledge with scientific rigor, this compendium seeks to promote the development of safe, effective, and standardized herbal medicines, while ensuring the conservation and responsible utilization of medicinal plants in Ethiopia. This compendium (Volume I) is the first in a planned series, to be followed by subsequent volumes (Volume II and more) that will incorporate additional medicinal plant species as conservation, research, development and use efforts expand.

Foreword

Ethiopia is a nation endowed with extraordinary ecological, cultural, and historical diversity. Its topography stretches from the Danakil Depression in Afar, one of the lowest points on Earth, lying more than 100 meters below sea level to the peak of Ras Dashen (Ras Dejen), rising over 4,500 meters above sea level. This dramatic variation in altitude and climate has shaped exceptional biodiversity and rich tradition of plant based health, nutrition, and cultural practices.

Ethiopia is also widely recognized as the cradle of humankind, a land where ancient ancestors once walked and where deep rooted traditions of observing, cultivating, and utilizing nature have endured. Among the most symbolic examples of this rich natural heritage is coffee (*Coffea arabica*), which originated in the Ethiopian highlands and still grows in wild today. The widely shared oral tradition of Kaldi, the 9th century goat herder credited with discovering the stimulating effects of coffee berries, reflects the depth of indigenous knowledge that continues to guide the use of medicinal plants across the country.

This rich heritage spans more than 80 ethnic groups, each maintaining its own practices in traditional medicine. In view of the expected breath of knowledge among the communities, documentation has been very limited. Few written sources in the country including *Metsehafe Fewes* and *Metsehafe Medhanit* have mainly recorded the traditional use of medicinal plants by communities in northern and central Ethiopian. Other

few manuscripts, which are available in religious institutions and hands of individuals, remain largely unexplored and await systematic investigation. The majority of the knowledge, however, has been conveyed orally from one generation to the next, making it increasingly vulnerable to adulterations and misuses and even loss.

Today, environmental degradation, unsustainable harvesting for various uses, cultural transitions, and declining interest among younger generations threaten both the medicinal plants and the knowledge associated with them. Systematic documentation, conservation, and scientific validation have therefore become urgent priorities to ensure the irreversible loss of this heritage.

The Green Legacy Initiative of the Ethiopian government, which has enabled the planting of billions of trees nationwide, provides strategic opportunity to enhance conservation of medicinally important species. Communities are increasingly encouraged to cultivate such plants in home gardens, farm boundaries, and other various land use systems.

Research and higher education institutions, including the Armauer Hansen Research Institute (AHRI), are putting their efforts to conserve medicinal plants, enhance knowledge transfer, promote research, and develop and avail herbal-based medicines to the community for rational and wider use. These initiatives play a vital role in supporting the traditional medicine sector in Ethiopia.

AHRI established a botanic garden of medicinal plants in October 2024, in alignment with its mandate for biomedical research and innovation. The garden currently serves as a sanctuary for about 200 priority medicinal plants including endemic species, globally and locally threatened species and species prioritized for herbal medicine development by the institute in the near future.

The botanic garden has rapidly become a learning hub, attracting policymakers, researchers, health professionals, students, local communities, and international visitors. This engagement demonstrates the growing recognition of the role of traditional medicine in health system and scientific advancement in Ethiopia.

AHRI is therefore committed to broad collaboration in areas of:

- Conservation and standardized medicinal plant material production
- Ethnobotanical and pharmacological research
- Knowledge documentation and digital archiving
- Public education and community engagement
- Development, deployment, and commercialization of herbal medicines

The Compendium of Ethiopian Medicinal Plants (Volume I) of selected species cultivated in the AHRI-ALERT Botanic Garden is an important contribution to the national efforts of safeguarding traditional medicinal knowledge, conservation of medicinal plants, and promotion of scientifically validated herbal-based

medicines in Ethiopia. We convey our heartfelt congratulations and sincere appreciation to all contributors whose dedication made this publication possible. Their work establishes a strong foundation for subsequent publications, ensuring that this valuable heritage continues to inform science, healthcare, and community well-being.

As you explore this compendium, I encourage you to engage with the knowledge contained within, apply it responsibly, and share insights that will enrich upcoming volumes. Through collective commitment, we can ensure that medicinal plant heritage remains vibrant, scientifically validated, and valued by the generation to come in Ethiopia.

Professor Afework Kassu
Director General
Armauer Hansen Research Institute
Addis Ababa, Ethiopia

Message from the director Traditional and Modern Medicine Research and Development Directorate

Ethiopia's remarkable botanical wealth and rich traditional healing practices are a source of national pride and global significance. For generations, communities across the country have relied on medicinal plants for healthcare and as a cornerstone of cultural identity.

At AHRI-ALERT Botanic Garden, we are dedicated to conserving this invaluable heritage while advancing scientific research that bridges traditional knowledge with modern health innovation. This Compendium of Ethiopian Medicinal Plants, Volume I directly supports AHRI's strategic objectives by strengthening research excellence; promoting the sustainable use and conservation of medicinal plants; fostering locally relevant therapeutics; supporting training and education from elementary to university levels; and serving as a space for learning, appreciation of medicinal plants, and recreation that promotes tranquility of mind through engagement with nature.

The forthcoming Volume II will further expand this work by covering additional prioritized medicinal plants conserved both within the garden and across the country, guided by conservation, scientific and public-health-driven criteria. This phased approach is expected to amplify research impact, conservation efforts, and translational outcomes.

I extend my sincere gratitude to the contributors who produced this compendium and the reviewers whose dedication has ensured that this knowledge is documented with respect, scientific rigor, and ethical responsibility. I hope this compendium inspires continued research, responsible utilization, and pride in Ethiopia's rich medicinal plant heritage.

Firehiwot Teka

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Acknowledgments

AHRI gratefully acknowledges the dedicated team behind preparation of the Compendium of Ethiopian Medicinal Plants, Volume I. We also sincerely thank our sister institutions, Wondo Genet Agricultural Research Center, Ethiopian Agricultural Research Institute; Ethiopian Biodiversity Institute; Gulelle Botanic Garden; and Tepi National Spice Research Center, Jimma Agricultural Research Center, for providing seedlings of medicinal plants

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Abbreviations

Institutions

AHRI: Armauer Hansen Research Institute

ALERT: ALERT Comprehensive Specialized Hospital

EBI: Ethiopian Biodiversity Institute

EIAR: Ethiopian Institute of Agricultural Research

GARC: Gondar Agricultural Research Center

GBG: Gulelle Botanic Garden

IUCN: International Union for Conservation of Nature
and Natural Resources

JARC: Jimma Agricultural Research Center

POWO: Plants of the World Online

TMMRD: Traditional and Modern Medicine Research
and Development Directorate

WGARC: Wondo Genet Agricultural Research Center

Languages

Afa: Afar

Age: Agew

Amh: Amharic

Daw: Dawro

Eng: English

Gam: Gamo

Gof: Gofa

Gur: Gurage

Kon: Konso

Oro: Afaan Oromoo

Sid: Sidama

Som: Af-Somali

Tig: Tigrigna

Wol: Wolayita

Executive summary

Ethiopia's rich floral diversity, particularly medicinal plants diversity, faces threats mainly from habitat loss and unsustainable harvesting practices. In response, the AHRI-ALERT herbarium and Medicinal Plants Botanic Garden were established to conserve medicinal plants species, support scientific research, and for education and promotion of sustainable utilization. The botanic garden also serves as site for seedling production and community engagement.

The garden currently houses a diverse collection of about 200 medicinal plant species, of which 180 have been identified to the species level, 11 only to the genus level, and the remaining are either infraspecific taxa, the same species represented by more than one accession, plants only known by their local names or through collected planting materials. The plants identified at both species and only genus levels belong to 155 genera distributed across 64 families. These include species endemic to Ethiopia and those under threat due to overharvesting or habitat loss. The collection features:

- **Species:** Include endemic species such as *Aloe benishangulana*, *A. tewoldei* (both known as እሬት Eret in Amharic), *Echinops kebericho* (ቀበረኛ Kebericho) and *Taverniera abyssinica*

(ድንገተኛ dingetegna), whose survival is highly threatened and at risk of extinction.

- **Families:** The medicinal plants identified to species and only genus levels belong to 64 families. Among these, Lamiaceae, Asteraceae, Fabaceae and Solanaceae contributed the highest number of species.
- **Origin:** Most of the medicinal plant species are native, with only a few being endemic to Ethiopia. Moreover, several exotic species that have been introduced and used for medicinal purposes in the country are also documented and cultivated in the botanic garden.
- **Growth habit:** Most of the medicinal plants cultivated in the botanic garden are herbs, followed by shrubs. Trees, climbers and creepers also contribute to the overall diversity of medicinal plants.
- **Establishment of planting materials:** Most of the medicinal plant species were successfully cultivated and established in the botanic garden. However, some species, mostly those that are wild naturally growing at varying altitudes have had difficulty to establish or have completely failed altogether in the AHRI-ALERT botanic garden (9°01' 22" N, 38°44' 22" E; about 2380 masl).

To overcome altitude-related cultivation challenges at the Addis Ababa site, the development of a greenhouse is recommended to house plant species native to Ethiopia's lower and higher altitudes as compared to that of Addis Ababa. It is also important to establish a well-equipped herbarium for proper identification and long-term storage of medicinal plant specimens managed in the garden as well as those to be collected from across the country. While significant progress has been made, improved infrastructure including dedicated buildings for herbarium management, plant processing, and demonstration facilities is essential. Moreover, succession strategies should be developed and implemented to ensure a smooth transfer of responsibilities and continued execution without major disruptions.

This compendium also includes comprehensive information on 25 selected medicinal plant species. It mainly includes medicinal plants that are widely known in the traditional medicine system of the country, species that require utmost effort for conservation, species that are widely used in traditional medicine from which standardized herbal medicine products have been developed through research and development, registered in international

and national pharmacopoeia and available for use in the market. Moreover, medicinal plants with broad information on their traditional use in Ethiopia that have undergone preclinical investigation, some of which have also passed through clinical studies, and are expected to be registered in the near future and use in the country are also included in the compendium.

Major information required for referencing and future herbal drug research and development, which included scientific name, voucher specimen and accession numbers, botanical descriptions, conservation status, ethnomedicinal use in Ethiopia, major phytoconstituents, preclinical and clinical efficacy and safety reports on each of the species is summarized for each of the 25 medicinal plant species. Moreover, representative Ethiopian local and English common names for each species are included. Furthermore, research gaps and recommendations are also presented. A wide range of credible references has been cited during compilation of the compendium. However, due to the need for limiting the size of the compendium, only thematic-based major references have been cited under the compilations of each species. Readers are advised to browse for any information which may not be properly cited or contact AHRI to get access to the

other literature sources. The four major references which were used in describing conservation status and/or identification of all medicinal plants included in Part I and II are cited bellow.

1. IUCN (2026). The IUCN Red List of Threatened Species. Version 2025-2.
<https://www.iucnredlist.org>
2. POWO (2026). Plants of the World Online. Facilitated by the Royal Botanic Gardens, Kew.
<https://powo.science.kew.org>.
3. Vivero JL, Kelbessa E and Demissew S (2005). The Red List of Endemic Trees & Shrubs of Ethiopia and Eritrea. Fauna and Flora International, Global Trees Campaign, IUCN.
DOI:10.13140/2.1.3139.6168.
4. National Herbarium, Addis Ababa University; and Uppsala University (1989-2019). Flora of Ethiopia and Eritrea. Vols 1-8. Addis Ababa and Uppsala.

Part I
AHRI-ALERT Medicinal Plants Botanic Garden
and Herbarium of Medicinal Plants: Current
Status and Future Prospects

Introduction

Ethiopia is endowed with diverse topography and wide range of altitude, extending from the Danakil (Dallol) Depression in the East, which lies about 130 meters below sea level to Ras Dashen, the highest peak in the North rising to an elevation of 4,550 meters above sea level. This remarkable variation in elevation with diverse climatic zones and ecological conditions, has contributed to the country's rich biodiversity. As a result, Ethiopia is home to an estimated 6,500 to 7,000 species of higher plants, of which about 10% are endemic. Of this this rich plant diversity, medicinal plants constitute an important subset with cultural and health significance.

Literature evidence indicates that more than 1000 plant species are used in traditional medicinal practices across Ethiopia. The majority of these medicinal plants are harvested from wild habitats, with relatively smaller proportion sourced from agricultural fields and backyard plantations. The high reliance on wild collection poses significant conservation challenges. The expansion of agricultural land coupled with unsustainable and destructive harvesting practices for various purposes, including medicinal use, fuelwood and construction, has significantly contributed to the decline of plant populations and overall reduction in the overall plant

species diversity. The threat to medicinal plant resources is further exacerbated by selective and often destructive harvesting, which target specific species or plant parts (such as whole plants, roots and bark) making natural regeneration difficult. Without appropriate conservation measures and cultivation initiatives, the long term availability of these vital medicinal resources is at serious risk.

In response to these conservation challenges, institutes such as the Armauer Hansen Research Institute (AHRI) are playing a pivotal role in addressing the documentation, conservation and sustainable utilization of medicinal plants. AHRI is mandated to conduct research on medicinal plants with the ultimate goal of developing safe, effective and quality products for consumer use. It is actively involved in the scientific study of plants, which are traditionally used as medicines in Ethiopia. A critical component of this work involves maintaining sources of plant materials to prevent overharvesting, ensure sustainable use, and support the development of high quality and evidence based herbal medicines. To this end, AHRI has collected plant materials of various medicinal plant species from different parts of the country and established them in the AHRI-ALERT Botanic Garden, located within AHRI-ALERT village premises. Additional plant materials have also been

obtained from key stakeholders including Ethiopian Biodiversity Institute (EBI); Wondo Genet Agricultural and Jimma Agricultural Research Centers of the Ethiopian Institute of Agricultural Research (EIAR); and Gullele Botanic Garden (GBG) for cultivation and conservation in the garden.

ALERT and AHRI are reputable by the public in providing health care service and conducting research with a focus on priority health problems of the country, respectively. They are located within a well-equipped communal village that welcomes a wider range of visitors, as well as national and international multidisciplinary experts who work towards the improvement of human health. The existence of the botanic garden within this esteemed health and research campus offers several added benefits to the public. Beyond their core mandates, the two institutions are well positioned to offer a range of complementary services. The following different initiatives are proposed to support and extend their primary responsibilities. In view of the growing threats to medicinal plants and the critical importance of their sustainable cultivation and conservation, it is essential to clearly define the objectives guiding AHRI's initiative. The following objectives aim to support the systematic conservation, scientific validation, and sustainable use of medicinal plants for future health, research and other complementary initiatives.

Objectives and key milestones

Primary objectives and milestones

Objective 1. Conservation of medicinal plants

Key milestone:

- Establish the botanic garden as sanctuary for conserving both wild and cultivated medicinal plants, with a focus on species with current or potential research interest and those at risk of rapid population decline and local extinction.

Objective 2: Upgrade AHRI mini-herbarium of medicinal plants

Key milestone:

- Systematically collect, and preserve voucher specimens of medicinal plant from across Ethiopia
- Expand infrastructure and build human resource capacity to support national level herbarium functions, including specimen storage and reference access
- Establish a debriefing and demonstration room to disseminate information, ranging from traditional use of medicinal plants to research, development and public use applications

Objective 3. Education and training

Key milestone:

- Develop the botanic garden as demonstration site for ethnobotany, pharmacognosy, plant systematics/taxonomy, horticulture and related disciplines for students from elementary school to university postgraduate students.

Objective 4: Research on medicinal plants

Key milestone:

- Facilitate and maintain standardized research using garden sourced medicinal plant materials for botanic, pharmacognostic, phytochemical, pharmacocological and clinical studies.

Objective 5. Production of medicinal plant seedling for cultivation

Key milestone:

- Develop protocol for propagation of wild medicinal plant species using advanced methods such as seed technology and plant tissue culture
- Establish a nursery to produce medicinal plant seedlings for conservation, research, and support the Ethiopia's green legacy program
- Equip the nursery with appropriate technologies and expand capabilities progressively

Objective 6: Establish and strengthen a national database of herbal medicines

Key milestone:

- Develop a comprehensive national database that consolidates information from ancient medical literature, ethnobotanical surveys, and agricultural data on medicinal plant cultivation and production

Note: Detailed description of the database structure and content will be provided in part II of the compendium. It is subject to revision as appropriate over time.

Secondary objectives and milestones

Objective 1. Recreation:

Key milestone:

- Make the botanic garden accessible to the public for leisure, relaxation, and nature appreciation
- Encourage visits by researchers, health workers, students and the general public

Objective 2. Establishment of healthy cafeteria:

Key milestone:

- Establish a cafeteria that provides healthy, safe and affordable food and beverages for visitors and staff

- Ensure the cafeteria supports the recreational function of the botanic garden

Objective 3. Landscape and riverbank maintenance, restoration and multipurpose plantation

Key milestone:

- Select multipurpose plant species with food, medicinal, aesthetic values to enhance environmental and social benefits
- Cultivate trees, shrubs and herbs along the Akaki Riverbank to prevent erosion, enhance biodiversity and for recreation
- Align the activities with the Green Legacy Program and expert-led planning initiatives

AHRI and ALERT can collaborate on joint initiative to enhance the botanic garden and support health initiatives focussing mainly on specialized programs.

Major accomplishments and needs

1. Establishment and development of medicinal plants botanic garden

Diversity of medicinal plant species cultivated in the garden

AHRI-ALERT has allocated land for a botanic garden where over 200 medicinal plant species from different localities are cultivated, of which 191 have

been identified to species or genus level and included in the checklist of medicinal plants cultivated in the garden. The garden is now fully covered with medicinal species, although annual species may not be visible the dry season.

Among the medicinal plant species, 180 were identified at the species level and 11 at only genus level while the remaining were only known from their local names and/or planting materials. Only the plants identified at the species and genus level (a total of 191) are included in the forthcoming analyses. These 191 species represent 155 genera and 64 families. The families Lamiaceae and Asteraceae were the most species rich, each with 16 species, followed by Fabaceae (13 species) and Solanaceae (12 species). Euphorbiaceae was represented by eight species, while Asphodelaceae and Rosaceae each had seven species and Poaceae had six species. The remaining 56 plant families were each represented by one to five species (Appendix 1).

Given that Ethiopia is home to over 1200 medicinal plant species, the current space is insufficient to accommodate the cultivation of additional species. Furthermore, medicinal plants that naturally grow in lowland and highland areas may require special facilities such as glass house and appropriate technologies for successful introduction and cultivation in the botanic garden. Therefore, continued support from AHRI and ALERT remains essential.

Growth forms of medicinal plants in the AHRI-ALERT botanic garden

The AHRI-ALERT botanic garden houses medicinal plants with diverse growth forms. Herbs have taken the lead, followed by shrubs, trees and climbers/creepers (Figure 1).

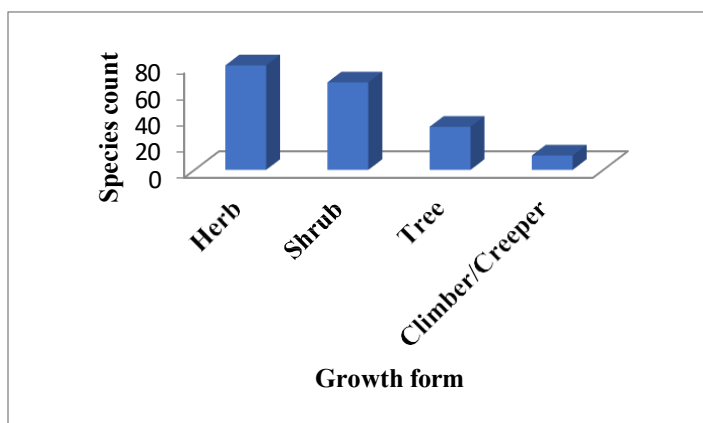


Figure 1. Distribution of medicinal plant species in the AHRI-ALERT botanic garden by growth form

Origin of the medicinal plants

The medicinal plants cultivated in AHRI-ALERT botanic garden originate from diverse sources (Figure 2). Majority of the plant species (118) cultivated in the garden are native (indigenous) to Ethiopia, followed by exotic species that were introduced through various means and for different purposes.

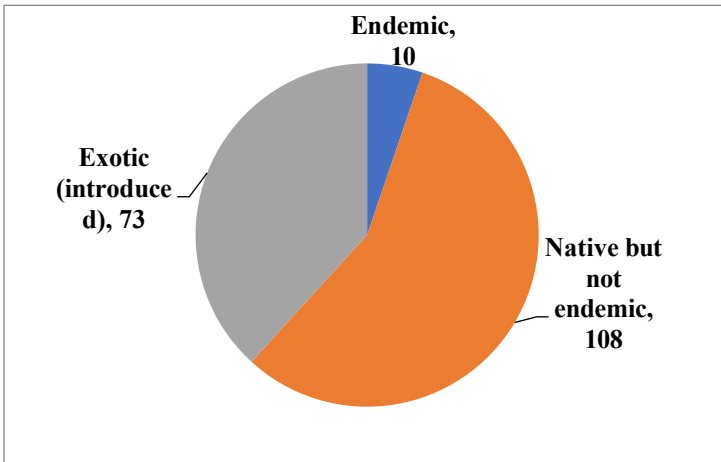


Figure 2. Origin of medicinal plant species grown in AHRI-ALERT botanic garden

Sources and cultivation status of the medicinal plants

The medicinal plants cultivated in the botanic garden have been collected from a range of sources, including wild habitats, backyards, agricultural fields and nurseries. Most of the medicinal plants naturally grow in the wild and others are cultivated, some of which have been domesticated. Certain species grow in the wild but are also cultivated for various reasons, whereas, others are primarily cultivated but have escaped and now grow in the wild (Figure 3).

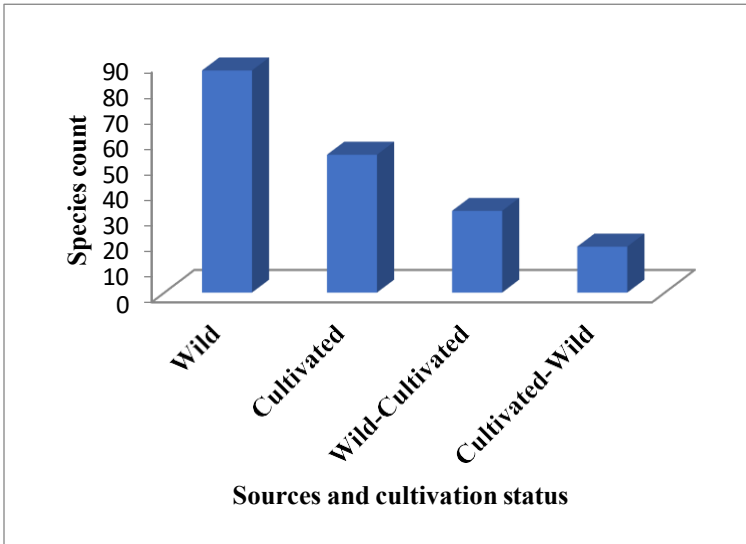


Figure 3. Sources and cultivation status of medicinal plant species cultivated in the botanic garden

Conservation status of the medicinal plants grown in AHRI-ALERT botanic garden

The conservation status of all the medicinal plants grown in AHRI-ALERT botanic garden requires a more rigorous and comprehensive review. However, according to The International Union for Conservation of Nature (IUCN), which assesses the global status of biodiversity, several species present in the garden are already under threat. These include:

- *Aloe benishangulana* (endemic to Ethiopia) - **Critically endangered**
- *Aloe tewoldei* (endemic to Ethiopia) - **Near threatened**
- *Echinops kebericho* (endemic to Ethiopia) - **Near threatened**
- *Coffea arabica* (indigenous to Ethiopia) - **Endangered**
- *Prunus africana* (indigenous to Ethiopia) - **Vulnerable**
- *Vanilla planifolia* (introduced to Ethiopia) - **Endangered and**
- *Cinnamomum verum* (introduced to Ethiopia) - **Vulnerable**

The IUCN (2026) has not yet assessed/reported the conservation status of all components of biological diversity. According to POWO (2026), *T. abyssinica* is native to Ethiopia, Eritrea, Saudi Arabia and South-Sudan and its survival is not considered threatened. In contrast, Vivero et al. (2005) included *T. abyssinica* in the Red List of Endemic Trees of Ethiopia and Eritrea, categorizing it as threatened or near threatened. Further investigation is therefore required to reconcile the differing information reported in the literature.

In this context, one of the contributors to this compendium, botanist by profession, conducted preliminary survey on the distribution, use and abundance of the species in its known natural habitats in Ethiopia. The unpublished findings indicate that the plant is heavily and destructively harvested for its medicinally valuable root. The survey further revealed that *T. abyssinica* has a very restricted distribution, a narrow ecological range, and has experienced a drastic population decline overtime. If this trend continues unchecked and no action is taken to cultivate and conserve the species, it faces a serious risk of extinction in the near future. This represents a critical moment for coordinated and urgent conservation measures to protect *T. abyssinica* and other medicinal plant species currently at risk.

2. Recognition of public engagement

The botanic garden has already become a focal point for public engagement. It has drawn visitors from the surrounding area and beyond, including AHRI and ALERT visitors and high profile government officials. Notably, under the Green Legacy Program, Ministry of Health staffs have begun cultivating plants within the AHRI-ALERT village. A recent visit led by H.E. Minister Mekdes Daba, along with State Ministers and media coverage, brought national attention to the

initiative. The strong appreciation and endorsements received highlight the importance of scaling up the garden.

3. Development of the medicinal plants herbarium

AHRI is currently upgrading its Medicinal Plants Herbarium as a holistic facility. The Herbarium comprises a curated collection of properly dried and accurately labelled plant specimens, together with the physical infrastructure required for their storage, management and use. It mainly serves as a valuable resource for plant identification, research and education. Major equipment like herbarium shelves have been procured, and additional facilities are under development.

The herbarium will be integrated with a medicinal plant database and a demonstration room, providing reference, educational and outreach functions. To fully realize these objectives, adequate physical infrastructure is required. A nearby building has been identified as a suitable space for the herbarium and related functions. Reallocating this space would enable the development of essential components, such as:

- Offices for botanic and herbarium operations

- Secure appropriate rooms for medicinal plant voucher specimen storage
- Integrated facilities linking the botanic garden's living conditions with the corresponding herbarium voucher specimens and databases
- Educational spaces for student demonstrations and visitor orientation, and
- Facilities to support future research, product development, and potential commercialization of herbal-based medicines.

Given its responsibilities and national significance, AHRI is envisioned as a center of excellence for:

- Medicinal plant research and development
- Production and value addition through incubation centers
- Technology transfer to manufacturing and industrial partners
- Conservation of medicinal plants in Ethiopia, in collaboration with sister institutions.

Part II

Compendium of Selected Medicinal Plant Species

Introduction

Herbal medicine is widely used in traditional, complimentary and modern health care systems across the globe. Documentation and transfer of the indigenous knowledge related to traditionally used herbal medicines are crucial to ensure the continuity, integrity and sustainability of these systems. Equally important are the proper identification of medicinal plants and the availability of scientific study findings on each species, which are essential for advancing subsequent research, developing herbal-based products, and producing safe, effective and standard products for both national and international use.

Furthermore, there is a critical need for conservation and sustainable use of medicinal plants. In this regard, the sustainable production of standardized raw medicinal plant materials is essential, without such standardization, products reaching end users may have compromised quality, reduced efficacy, or may even pose health risks in the short or long term. Moreover, since most traditionally used medicinal plants are sourced from the wild, there is a pressing need to introduce and develop appropriate propagation methods. Unlike cultivated or domesticated species, whose propagation techniques have been refined over hundreds or thousands of years, many medicinal plants are not inherently

conducive for cultivation. With this conviction, the present compendium (Volume I), which includes 25 medicinal plant species, has been prepared to provide comprehensive, multidisciplinary review compilations for each species.

Accordingly, information for each species includes its scientific name, later published or well recognized synonyms, and representative local and English names to facilitate accurate referencing. Associated information on family, botanical description and habitat characteristics is also provided for each species. Where available, information on infraspecific taxa and officially developed and registered varieties released by appropriate government authorities for production is included to support users interested in cultivation and utilization of plant materials. In the context of the AHRI-ALERT Medicinal Plants Botanic Garden, accession numbers and herbarium voucher specimen numbers of the cultivated medicinal plant species are also included to facilitate citation, identify source of planting materials, and enable linkage with standardized voucher specimens deposited in AHRI Medicinal Plants Herbarium.

As botanic gardens are primarily established for offsite (*ex situ*) conservation, brief yet essential information on the conservation status of each species is presented in this compendium, with the

understanding that further elaboration may be required for future conservation actions. Information on both global and national (Ethiopian) conservation status is of paramount importance for conservation prioritization. Accordingly, three major international references and one national reference were used to categorize conservation status of each species.

At the global level, International Union for Conservation of Nature and Natural Resources (IUCN) Red List is the most widely used reference for assessing the conservation status of biological diversity, including plants. Accordingly, the IUCN RED List was used to indicate conservation status of medicinal plants in the compendium. However, not all species are currently assessed or included. Conservation status classifications are provided by IUCN, and readers are encouraged to refer the cited references for a better understanding of the global status of each species. Where such limitations were encountered, Plants of the World Online (POWO) was referred to supplement the compendium with available information.

Credible research based information on the conservation status of Ethiopia's biological diversity is extremely vital but remains limited. Existing literature addressing conservation status is largely confined to endemic trees and shrubs of Ethiopia and

Eritrea. This presents a significant challenge in providing adequate guidance for sustainable harvesting and prioritizing species for conservation through *in situ* (onsite) and/or *ex situ* (offsite) approaches. Therefore, comprehensive surveys assessing the status of medicinal plant species, native and endemic taxa, using internationally accepted criteria are urgently needed to inform the public and guide sustainable use and conservation strategies. Where available, information on propagation method(s) for each medicinal plant species is included to support cultivation in botanic gardens and facilitate production at small to large scale levels. Nonetheless, further research and review are required for species that are rarely cultivated or poorly studied.

The compendium also documents commonly reported ethnomedicinal uses of each species in Ethiopia. It further provides information on scientific studies conducted to validate the traditional use reports with the aim of developing herbal-based products. To that end, major biomedical research findings on phytoconstituents as well as safety and efficacy data from preclinical and clinical studies, are summarized where literature evidence permits. Information on product registration and commercialization at international and country

specific levels, where available, is also provided. This helps readers understand the current status of herbal product development and use worldwide. In Ethiopia, there is no report of locally registered, research based herbal products approved for use.

This compendium does not attempt to cover all aspects of medicinal plants. Rather, it provides comprehensive yet concise guidance to support further research, development, conservation, and utilization efforts. Identified gaps and recommendations for herbal-based product development and conservation are highlighted where deemed appropriate. However, this work is not exhaustive, and readers are encouraged to consult additional relevant literature for more detailed information.



Artemisia afra Jacq. ex Willd.

ጭቁኝ

***Artemisia afra* Jacq. ex Willd.**

Local and common names: ጭቁኝ Chikugn, አረቲ Ariti (Amh); Kaapaani, Arrittii (Oro); ጭራኮት Ch'irakot (Gur); Natiriya (Wol); Wormwood, Wild wormwood, African wormwood (Eng)

Voucher number and identification:
GA074/AHRI/2025

Synonyms: *A. afra* is a stable taxon in terms of nomenclature and there are no widely recognized synonyms for this species.

Varieties recorded in Ethiopia: *A. afra* var. *afra* and *A. afra* var. *friesiorum* Chiov are the recognized infraspecific taxa (varieties) in Ethiopia.

Family: Asteraceae

Botanical and habitat distribution

A. afra is a subshrub or erect perennial herb with a height of 0.5-1 m tall. The basal leaves may reach up to 8 cm in length. The plant has a characteristic greyish appearance; the upper leaf surface is dark green, while the underside is covered with small white hairs. The plant produces small, crowded, nodding flower heads (capitula) that are creamy-yellowish, measuring 3 to 5 mm wide. These are

followed by tiny, dry, one-seeded fruits (achenes). The pappus (tuft of hairs on the fruit) is absent. It is an aromatic plant and when it is touched or cut, it emits a sweet scent. It is a perennial plant that grows in the highland areas of Eastern and Southern Africa, typically at altitudes of about 1500-3600 meters above sea level (masl). In Ethiopia, the plant occurs in the mountain regions commonly in Arsi and Bale Mountains.

Conservation status

A. afra is not currently included in the IUCN Red List although POWO reports that the species is not threatened, which broadly corresponds to the IUCN category of Least Concern.

Propagation method

A. afra can be propagated from seeds, cuttings, and root pieces. Tissue culture techniques could also provide an efficient means of propagation where optimal growth is achieved using sterile shoot tip explants.

Cultivation in botanic garden

The plant was established in the botanic garden in October 2024 from a whole plant collected from the AHRI-ALERT Health Village (Accession number 0012).

Ethnomedicinal uses

The root and aerial part of *A. afra* are often used to treat abdominal pain, headache, malaria, constipation, rheumatism, round worm, eye diseases, and common cold and symptoms of respiratory distress. The juice of the crushed leaves is mixed with water or honey and administered orally for stomachache. It is also used as a fumigant, particularly after childbirth or to ward off mosquitoes and snakes.

Major phytoconstituents

A. afra has a variety of phytochemicals including 4 α ,12 α -dihydroxybishopsolicepolide, α -thujone, β -thujone and camphor, which were reported as the major constituents of *A. afra* from South Africa. Whereas, yomogi alcohol and artemisyl acetate were reported to be the major constituents of Ethiopian origin. Other phytochemicals such as α -amyrin, acacetin and scopoletin have also been reported.

Pharmacological and safety evidences

Preclinical evidences

Antimicrobial effect: In microdilution assay, the ethanol extract of the aerial parts of *A. afra* showed antibacterial activity against a panel of gram-positive bacteria. Moreover, the crude leaf extract of the plant showed potent activity against *E. coli*. The

dichloromethane extract exhibited anti-plasmodial activity against *P. falciparum*. Antiprotozoal activity was also reported against trypanosome species, *in vitro*. Moreover, *A. afra* was found to inhibit *C. albicans*, and exhibited activity against *Mycobacterium tuberculosis* and *M. smegmatis*.

Cardiovascular effect: The aqueous *A. afra* extracts exerted hypotensive effect, *in vivo*. Furthermore, an isolated compound (scopoletin) induced a dose-dependent decrease in inotropic activity and a decrease in heart rate

Antioxidant effect: Three isolated compounds (scopoletin, acacetin, and botulinic acid) *A. afra* leaves exhibited strong free radical scavenging activity in DPPH antioxidant assay.

Other pharmacological effects: Cytotoxic and spasmolytic effects.

Clinical evidence

In randomized, double blinded superiority clinical trial involving 200 patients, *A. afra* tea infusions were found to be 30% faster in treating schistosomiasis compared to praziquantel.

Safety

The acute and sub-acute *in-vivo* toxicity tests on aqueous leave extracts of *A. afra* indicated the safety

of the plant with LD₅₀ > 2500 mg. Moreover, the chronic oral administration of *A. afra* extract did not cause any noticeable toxicity up to the dose of 1000 mg/kg.

Research gaps and recommendations

The formulation and clinical studies on this species are largely absent indicating a strong need for further research in these areas. Furthermore, the standardization of the phytochemicals has not been done. Thus, we recommend standardizing the phytoconstituents of the plant.

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Brucea antidysenterica J.F. Mill.

የደጋ አባሎ፣ ዋጊኖስ

***Brucea antidysenterica* J.F. Mill.**

Local and common names: የደጋ አባሎ Yedega Abalo, ዋጊኖስ Waginose (Amh); Qomonyoo (Oro); Dysentery tree, Bitter orange (Eng)

Voucher number and identification:
GA070/AHRI/2025

Synonyms: *B. antidysenterica* is known by eight synonyms, among which *Trichilia siderotricha*, *B. erythraeae* and *B. salutaris* are the later published names.

Varieties recorded in Ethiopia: There are no interspecific taxa and officially registered varieties of *B. antidysenterica* in Ethiopia.

Family: Simaroubaceae

Botanical and habitat distribution

B. antidysenterica is an evergreen, monoecious shrub or small tree, commonly reaching up to 7 m, though sometimes growing as tall as 15 meters. The plant is widely distributed across tropical Africa, thriving at moderate to high elevations, typically between 1400-2800 meters in Ethiopia. The plant is characterized by its alternate, compound leaves, which can be quite large (up to 65 cm long) and are often clustered at the

ends of younger branches. The small, regular flowers are unisexual and greenish-pale green, occurring in separate inflorescences on the same plant. The resulting fruits are 1-seeded, drupe-like structures that mature from pale green to yellow-orange or dark red. The species was named in honor of the Scottish explorer, James Bruce, who was in Ethiopia from 1769 -1771.

Conservation status

According to IUCN Red List, *B. antidysenterica* is currently classified globally as a species of Least Concern. However, in Ethiopia, it faces a threat from habitat loss due to deforestation and agricultural expansion.

Propagation method

The plant is propagated from seed, as germination rate is high but seedlings are sensitive to transplanting stress. Seeds remain viable for over a year at room temperature. Alternatively, wildlings (young seedlings from natural regeneration) can be transplanted during the rainy season. Seed germination can be variable and thus may require pre-treatment such as scarification or soaking.

Cultivation in botanic garden

The species was planted at AHRI-ALERT botanic garden in June 2024 from seedlings donated from Gullele Botanic Garden (Accession number 0019).

Ethnomedicinal uses

B. antidysenterica is traditionally used in Ethiopia for the treatment of various human ailments. The bark, fruits and roots are used to treat dysentery (from which the species name is derived), as well as for anthelmintic properties and management of fever. Moreover, the bark, fruit, seeds, leaves and roots are used to treat diarrhea, indigestion and stomach-ache. The leaves and root are also cooked with meat or infused with milk to relieve asthma; while preparations of the root or leaf combined with fruit and mixed with milk are used against rabies. As part of polyherbal prescriptions, the leaf and fruit are used against leishmaniasis and leprosy; the root and bark against syphilis; the root and leaf against rectal prolapse and rheumatic pain; charred root or leaf powder for wounds; the root against eczema; and the fruit against elephantiasis. Beyond medicine, oil of the fruit is used for soap-making, and the wood serves as firewood or roofing material. A yellow dye from the fruit endocarp colors textiles, adding cultural depth to its utility. Also used as a natural pesticide and for other ethnoveterinary purposes.

Major phytoconstituents

Bruceantin, brusatol, bruceanoside A, bruceacanthinones A and B, have been reported from the roots and bark part *B. antidysenterica*.

Pharmacological and safety evidences

Preclinical evidences

Antimicrobial effect: In complementary *in vitro* assays, the extract exhibited antimicrobial activity against common diarrheal such as *Shigella flexneri*, *Salmonella typhi*, and *Escherichia coli*. Furthermore, the methanol extract of the leaves of *B. antidysenterica* showed antifungal activity against *Candida albicans*. Different of extracts *B. antidysenterica* inhibited parasitaemia level in *Plasmodium berghei*-infected in mice. The hydroalcoholic seed extract possesses *in vitro* anti-leishmanial activity against *Leishmania aethiopica* and *L. donovani*. Moreover, Bruceantin was found to be a potent amebicide.

Wound healing effect: The aqueous fraction of 80% methanol leaf extract of *B. antidysenterica* possesses wound healing with a tensile strength boosting effect and accelerating wound contraction, in rodent model.

Cytotoxic effect: *B. antidysenterica* extract and isolated compounds (bruceantinoside A and B) demonstrated antileukemic activity *in vivo*. The

methanol root and bark extracts, dichloromethane and ethyl acetate fractions, as well as isolated compounds, exhibited cytotoxic effects against different cancer cell lines (A-549, MCF-7, and PC-3).

Other pharmacological effects: Anti-inflammatory, antidiarrheal effect, ant motility and organ protective effects were reported from *B. antidysenterica*.

Clinical evidences

Bruceantin, an isolated compound from *B. antidysenterica*, which is was subjected to Phase I and Phase II clinical trials for cancer (including metastatic breast cancer and malignant melanoma) but no objective responses were observed in clinical trials, and further development was terminated.

Safety

In acute toxicity study the median lethal dose of root extract of the plant was reported to be above 2000mg/kg. In contrast to the seeds, a methanol extract of the leaves did not show any signs of acute toxicity up to a dose of 2000 mg/kg body weight in mice in one study.

Research gaps and recommendations

The standardization of the phytochemicals from this plant have not been done.

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

ብሳና

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

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

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 Gullele 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.

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Cymbopogon citratus (DC.) Stapf

ሎሚ ሳር

***Cymbopogon citratus* (DC.) Stapf**

Local and common names: ሎሞላ ሳር Lomisar (Amh); Xajjiisaar, Xajisaara (Oro); Lemongrass (Eng)

Voucher number and identification:
GA051/AHRI/2025

Synonyms: *C. citratus* is known by six synonyms, among which *Andropogon nardus* subsp. *cerifer*, *A. cerifer* and *C. nardus* subvar. *citratus* are the latest published names.

Varieties recorded in Ethiopia: Currently, three lemongrass varieties, namely *C. citratus* var. *WG-Lomisar-Java*, *C. citratus* var. *WG-Lomisar-UA* and *C. citratus* var. *WG-Lomisar-I* are nationally registered in Ethiopia.

Family: Poaceae

Botanical and habitat distribution

C. citratus is stemless perennial grass with numerous stiff tillers arising from short rhizomatous rootstock, making large tussocks. Leaves are long, glaucous, green, linear tapering upwards and along the margins; ligule very short; sheaths are serrated (toothed), those of the barren shoots are widened and tightly clasping at the base, others are narrow and separating. The evergreen leaves release

citrus/lemon like aroma when crushed. It seldom flowers under cultivation. It is best grown at altitudes of 1200-2000 masl, where the average annual rainfall ranges from 2500-3000 mm; higher altitudes increase susceptibility to rust infestation.

Conservation status

C. citratus is not currently included in the IUCN Red List, although POWO reports that the species is not threatened, which broadly corresponds to the IUCN category of least concern.

Propagation method

In Ethiopia, *C. citratus* is propagated through vegetative propagation by splitting clumps into slips with one to three tillers. Healthy, pest-free tillers are planted at the start of the rainy season, with tops cut back to 20-25 cm and dried sheaths removed to expose young roots. Slips are planted at a suitable depth, the soil is firmed to remove air pockets, and plants are spaced 60 cm apart between plants and rows for proper establishment.

Cultivation in botanic garden

The species was planted in the AHRI-ALERT botanic garden in October 2024, using a whole plant collected from the former mini medicinal plant garden at the Ethiopian Public Health Institute (Accession number 0038).

Ethnomedicinal uses

C. citratus is widely used in the Ethiopian ethnomedicinal practice. The leaves are the main plant parts used and are prepared in various ways: leaf smoke is inhaled to alleviate cough, while leaf infusions or juices are taken orally to treat respiratory and gastrointestinal ailments, including pneumonia and stomachache, and leaves are used in traditional preparations for gallstone related symptoms. The roots are traditionally used to manage diarrhoea, and dried leaf powder mixed with water is employed in anthrax treatment. The whole plant is also crushed to relieve cough. *C. citratus* also serves as a natural insect repellent and is also used in cooking.

Major phytoconstituents

The leaf of *C. citratus* is rich in essential oils (EO), including citral, and neral, which together constitute about 28-71% of the total EO. Other volatile compounds include γ -myrcene, nerol, geraniol, citronellal, terpinolene, geranyl acetate, and terpinol methylheptenone were also identified.

Pharmacological and safety evidences

Preclinical evidences

Antimicrobial effect: *In vitro* the essential oil of *C. citratus* is active against a broad range of microbes,

including bacteria (*Staphylococcus spp.*, *E. coli*, *Klebsiella pneumonia*), and fungi (*Candida sp.*, *Aspergillus sp.*). The methanol extract and essential oil of *C. citratus* also showed antiviral activity against the DENV-1 virus that causes dengue and HSV-1 virus, respectively.

Insect repellent and insecticide properties: *C. citratus* exhibits both insect repellent and insecticidal activities, primarily due to its essential and major constituents such as citral. The EO showed strong insecticidal effects, causing high mortality against the velvet caterpillar (*Anticarsia gemmatalis*) and showing synergistic activity with clove oil against adult *Anopheles* mosquitoes. The methanol leaf extract also displayed potent larvicidal activity against *Anopheles arabiensis*.

Anti-inflammatory: *C. citratus* showed anti-inflammatory effects via nitric oxide scavenging activity and inhibits inducible nitric oxide synthase expression. The anti-inflammatory effect was also noted in carrageenan induced inflammatory models.

Other pharmacologic effects: Cytotoxic, antioxidant, hyperlipidemic and anti-obesity effects were reported from *C. citratus* extracts and essential oil.

Clinical evidences

In healthy children, a mouthwash containing *C. citratus* oil was effective in reducing plaque index (PI) and GI (Gingival index) while in healthy adults, the use of a *C. citratus* oil mouth rinse decreased malodor. In another clinical study conducted on 47 patients with *Pityriasis versicolor* (fungal skin infection) revealed that using essential oil of *C. citratus* inhibited *Tinea versicolor*. Different clinical studies also reported that topical application of *C. citratus* treats fungal infections, reduce dandruff, and improved skin hydration, texture, and antioxidant protection. Moreover, a study conducted on 110 participants showed that, infusions prepared from *C. citratus* leaf powder significantly increased packed cell volume, hemoglobin.

Safety

The EO of *C. citratus* and its major component were found safe when given orally and applied topically. No mortality was observed at doses up to 5000 mg/kg when given orally. Citral is a mild skin irritant and sensitizer but is not irritating to the eyes. Subacute and chronic studies indicate the oil is generally safe at moderate doses, although repeated dose studies in rats have reported mild hepatotoxicity at 250 mg/kg, highlighting the need for dose control during prolonged use. Citral is non-genotoxic, and its No-

Observed-Adverse-Effect Level for developmental toxicity in rats is 200 mg/kg/day; at higher doses, it primarily reduces pup weight rather than causing structural malformations. In human studies, topical applications in dermatology and oral health were well tolerated, with occasional mild, localized irritation that resolved spontaneously. Cytotoxicity and regulatory data indicate low toxicity at clinical doses. The US FDA has listed *C. citratus* oil as substance added to foods or used as spice, which indicates its recognition for safe use in food products.

Research gaps and recommendations

Despite promising evidence on the safety and efficacy of *C. citratus* EO, several gaps remain. Current clinical trials are mostly small and short-term; larger, well-designed studies and post-marketing surveillance are advised to further confirm efficacy and safety. Standardization of doses and formulations, through phytochemical profiling, stability testing, and rigorous quality control are also advised. The phytoconstituents identification of this plant is limited to GC-MS, and therefore the identification of non-volatile compounds is recommended.

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Cymbopogon nardus (L.) Rendle
ናርዶስ ሳር

***Cymbopogon nardus* (L.) Rendle**

Local and common names: ናርዶስ ሳር Nardos sar (Amh) Citronella, Winter's citronella, Ceylon citronella (Eng)

Voucher number and identification:
GA052/AHRI/2025

Synonyms: *C. nardus* is known by 27 synonyms, among which *C. nardus* var. *luridus*, *C. virgatus* and *C. nardus* var. *confertiflorus* are the later published names.

Varieties recorded in Ethiopia: Only one variety is registered in Ethiopia, namely *C. nardus* var. *Wondo*.

Family: Poaceae

Botanical and habitat distribution

C. nardus has not been listed, nor has its botanical description been provided in the published Flora of Ethiopia and Eritrea. The following description is therefore based on other literature sources. It is a tall, aromatic, perennial grass that grows in dense clumps, reaching up to 2.5 m in height. Its long, narrow leaves, about 20-60 cm long and 3-15 mm wide, bend downwards and have a characteristic lemon like scent, often turning reddish as they mature. The plant produces a dense, spike like inflorescence (flowering stem) up to 60 cm long and reproduces naturally by

seed as well as division of clumps. To the author's knowledge, flowering has not been observed in Ethiopia, and propagation is mainly achieved vegetatively by dividing and replanting the clumps. The species is valued for its essential oil, which is widely used in the formulation of insect repellents and in traditional medicine. Detailed studies on altitudinal range requirement of *C. nardus* in Ethiopia are lacking. Based on general tropical records, the species occurs or can be cultivated in lowland areas around 500 m up to 1500-2000 masl. It prefers well drained soils with moderate rainfall.

Conservation status

R. abyssinicus is not currently included in the IUCN Red List. However, POWO reports that the species is not threatened, which broadly corresponds to the IUCN category of Least Concern.

Propagation method

C. nardus is a tropical, clump forming perennial grass cultivated mainly for its EO. While specific Ethiopian data are limited, cultivation practices can be cautiously inferred from related species like *C. citratus*. The plant thrives in warm, humid climates (20-30°C, 1300-2000 mm rainfall) on well drained loamy soils and is propagated vegetatively by root divisions or slips. Initial spacing trials of 50-75 cm

between plants and 75-100 cm between rows, combined with full sunlight, moderate fertilization, and regular weeding are recommended. Harvesting likely begins 4-6 months after planting and continues every 2-3 months, with leaves cut near the base and distilled soon after, though local trials are needed to confirm optimal yields and oil content.

Cultivation in botanic garden

The plant was cultivated in the AHRI-ALERT botanic garden in October 2024, using a whole plant collected from the former mini medicinal plant garden at the Ethiopian Public Health Institute (Accession number 0040).

Ethnomedicinal uses

UNIDO and recent reports indicate that *C. nardus* is cultivated in various countries, particularly in South and Southeast Asia, mainly for its citronella oil, valued for its insect repellent properties as well as for use in soap perfumery, pest control, and aromatherapy. In Ethiopia, the species is grown for its traditional medicinal and culinary purposes. Locally, it is primarily used as mosquito repellent through burning its leaves to produce insect repelling smoke, a practice common in rural communities. Beyond its practical uses, the smoke is associated with household protection, cleanliness, and traditional

health preservation. Information on its application against human ailments is limited.

Major phytoconstituents

It is reported that fresh leaves of *C. nardus* contain about 1.96-3.38% of essential oil (EO). Citronellal, a monoterpenoid responsible for the characteristic aroma, is the predominant constituent (27.87-35.2%) of the EO. Other major constituents include geraniol (21.24-28.4%), and citronellol (8.2-13.02%), elemol (5.25-11.8%), and nerol, reaching up to 11.21%.

Pharmacological and safety evidences

Preclinical evidences

Antimicrobial effect: The major essential oil component of *C. nardus*, citronella, exhibits a strong antimicrobial effect. It has shown notable antibacterial efficacy against *Propionibacterium acnes*; the bacterium associated with acne. The oil also demonstrates antifungal and antibiofilm activity against *Candida albicans* and *Aspergillus niger*. Additionally, a study evaluated the antiviral activities of *C. nardus* fractions against measles virus in Vero cells showed a reduction of virus-induced cell death.

Insect repellent and insecticide effects: *C. nardus* showed strong repellence against mosquitoes such as *Anopheles stephensi*, *Culex quinquefasciatus*, and *Aedes aegypti* a major vector of malaria, filariasis, dengue,

yellow fever and chikungunya. As a botanical pesticide, the oil contains bioactive compounds that act as fumigants, contact insecticides, repellents, and antifeedants. The essential oil also showed larvicidal potency.

Wound healing effect: Investigations showed that essential oil of *C. nardus* reduced levels of the inflammatory cytokines and accelerated wound healing in mice with chronic diabetic wound.

Other pharmacological effects: Antioxidant, anti-proliferative, analgesic, diuretic, organo-protective, and anti-diabetic effects were reported from this plant.

Clinical evidences

There are no clinical trial reports. However, the oils of *C. nardus* has proven efficacy as mosquito repellent.

Safety

The skin and eye irritation studies on rabbit show that the essential oils of the plant had a very weak irritant power on the skin and the eye. The essential oil also showed low toxicity, with no mortality or major adverse effects in acute and sub-acute oral toxicity studies in Wistar rats. The LD₅₀ value was estimated to 5000 mg/kg. The Maximum Acceptable Concentrations (MACs) of citronellal in finished products range from 0.49% to 2.3%.

Product registration

No citronella-based products have been developed or registered for public use in Ethiopia. In the USA, topical preparations for use as insect repellent are not considered drugs and do not require FDA approval. Instead, the U.S. Environmental Protection Agency (EPA) evaluates these products, determining whether they require full registration or qualify for exemption.

Research gaps and recommendations

C. nardus has significant but underexplored medicinal and industrial potential. EO yield and composition vary widely, and cultivation, harvesting, and chemotype selection for high EO content remain suboptimal. Chemical profiling and genetic studies are needed to identify superior, locally adapted varieties, and standardizing EO yield and composition would support high quality herbal product production. Adoption of good agricultural practices could enhance herbage and EO yield. Strengthening local distillation, value addition, storage, market systems, and coordinated research could establish *C. nardus* as a valuable medicinal and industrial crop in Ethiopia. The phytochemicals are limited to GC—MS analysis. Therefore, the isolation of bioactive constituents is recommended.

References

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Echinops kebericho Mesfin

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***Echinops kebericho* Mesfin**

Local and common names: ቀበረኛ Kebericho (Amh); Qabariichoo (Oro); the species is endemic to Ethiopia and has no widely recognized common name beyond these local names.

Voucher number and identification:
GA068/AHRI/2025

Synonyms: *E. kebericho* is a stable taxon in terms of nomenclature and there are no widely recognized synonyms for this species.

Varieties recorded in Ethiopia: There are no interspecific taxa and officially registered varieties of *E. kebericho*.

Family: Asteraceae

Botanical and habitat distribution

E. kebericho is an erect perennial herb or shrub, growing up to 1.2 m high with leafy stems and usually arising from a massive tuberous root stock. The stem is leafy throughout and sparsely covered with characteristic white, cob-webby hairs. The leaves are alternate, often sessile, and deeply lobed or dissected with spiny margins. The plant culminates in a large, spherical, thistle-like flower head and contains numerous tiny, brilliant blue or white florets.

Following flowering, the plant produces cylindrical-oblong fruits, and is typically covered with long, silky hairs. The fruits are 7.5-10.5 mm long and 1.5-2.5 mm wide. This plant is endemic to Ethiopia and generally dispersed in the Ethiopian highlands at an altitude of 2300-2600 m.

Ethnomedicinal uses

Infusion of the root is taken orally to treat fever, headache, diarrhea, stomachache, malaria, typhus fever, taeniasis, tonsillitis, vomiting, and acute sickness. The smoke is also used as a fumigant mainly after childbirth, as a repellent for mosquitoes and snakes. The plant is also used in the preparation of medicines against migraine, mental illness, lung TB, leprosy, kidney disease, bilharzia, syphilis, hemorrhoid, amoebic dysentery, and other ailments.

Conservation status

According to the IUCN Red List, *E. kebericho* is currently listed as a Near Threatened species. As the species is endemic to Ethiopia, it warrants high conservation priority.

Propagation method

E. kebericho is commonly propagated by its seeds. Moreover, micropropagation protocols have been developed to support mass propagation and conservation of this medicinal species.

Cultivation in botanic garden

The plant was planted in the botanic garden in October 2024, from a whole plant dug up, at the AHRI-ALERT Health Village (Accession number 0044).

Major phytoconstituents

Dehydrocostus lactone, isoshyobunone, β -guaiene, β -phellandrene, modephene, and caryophyllene oxide were identified from the essential oils of rhizome part.

Pharmacological and safety evidences

Preclinical evidences

Antimicrobial effect: The alcoholic extracts of *E. kebericho* root demonstrated antibacterial activity against *Staphylococcus aureus* while the essential oil and ethyl acetate fraction showed antibacterial activity against methicillin-resistant *S. aureus* (MRSA). The essential oil from the root also possesses antifungal activities.

Antiprotozoal effect: The hydroethanolic root extract of *E. kebericho* showed moderate parasitemia suppression in early malaria infection. Furthermore, the essential oils possess a highly active antileishmanial property.

Analgesic and anti-inflammatory effects: The hydroalcoholic root extract of *E. kebericho* demonstrates significant analgesic and anti-inflammatory properties in mice. It effectively mitigates both peripheral and central pain. Additionally, the extract reduces paw edema in inflammatory models induced by carrageenan and formalin.

Clinical evidences

There are no clinical trials reported.

Safety

Oral administration of the aqueous and 70% methanol root extracts didn't show any toxic effect over a period of 14 days after administration of 2000 mg/kg indicating the LD₅₀ of greater than 2000 mg/kg in mice.

Research gaps and recommendation

The non-volatile phytoconstituents of these plants have not been exhaustively done. Scientific gaps remain in clinical validation and long-term safety evaluation. Moreover, conservation efforts are critical due to its endangered status of *E. kebericho*.

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Embelia schimperi Vatke

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Photo by Prof. Mirutse Giday

***Embelia schimperi* Vatke**

Local and common names: እንቆቆ Enqoqqo (Amh and Tig); Haanqaa, Haanquu, Haanqoo, Haanquu, Qaanko (Oro); Schimper's embelia, Schimper's false black pepper (Eng)

Voucher number and identification:
GA073/AHRI/2025

Synonyms: *E. schimperi* is known by 16 synonyms, among which *E. bambuseti*, *E. dasyantha*, *E. tessmannii* and *E. tibatiensis* are the later published names.

Varieties recorded in Ethiopia: There are no recognized infraspecific taxa or registered varieties of *E. schimperi* in Ethiopia.

Family: Myrsinaceae

Botanical and habitat distribution

E. schimperi is a woody climbing shrub that can grow 2-13 m tall. Its branches have noticeable small bumps called lenticels. The leaves are arranged alternatively (alternate), shaped like narrow ovals that is taper towards the tip (oblanceolate), with edges that slightly curl under (slightly revolute), a round base, and a pointed tip (acuminate). The flowers grow on short stalks (pedicellate) and are covered with rusty colored hairs. The small fruits, 5–8 mm in diameter, change colour as they ripen from orange-yellow to

reddish-green or black-red color, and usually contain a single brown seed with irregular orange markings. In Ethiopia, this plant grows at elevations of 1700-2800 masl, commonly along streams on mountain slopes, in dense moist forests, at the edges of thickets, and near rivers in grassy fields and farmed areas.

Conservation status

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

Propagation method

E. schimperi can be propagated from seeds, which are sown in well-drained soil and kept moist until germination. Seedlings or whole young plants collected from the natural habitats may also be transplanted directly to sites similar to those described under the habitat distribution above. Vegetative propagation using stem cuttings is possible, although success may be variable.

Cultivation in botanic garden

The plant was established at AHRI-ALERT Botanic Garden from a wild-grown whole plant collected from Yem in September 2025 (Accession number 0045).

Ethnomedicinal uses

E. schimperi is widely used in traditional medicine in Ethiopia. The fruits and bark, and less commonly the

roots are used to treat intestinal parasites, particularly tapeworm. Preparations from the fruits and bark are also taken to relieve stomachaches and other digestive complaints including bloating. Moreover, these plant parts are traditionally used to manage fevers, skin related ailments conditions, and menstrual disorders (dysmenorrhea). The fruit or bark is also frequently combined with other medicinal plants such the stem bark of *Albizia anthelmintica*, seeds of *Guizotia abyssinica*, aerial parts of *Glinus lotoides*, and flowers of *Hagenia abyssinica*, mixed with water and either taken as a taenicide or applied as a disinfectant.

Major phytoconstituents

A benzoquinone derivative, Embelin (2,5-dihydroxy-3-undecyl-*p*-benzoquinone), is one of the major phytoconstituent obtained from the fruit part of *E. schimperi*.

Pharmacological and safety evidences

Preclinical evidences

Antimicrobial effect: Methanol extracts of *E. schimperi* leaves and fruits have shown strong antibacterial effects against *Proteus mirabilis*. Chloroform extract of the fruit has exhibited antibacterial activity against various pathogenic bacterial strains. The methanolic stem extract of *E.*

schimperi possesses antifungal efficacy, specifically targeting the opportunistic pathogen *Cryptococcus neoformans*

Anthelmintic effect: The hydroalcoholic extract of *E. schimperi* and the diammonium salt of the isolated compound embelin exhibit anthelmintic activity against hookworm larva *in vitro* and *Hymenolepis nana*, *in vivo*.

Other pharmacological effects: Antiepileptic, antioxidant and cytotoxicity.

Clinical evidences

There are no clinical trials reports.

Safety

The oral acute toxicity of 80% ethanol extract of the dried fruits of *E. schimperi* revealed that no sign of toxicity was observed up to the dose of 5000 mg/kg on Swiss albino mice. In a reproductive toxicity study, administration of the 80% hydroalcoholic extract of *E. schimperi* fruit cause inflammatory reactions and calcifications in the placenta. In addition, embelin was found to have toxic effects on the reproductive system of animal models.

Research gaps and recommendations

Clinical studies should be conducted to determine the appropriate dose for human use.

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Ensete ventricosum (Welw.) Cheesman

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***Ensete ventricosum* (Welw.) Cheesman**

Local and common names: እንሱት Enset (Amh); Waarqee, Qooccoo (Oro); Asat (Gur); Uuthi (Gam); Weise (Kam); Wassa (Sid); Natiriya (Wol); Ethiopian banana, Abyssinian banana, Pseudo-banana, False banana, Wild banana (Eng)

Voucher and identification:

GA064/AHRI/2025

Synonyms: *E. ventricosum* is known by 33 synonyms, of which *Ensete ventricosum* var. *montbeliardii*, *Ensete arnoldianum* and *Ensete bagshawei* are the later published names.

Varieties recorded in Ethiopia: There are officially registered and released improved varieties in Ethiopia that include *yanbule*, *gewada*, *endale*, *kelisa*, *zereta*, and *messina*.

Family: Musaceae

Botanical and habitat distribution

E. ventricosum is a perennial plant that grows up to 6-12 meters high. Its unbranched 'stems' are actually pseudostems (1.5-5 meters tall) made up of tightly-overlapping leaf sheaths, left behind following the death of the leaf blade. The pseudostem widens at the base giving rise to the specific name *ventricosum* (a

Latin word for swollen or inflated on one side). Both the leaf midrib and the pseudostem are often variably stained purple or purplish-brown. The main pseudostem dies after flowering and fruiting. The yellow or orange-coloured fruits are 8-15 cm long and up to 4-5 cm in diameter. There are usually 15-25 very hard, black seeds with varying sizes per fruit embedded in an edible but tasteless orange pulp. In Ethiopia, *E. ventricosum* is a widely cultivated staple food plant. It also grows in the wild montane and riverine forest, often in clearings, gullies and near streams at altitudes mainly ranging from 1000-2400 masl.

Conservation status

E. ventricosum has been categorized as a species of least global concern in the IUCN red list.

Propagation method

The plant can be propagated both sexually and asexually. However, it is commonly and traditionally propagated vegetatively from its underground corm by stimulating multiple shoots (suckers).

Cultivation in botanic garden

The species was planted at AHRI-ALERT botanic garden in October 2024 from a whole plant dug up at

the AHRI-ALERT Health Village (Accession number 0122).

Ethnomedicinal uses

E. ventricosum is traditionally used by different ethnic groups in Ethiopia to treat human ailments. Leaves and pseudostem of the plant are most frequently used parts as medicine. The boiled Amicho and Bulla of the tayo clone in Bonga, and ado, Genticha, Midasho, Gediwocho, and Kiticho clones in the Sidama region are mixed with milk and used to treat bone fractures and swellings with pus. The Amicho of the choro clone in Bonga and asikala clone in Sidama are formulated mixed with butter and milk and given to woman after delivery to stimulate placenta discharge.

Major phytoconstituents

Enset primary contains carbohydrate, in the form of Starch. Phytochemical analysis of Enset has revealed the presence of phenylphenalenone phenols. Enset also contains high fiber and minerals (iron, zinc and calcium) as well as arginine.

Pharmacological and safety evidences

Preclinical evidences

Organo-protective effects: The hydromethanolic extract of the corm of *E. ventricosum* (Welw.) Cheesman demonstrated hepatoprotective properties and ameliorated nephrotoxicity induced by

antituberculosis drugs (isoniazid and rifampicin) in mice. In addition, the aqueous root extract of *E. ventricosum* showed significant antiulcer and gastroprotective activities.

Antioxidant effect: There is also a report of antioxidant activity, with the corm showing a particularly strong ferric reducing antioxidant power. In another study, the DPPH radical-scavenging activity and total antioxidant capacity of Kocho extracts were evaluated using the DPPH assay and the phosphomolybdenum method. The results showed that fermented Kocho had higher antioxidant and DPPH scavenging activities than the unfermented product, with methanolic extracts performing better than aqueous extracts.

Others pharmacological effects: The plant contains phenylphenalenones with antitumor, antibacterial, nematocidal effects.

As a nutraceutical value: High calcium levels, particularly in corm, reported to have significant value for bone strength, growth and repair while high arginine content, linked to collagen formation, tissue repair, and wound healing. It also contains notably high concentrations of iron and zinc so highlighting the importance of its potential dietary source of iron ultimately to fight against anemia.

As a pharmaceutical excipient: Its starch has remarkable pharmaceutical application such as disintegrant, binder, gelling agent and sustained release agent.

Clinical evidences

No clinical reports found.

Safety

Acute oral toxicity testing of the 80% methanolic extract of *E. ventricosum* corm showed no detectable toxicity up to a dose of 2000 mg/kg. *E. ventricosum* is generally considered safe for human and animal consumption when processed traditionally. As a staple food for millions of people in Ethiopia, it is a non-toxic crop.

Research gaps and recommendations

Introduce standardized traditional fermentation protocols for bulla production that ensure consistent nutritional quality, safety, and consumer acceptability.

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Gymnanthemum amygdalinum
(Delile) Sch.Bip.

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***Gymnanthemum amygdalinum* (Delile)**

Sch.Bip.

Local and common names: ግራዋ Girawa (Amh);
Eebiicha (Oro); Vernonia tree (Eng)

Voucher number and identification:

GA061/AHRI/2025

Synonyms: *G. amygdalinum* has 17 known synonyms. Among these, *V. condensata*, *V. bahiensis* and *V. giorgii* the are later published names globally, whereas *V. amygdalina* is the most commonly cited name in Ethiopia.

Varieties recorded in Ethiopia: There are no recognized infraspecific taxa or registered varieties of *G. amygdalinum* in Ethiopia.

Family: Asteraceae

Botanical and habitat distribution

G. amygdalinum is a perennial shrub or small tree often much branched from near the base. The bark is rough and flaky, gray to brown in colour. The leaves are alternate, green, and characteristically bitter in taste. The flowers are arranged in clusters (inflorescences) composed of small creamy-white, thistle-like flower heads (capitula). These clusters

occur both in the leaf joints (axillary) and at the tips of branches (terminal), forming broad, flat-topped groups, and are often pleasantly aromatic. In its natural habitat, the species mainly occurs at forest edges, in woodland, and along rivers and streams (riverine vegetation). It is typically found in moist environments at elevations between about 600-2700 masl, and 750–2000 mm of annual rainfall.

Conservation status

G. amygdalinum is not currently included in the IUCN Red List. However, POWO reports that the species is not threatened, which broadly corresponds to the IUCN category of Least Concern.

Propagation method

G. amygdalinum can be propagated by stem cuttings, which is the simplest and quickest method. The cuttings are planted either vertically or at a 45° angle to encourage the development of side shoots. The plant can also grow from seeds collected from matured, dried flowers. The seeds are sprinkled on nursery beds of humus-rich soil, kept shaded from intense sunlight heat, and watered regularly until they germinate. Seedlings are then transplanted to their final location about four to six weeks later. Moreover, the plant can be propagated using micropropagation techniques.

Cultivation in botanic garden

The plant was established in the botanic garden in October 2024, using a whole plant collected from the AHRI-ALERT Health Village Compound (Accession number 0116).

Ethnomedicinal uses

G. amygdalinum has been traditionally used for the treatment of various diseases. Aqueous leaf extracts are commonly employed to treat malaria, fever, abdominal pain, nematode infection, and ascariasis. Leaf extract mixed with honey is used to alleviate menstrual pain and to treat infections caused by amoeba and giardia. Chopped leaves combined with coffee grounds and blended with butter are traditionally used to treat diarrhea. In addition to its medicinal applications, this plant has numerous other uses. In Ethiopia, it is used to make "Tej," a traditional honey wine, and as a bittering agent (hops) in "tella," a traditional beer. The leafy component of *G. amygdalinum* is rich in nutrients and contributes to human nutrition and food security.

Major phytoconstituents

G. amygdalinum contains a wide range of phytochemicals including flavonoids (luteolin, myricetin, luteolin-7-*O*- β -glucoside), sesquiterpene lactone (vernodalin, vernodalol, vernolide,

vernonioside A1, vernonioside A2, vernonioside B1, vernonioside B2, vernolepin, vernomygdin, vernodalinol, and vernoamyoside), phenolic acids (caffeoylgunic). Luteolin, isorhamnetin, vernodalol, vernodalinol, and vernoniosides are among the major bioactive compounds isolated from this plant.

Pharmacological and safety evidences

Preclinical evidences

Antimicrobial effects: The hexane, chloroform and acetone extract as well as the isolated constituents of *G. amygdalinum* showed antibacterial effect against *Escherichia coli*, *Klebsiella pneumoniae* and *Proteus mirabilis*.

Antimalarial effects: The leaves and root extracts of *G. amygdalinum* showed suppression of a parasitemia in *Plasmodium berghei* infected mice while the aqueous leaf extract reduced the *P. berghei* macrogametocyte density in mice. Furthermore, the ethanolic extract almost completely inhibited the early sporogonic stages.

Anti-inflammatory and analgesic effects: Extracts from the leaves exhibit strong anti-inflammatory and pain-relieving properties by inhibiting pro-inflammatory enzymes and the production of cytokines.

Antidiabetic effects: Extracts from the leaves and roots of *G amygdalinum* have shown a significant ability to lower blood glucose levels in animal models.

Other pharmacological effect: anticancer, hepatoprotective, nephroprotective and antioxidant.

Clinical evidences

In a clinical study using an infusion of fresh *G. amygdalinum* leaves to treat uncomplicated malaria in patients aged 12 years and above, over 67% of participants reported an adequate clinical response. However, the infusion showed limited effectiveness in clearing the malaria parasite. Only 32% of the patients who experienced clinical improvement showed complete parasite clearance

Safety

An acute toxicity study on female Sprague Dawley rats at a dose of 5000 mg/kg has shown no signs of toxicity or mortality. Also, the body and organ weights remained normal. Liver function tests showed slight increases in AST and globulin. Genotoxic evaluation showed that exposure of HepG2 cells to chloroform root extract of *G. amygdalinum* doesn't cause genotoxic effect. In the study using the infusion of fresh *G. amygdalinum* leaves, no severe adverse events were recorded throughout the study period

Research gaps and recommendations

Clinical trials are needed to validate the efficacy of the plant in humans for various diseases, including malaria. Moreover, chronic toxicity studies should be conducted to assess potential long-term adverse effects and to establish safe dosage levels for human use. Moreover, the phytochemicals have not yet been standardized. Standardizing the plant's phytoconstituents was therefore advised.

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Hagenia abyssinica (Bruce) J.F. Gmel.

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***Hagenia abyssinica* (Bruce) J.F. Gmel.**

Local and common names: ኮሶ Koso (Amh); Heexoo (Oro); ሐቢ Habbi (Tig); Koussou, Hagenia, Cusso, Brayera, African redwood (Eng)

Voucher number and identification:
GA072/AHRI/2025

Synonyms: *H. abyssinica* is known by eight synonyms, among which *H. abyssinica* var. *viridifolia*, *H. anthelmintica* and *Brayera anthelmintica* are the later published names.

Varieties recorded in Ethiopia: There are no recognized infraspecific classifications or registered varieties of *H. abyssinica* in Ethiopia.

Family: Rosaceae

Botanical and habitat distribution

It is a tree growing up to 25 m tall with brownish bark peeling in strips, sometimes very thick on old stems. Young branches are pubescent covered with 3-4 mm long stiff hairs. Leaves are up to 40 cm in length bearing 5-8 narrowly oblong leaflets on each side. The petiole is 5-13 cm long and winged with adnate stipules. The inflorescence is a conspicuous, drooping (hanging downwards) panicle up to 60 cm long and 30 cm wide. Colour of male flowers range from

orange to white, while the female flowers are reddish. The fruits are small and asymmetric. The Afromontane forests of East Africa are well-suited habitats for *H. abyssinica*. The plant prefers an altitudinal range of 1850-3700 masl with annual rainfall of 1000–1500 mm.

Conservation status

According to IUCN Red List, *H. abyssinica* is classified globally as a species of Least Concern. However, in Ethiopia, its population has declined drastically, warranting conservation attention.

Propagation method

Propagation is mainly achieved through seedlings and naturally grown wildlings. Its seedling requires shaded, moist, and cool environmental conditions, especially during its early stages. Once germinated in soil, the numerous secondary roots enable the seedlings to absorb nutrients quickly and establish themselves effectively. This competence involves the production of healthy leaves for photosynthesis and well-developed root systems. In contrast, seedlings germinated on petri dishes often deplete their food reserves early and struggle to adapt when transferred to soil. Under favorable conditions, potted seedlings grow rapidly and reach transplanting size within six

to eight months. Additionally, an *in vitro* propagation protocol has also been developed for this plant.

Cultivation in botanic garden

H. abyssinica was planted in AHRI-ALERT botanic garden in June 2024 from seedlings donated from Gullele Botanic Garden (Accession number 0054).

Ethnomedicinal uses

H. abyssinica is widely known in Ethiopia for its medicinal significance. Different parts of the plant are traditionally used to treat diverse ailments. The bark is applied to treat fever, cough, typhoid, and livestock diseases. The flowers or the whole panicles are widely used as an effective remedy against intestinal worms, especially tapeworms. The roots are employed to relieve stomachache, severe abdominal pain, and diarrhea, while the leaves serve in the treatment of malaria, hepatitis, and throat diseases. The stem and its reddish sap are used for stomach disorders and wound healing. Additionally, different parts of the plant are used to treat skin problems, sexually transmitted infections, epilepsy, and livestock diseases. In some cases, the leaves are used as part of polyherbal preparations to treat cancer and livestock ailments.

Major phytoconstituents

The major bioactive constituents in *H. abyssinica* include one-, two-, and tricyclic phloroglucinol derivatives, including kosins: kosotoxin, protokosin, kosidin, α -kosin and β -kosin.

Pharmacological and safety evidences

Preclinical evidences

Antimicrobial effect: Solvent extracts from the flowers and leaves of *H. abyssinica* exhibited notable antibacterial activity against *Escherichia coli*, *Shigella flexneri*, and *Staphylococcus aureus*. Additionally, stem bark extracts demonstrated antibacterial effects against *S. aureus*, methicillin-resistant *S. aureus* (MRSA), and *Pseudomonas aeruginosa*, and significantly reduced parasitemia in animal malaria models. Nevertheless, the plant appears to possess limited antifungal activity. Consistent with traditional claims, leaf extracts were effective in reducing tapeworm eggs in animal studies, while both flower and bark extracts displayed strong activity against *Schistosoma mansoni*. However, the plant is reported to have limited antifungal effect.

Antidiabetic effect: Crude extracts from the flowers and leaves of *H. abyssinica* have been shown to significantly reduce blood glucose levels in diabetic, normoglycemic, and oral glucose-loaded mice.

Additionally, the plant exhibits in vitro α -amylase inhibitory activity.

Anti-hyperlipidemic effect: Aqueous and ethyl acetate fractions, as well as methanolic leaf extracts of *H. abyssinica*, significantly lowered serum total cholesterol, triglycerides, and low-density lipoprotein (LDL) cholesterol levels in streptozotocin-induced diabetic mice compared to negative controls.

Wound healing effect: In wound healing pharmacological evaluation of *H. abyssinica*, ointments containing 5% (w/w) and 10% (w/w) crude flower extract of the plant showed a significant wound contraction and increment of tensile strength in excision and incision models, respectively.

Other pharmacologic effects: Anti-trypsinolytic, antioxidant, antidiarrheal, anti-inflammatory, cytotoxic

Clinical evidence

No well-controlled human trials have been conducted. However, in one study, a single oral dose of powdered *H. abyssinica* flowers mixed with honey was administered on an empty stomach to six volunteers, confirming the plant's potential taenicidal activity.

Safety

Acute oral toxicity studies demonstrated that methanolic leaf and flower extracts of *Hagenia abyssinica* have an LD₅₀ greater than 2 000 mg/kg in mice, with no observable adverse effects over a 14-day period. Similarly, acute dermal toxicity testing of a 10% (w/w) methanolic flower extract revealed no signs of toxicity, erythema, edema, or mortality during the 14-day observation. The active compound kosotoxin exhibited no observable oral toxicity up to 200 mg/kg; however, it was toxic when administered intraperitoneally at doses above 50 mg/kg, with a single 100 mg/kg (i.p.) dose proving lethal to all tested animals.

Research gaps and recommendations

Standardizing the phytoconstituents of the plant is recommended.

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Lippia abyssinica (Otto & A.Dietr.) Cufod.

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***Lippia abyssinica* (Otto & A.Dietr.) Cufod.**

Local and common names: ኮሰረት Kossieret, ከሴ Kessie (Amh); ኮሰረት Kossieret (Gur); Kusaayee, Shuukkee (Oro); ኩሳይ Kusay, ከስከሴ Keskesse (Tig); Dhigri (Som)

Voucher number and identification:
GA057/AHRI/2025

Synonyms: *L. abyssinica* has nine known synonyms, among which *L. adoensis* var. *koseret*, *L. adoensis* var. *pubescens* and *L. grandifolia* var. *longipedunculata* are the later published names.

Varieties recorded in Ethiopia: Previously, *L. adoensis* (now a synonym) was recognized as having two varieties, *L. adoensis* var. *adoensis* and *L. adoensis* var. *koseret*. However, under the revised nomenclature, there are no formally recognized infraspecific taxa or varieties for *L. abyssinica*.

Family: Verbenaceae

Botanical and habitat description

L. abyssinica is an aromatic shrub growing up to 3 m in height. The branches are four angled and covered with fine hairs. The leaves grow opposite each other or arranged in whorles (small circle), with upper surface green and smooth to slightly rough, and the

lower surface greyish and densely wooly (tomentose). The flowers are born in small spikes either at the tips of the branches (terminal) or from the leaf joints (axillary). Individual flowers are small measuring about 4-10 mm in width and 5-12 mm in length, elongating to 15-20 mm as they develop into fruit. The corolla is typically purple, pink, or purplish often with a white, yellow or purple center. This species commonly grows in Ethiopia at altitudes ranging from 1600-3000 masl.

Conservation status

L. abyssinica has not been evaluated by IUCN Red List for its conservation status. However, POWO considered the species as not threatened, which is equivalent to “Least Concern” status according to IUCN criteria.

Propagation methods

L. abyssinica can be propagated through seeds, stem cuttings, and division. Seeds collected from mature plants can be sown in a well-draining medium such as mixture of soil, sand and compost, and require regular watering and warm, bright/indirect sunlight conditions. However, seedlings grow slowly and may take several months to reach transplanting size. Stem cuttings (4-6 cm) taken from healthy tips root more quickly when the lower leaves are removed and the

cuttings are placed in a moist potting mix under warm, humid conditions, usually forming roots within 2-4 weeks. Division of mature plants is another effective method, where the plant is carefully separated into sections with their own roots and stems, and then replanted individually. This is best done during the growing season and can be repeated every 2 to 3 years.

Cultivation in botanic garden

The species was planted at AHRI-ALERT botanic garden in October 2024 from whole plants transferred from the previous mini medicinal plants botanic garden at the Ethiopian Public Health Institute (Accession number 0121).

Ethnomedicinal uses

The leaves of *L. abyssinica* are used in the Ethiopian traditional medicine to treat various skin diseases including eczema (chife in Amharic) and superficial fungal infections (chirt in Amharic). The dried leaves are powdered together with roasted and pounded barely (Beso) and consumed to relieve stomach complaints. Moreover, boiled flowers and leaves of *L. abyssinica* are taken to prevent flu, indigestion and headaches. The essential oils of this medicinal plant are reported to possess a significant radical scavenging property. Its free radical oxidative stress is

implicated in the inhibition of pathogenesis of a variety of inflammatory disease. Beyond medicinal value, the leaves of the cultivated *L. abyssinica* (locally known as Koseret) are widely used to flavour butter used in the preparation of Ethiopian dishes.

Major phytoconstituents

The GC-MS analysis of the essential oil of the leaf indicated linalool, geranial, germacrene D, nerol, geranial, neral, limonene, and carvone.

Pharmacological and safety evidences

Preclinical evidences

Antimicrobial effect: In the disc diffusion assay, high concentration of water-based extract of *L. abyssinica* showed bactericidal effect against *Staphylococcus aureus* and *Enterococcus faecalis*, while *Escherichia coli* remained resistant. However, ethanol and methanol-based extracts were able to kill *E coli*. The plant also exhibited fungicidal effect against *Candida albicans* and *Aspergillus flavus*. In addition, the hydroethanolic leaf extract of *L. adoensis* inhibited the growth of *P. falciparum* strains.

Antioxidant effect: Using the DPPH assay, the 80% methanol leaf extract of *L. adoensis* exhibited an IC₅₀ value of 10.96 µg/mL, which is comparable to the IC₅₀ value of ascorbic acid.

Antipyretic effect: The aqueous and ethanol leave extracts of *L. adoensis* were evaluated for antipyretic activity in Wistar albino mice at oral doses of 50, 100, and 200 mg/kg, showing dose-dependent fever reduction.

Other pharmacological effects: Analgesic, hepatoprotective

Clinical evidence: There are no clinical trials reported.

Safety

In acute toxicity testing, the ethanol leaf extract of *L. adoensis* caused 80% mortality at 10,000 mg/kg, indicating an LD₅₀ below this dose. In subacute studies, administration of 2000 mg/kg produced observable toxic effects, including hypoactivity, piloerection, lethargy, and a convulsive episode. Histopathological analysis further revealed hepatic and renal damage characterized by congestion, hemorrhage, severe necrosis, and inflammatory cell infiltration following high-dose extract administration in mice.

Research gaps and recommendations

Further *in vivo* studies on the extracts and isolated compounds of *Lippia adoensis* are needed, along with

clinical investigations, to support the development of potential drug candidate molecules.

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***Moringa stenopetala* (Baker f.)
Cufod.**

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Photo: Plants of the World Online

Moringa stenopetala (Baker f.) Cufod.

Local and common names: Haleko (Daw, Gam, Gof, Kon and Wol); Shelagda (Sid); Mukaa raajii, Ykn kumarraa (Oro); ጥረጉጋ Moringa, ሸፈራው Shiferaw (Amh); African Moringa, Cabbage Tree (Eng)

Voucher number and identification:
GA062/AHRI/2025

Synonyms: *M. stenopetala* is also known under the synonyms *Donaldsonia stenopetala* and *Moringa streptocarpa*.

Varieties recorded in Ethiopia: There are no formally recognized infraspecific taxa or registered varieties of *M. stenopetala*.

Family: Moringaceae

Botanical and habitat distribution

M. stenopetala is a medium-sized, deciduous tree, typically growing 6–10 m tall with soft wood and trunk that is thick at base, covered with white to pale grey or silvery bark. The leaves are large, up to 55 cm long, and are divided into smaller leaflets that are oval, thick and fleshy. The flowers are cream-white, fragrant, and appear in loose clusters. The pods are three-angled, 19–50 cm long, pendulous, sometimes slightly bumpy along their length (torulose) and may

twist slightly when young but straighten as they mature. Each pod contains light, smooth winged seeds that range in colour from cream to brown. This species occurs naturally in the semi-arid lowlands of Southern Ethiopia and Northern Kenya, at elevations ranging from about 390-2200 masl, both in the wild and under cultivation.

Conservation status

M. stenopetala is not currently included in the IUCN Red List, although POWO reports that the species is not threatened, which broadly corresponds to the IUCN category of Least Concern. In Ethiopia, it is cultivated in various regions for food and other uses, which contributes to its conservation.

Propagation method

M. stenopetala is propagated both by direct sowing of seeds without pretreatment and vegetatively using branch cuttings. The optimum temperature for germination is about 25 °C. Germination under full sunlight reaches about 54%, compared to 92% in half shade. Seeds should be sown approximately 2 cm deep in soil that is moist but not waterlogged.

Cultivation in botanic garden

The species was planted at AHRI-ALERT botanic garden in July 2024 using seedlings obtained from ALERT (Accession number 0069).

Ethnomedicinal uses

Local communities in different parts of Ethiopia use *M. stenopetala* extensively for traditional medicine. The leaves are the most commonly used part; they are often crushed or dried and powdered. The leaf powder may be taken orally, sometimes mixed with water or prepared as syrup, to treat ailments such as anemia, malaria, and high blood pressure. Fresh leaves can also be pressed to extract juice, which can be applied externally or administered in small drops to treat eye or ear infections. The roots are another medicinal part of the plant. Fresh roots are crushed or juiced and taken orally for stomach aches and dysentery, smoke from burned roots is inhaled in the management of epilepsy. In addition to their medicinal uses, the species has important practical applications. When the leaves and seeds are ground into powder and added to turbid water, they act as natural coagulant, causing suspended particles to settle and thereby improving water clarity and safety for drinking. Ethnobotanical studies document this practice, highlighting the multipurpose role of *M. stenopetala* in local communities.

Major phytoconstituents

A diverse range of bioactive compounds including glucomoringin, *O*(rhamnopyranosyloxy)benzylglucosinolate, hydroxycinnamic acids, and quercetin-3-*O*-

rutinoside have been reported from the leaf and seed of *M. stenopetala*.

Pharmacological and safety evidences

Preclinical evidences

Antimicrobial effect: The methanol, ethanol, aqueous and chloroform extracts of the dried leaves of *M. stenopetala* showed inhibitory activity against Gram-positive (*Klebsiella pneumoniae*, *Bacillus cereus*, *Streptococcus pneumoniae*, *S. pneumoniae*, *Staphylococcus aureus*, *Listeria monocytogenes*) and Gram-negative bacteria (*Escherichia coli*, *Salmonella Typhimurium* and *P. aeruginosa*). Moreover, the ethanol leaf extract exhibited inhibitory activity against *Candida albicans* and *Aspergillus niger*.

Antiparasitic effect: Ethanolic and aqueous leaf extracts show dose-dependent parasite suppression in *Plasmodium berghei*-infected mice. In addition, the ethanol extract of fresh leaves and root of *M. stenopetala* showed anti-leishmanial effect. Essential oil of *M. stenopetala* seed and its isolated compound showed trypanocidal activities.

Antidiabetic effect: The ethanol extract of dried leaves of *M. stenopetala* showed antihyperglycemic activity. Moreover, the chloroform and butanol fractions of the leaf extract exhibited hypoglycemic and antihyperglycemic effects.

Antihypertensive and hypolipidemic effect:

Aqueous and hydroalcoholic leaf extract of *M. stenopetala* exhibited vasodilatory, reductions in systolic and diastolic blood pressure effects. The aqueous and hydroalcoholic leaf extract show decreases in total cholesterol, LDL, triglycerides along with elevation of HDL in hyperlipidemic rats.

Antioxidant effect: High phenolic and flavonoid content of the leaf extract provides robust free radical-scavenging activity, extracts reduce oxidative stress markers such as, MDA (malondialdehyde), Improve (superoxide dismutase) SOD and catalase activity.

Other pharmacological effects: The leaf extract of *M. stenopetala* exhibited Antidiarrheal, cytotoxic, anti-inflammatory, hepatoprotective and nephroprotective effects. Whereas the infusion of the leaves was found to enhance immune function.

Clinical evidences

There is no high-quality clinical trial evidence to support therapeutic claims of *M. stenopetala*. The human-related research remains limited to observational, ethnopharmacological, or nutritional-survey studies.

Safety

In oral acute toxicity study, there was no behavioral change on live animals and abnormality was not observed on postmortem examination up to the dose of 5000 mg/kg. In repeated administration of leaves of herbal tea blend (250–1000 mg/kg), no mortality or any toxic effect on food consumption, body weight gain, organ weight, hematological and biochemical parameters. In the prenatal oral administration of herbal formulations from the leaves of *M. stenopetala* didn't show mortality or signs of morbidity in pregnant rats. However, the methanol seed extract of *M. stenopetala* exhibited developmental toxicity when administered to pregnant rats (250–1000 mg/kg) during gestation (days 6–12). The highest dose (1000 mg/kg), showed prenatal growth retardation, reduced litter weight and crown-rump length, delayed development of sensory organ systems, increased fetal resorptions, and greater fetal death rate compared to controls.

Research gaps and recommendations

The absence of well-designed clinical trials remains the largest barrier, preventing reliable conclusions about therapeutic safety and efficacy. In addition, the poor standardization of extracts and formulations leads to inconsistent quality, dosage, and bioactive profiles, making reproducibility difficult.

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Ocimum lamiifolium Hochst. ex
Benth.

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***Ocimum lamiifolium* Hochst. ex Benth.**

Local and common names: ዳማካሴ Damakese, አንጨባ Ancheba (Amh); Qoricha-michii, Anchabbi (Oro); ዳማቹ Damachu, ዳማከር Damakher (Tig)

Voucher number and identification:
GA056/AHRI/2025

Synonyms: *O. lamiifolium* is known by four synonyms, among which *O. hararense*, *O. nakurense* and *O. rothii* are the later published names.

Varieties recorded in Ethiopia: There are no recognized infraspecific classifications or registered varieties of *O. lamiifolium* in Ethiopia.

Family: Lamiaceace

Botanical and habitat distribution

O. lamiifolium is an aromatic perennial shrub. It grows up right and is much-branched, reaching up to 3 m tall. The leaves are opposite, egg shaped (ovate), and have toothed edges (serrate). The leaves give off a strong, pleasant aroma when crushed. The flowers are small tube shaped (tubular), and grow in loose clusters (lax inflorescences). It is a hardy plant that tolerates a wide range of environmental conditions. This species occurs in forest edges, bushlands, and grasslands at elevations of 1000-2500 masl. It prefers

sunny areas with well-drained soils and can grow in both tropical and subtropical climates.

Conservation status

O. lamiifolium is not currently included in the IUCN Red List. However, POWO reports that the species is not threatened, which broadly corresponds to the IUCN category of Least Concern.

Propagation method

O. lamiifolium is commonly propagated by stem cuttings and seeds, methods widely used for *Ocimum* species for producing vigorous and uniform plants. For vegetative propagation, healthy non flowering stem-cuttings about 5 to 10 cm long and bearing several nodes are taken from disease free plants and rooted in a well-draining soil mix. The cuttings are maintained in a warm, bright environment with indirect sunlight and high humidity often achieved by covering with plastic bag or humidity dome to reduce moisture loss and promote rooting. This method is generally preferred over seed propagation because it ensures genetic uniformity and faster establishment. The species can also be propagated from seeds, which are sown in well-drained soil and allowed to germinate under warm and moist conditions. Both propagation methods are widely used for small to

large scale cultivation of *O. lamifolium* and others *Ocimum* species.

Cultivation in botanic garden

The plant was established at AHRI-ALERT Botanic Garden from a whole wild-grown plant collected in May 2024 along the road to Adadi Mariam, which branches eastward from Addis Ababa-Butajira Road (Accession number 0075).

Ethnomedicinal uses

O. lamiifolium is one of the popular medicinal plant species in Ethiopia. The leaf juice is commonly used to treat cough and eye diseases, while leaf infusions are taken for colds, stomach distention and as antipyretic. As part of polyherbal preparation, decoctions prepared from powdered leaves combined with parts of other plant species, honey, and butter are administered orally to treat whooping cough. Leaves are also widely used in the management of diarrhea, stomach disorders, abdominal pain, headache, fever, cough, measles, and eye infections as well as for skin conditions and wound treatment. Moreover, the leaves are applied topically for the treatment of skin conditions and wounds, and fresh or burned leaves are traditionally used as mosquito repellent.

Major phytoconstituents

Linalool (28.52%) and 1-octen-3-yl-npropionate (20.82%) were identified as the essential oil's (EO's) primary ingredients, followed by 3,7,11-trimethyl-(E,E)-2,6,10-dodecatrienal (12.14%).

Pharmacological and safety evidences

Preclinical evidences

Antimicrobial effect: *O. lamiifolium* fresh leaves methanol extract shows antimicrobial activity against microbial pathogens: *S. aureus*, *E. coli*, and *P. aeruginosa*. Moreover, the aqueous, methanol and chloroform extracts of *O. lamiifolium* leaves exhibited significant antiplasmodial activities. The highest suppression was recorded from aqueous extract of *O. lamiifolium*.

Antidiabetic effect: Crude 80% methanol extract and solvent fractions of *Ocimum lamiifolium* leaves have been shown to significantly lower blood glucose levels in normoglycemic, glucose-loaded, and streptozotocin-induced diabetic mice.

Antidiarrheal effect: In enteropooling, castor oil-induced, and gastrointestinal motility models of diarrhea, both the solvent fractions and crude methanolic leaf extracts of *O. lamiifolium* significantly reduced the fluid content, weight, and volume of intestinal contents in mice.

Other pharmacological effects: Anti-inflammatory, antipyretic, antioxidant, antiproliferative, and organo-protective.

Clinical evidences

There are no clinical trials reports.

Safety

O. lamiifolium extract demonstrates sub-chronic toxicity at high doses (600 mg/kg), causing reduced food intake, weight gain, increased liver/kidney enzymes, and potential liver damage in rats. However, lower doses (up to 400 mg/kg) showed no significant toxicity, and the essential oil was predicted to be safe by some in-silico studies.

Research gaps and recommendations

Although the plant widely utilized by the community, the phytochemicals have not yet been standardized. Standardizing the plant's phytoconstituents was therefore advised.

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Plumbago zeylanica L.

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***Plumbago zeylanica* L.**

Local and common names: አሞራራ Amera (Amh); Meerxees (Oro); Merxs (Som); Wild Plumbago (Eng)

Voucher number and identification:
GA055/AHRI/2025

Synonyms: *P. zeylanica* is known by 24 synonyms, among which *P. maximowiczii*, *P. scandens* var. *erecta* and *P. scandens* var. *densiflora* are the later published names.

Varieties recorded in Ethiopia: There are no recognized infraspecific taxa or registered varieties of this species in Ethiopia.

Family: Plumbaginaceae

Botanical and habitat distribution

P. zeylanica is a scrambling shrub and grows primarily in the seasonally dry tropical biome with wiry, often diffusely branched, glabrous stems up to 1.5–2.5 meters long. The leaves are simple, alternate, often ovate to lance-elliptic in shape. Roots are straight, smooth, branched or unbranched, with or without secondary roots and about 30 cm long. Up on drying their color changed from light- yellow to reddish-brown. The roots have a strong and characteristic odor with acrid and bitter taste. Flowers are bright

white in color and are borne in axillary and terminal elongated spikes. *P. zeylanica* is widely distributed in disturbed habitats along roadsides and paths, as well as in bushland, woodland and grassland, at altitudes ranging from 700-2200 masl.

Conservation status

According to IUCN Red List, *P. zeylanica* is categorized globally as a species of Least Concern.

Propagation method

Vegetative propagation by splitting the whole plant and cuttings is a highly reliable method, providing a rapid means of establishing new plants. Propagation by seed is also possible; however, under normal conditions it often results in a low germination and establishment.

Cultivation in botanic garden

The plant was established in the botanic garden in October 2024, using a whole plant transplanted from a wildy growing population at the AHRI-ALERT Health Village (Accession number 0083).

Ethnomedicinal uses

The leaves and roots of *P. zeylanica* are used to treat conditions such as glandular and bone tuberculosis, as well as common ailments including impotence,

malaria, heart disease, and hemorrhoids. Furthermore, leaves and root are employed in the management of intestinal parasitic infection, urinary problems, gonorrhoea, and generalized body swelling. Fresh leaves are also used to relieve rheumatic pain. Although primarily valued for its medicinal applications, the species is also locally recognized as an important honeybee plant, producing abundant nectar.

Major phytoconstituents

The primary chemical component of *P. zeylanica* is plumbagin, a naphthoquinone. Other naphthoquinones, such as zeylanone, chitanone, and 3,3-bisplumbagin, are also reported.

Pharmacological and safety evidences

Preclinical evidences

Antimicrobial and Anthelmintic effect: The aqueous extract of the leaves and methanol extract of the root inhibit the growth of broad range of bacteria and fungi. The methanol root extract was also found to exhibit a significant anthelmintic effect. Furthermore, the chloroform and ethanol extracts of *P. zeylanica* roots paralyzed and killed earth-worms in lesser time than that of the piperazine citrate and albendazole.

Anti-inflammatory and Antioxidant effect: The methanol and dichloromethane root extract of *P.*

zeylanica reduced carrageenan induced rat paw edema whereas the methanol extract of the root exhibited antioxidant activity in diphenyl Picrylhydrazyl (DPPH) model.

Wound healing effect: The methanol extract and the isolated compound, plumbagin exhibited wound healing activity in mice. The ointment (10%w/w) of ethanol extract also showed increase in tensile strength.

Other pharmacological effect: Ant-ulcer, antihypertensive, hepatoprotective, anticancer and anti-diabetic.

Clinical evidences

There are no clinical trials reported.

Safety

In the acute oral toxicity studies, the LD₅₀ for hydroalcoholic and acetone extract were 928.4 mg/kg whereas the LD₅₀ of dichloromethane extract of the root was 2000 mg/kg.

Research gaps and recommendations

Further chromatographic isolation and spectroscopic characterization on the phytoconstituents is recommended. Furthermore, correlation between the compounds and their pharmacological properties should be carried out.

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Rhamnus prinoides L'Hér.

ਬੜ

***Rhamnus prinoides* L'Hér.**

Local and common names: ኔሾ Gesho (Amh, Tig); Geeshoo (Oro); ኒሾ Gishe (Gur); ኔሾ Geshu (Age); African Dogwood, Shiny-leaf, Glossy-leaf (Eng)

Voucher number and identification:
GA060/AHRI/2025

Synonyms: *R. prinoides* has eight known synonyms, of which *R. prinoides* var. *acuminata*, *R. prinoides* var. *obtusifolia* and *R. pauciflora* are the later published names.

Varieties recorded in Ethiopia: There are no formally recognized infraspecific taxa or varieties of *R. prinoides*.

Family: Rhamnaceae

Botanical and habitat description

R. prinoides is a shrub or tree that commonly grows to about 6-8 m in height. It has smooth, shiny, dark green leaves that remain on the plant throughout the year. The leaves are arranged alternately along the branches and are simple in shape, usually oval to slightly elongated, and are about 2.5-10 cm long and 1.5-5 cm wide. Young leaves are light green, while mature leaves are dark green and glossy on the upper side and duller underneath. The leaf edges are finely

toothed, and the leaf stalks are short. Flowers yellowish green, solitary or in 2-5 flowered axillary fascicles. Each flower has five small sepals, and petals are either very small or completely absent. The fruit is small, round, and berry-like, about 5-8 mm in diameter, and is shiny red when young, and becomes dark red to almost black when fully mature. In Ethiopia, *R. prinoides* is widely cultivated, especially in the highlands, at altitudes ranging from about 1400-3200 masl.

Conservation status

According to IUCN Red List, *R. prinoides* is classified as Least Concern, meaning that the species is currently stable and has a widely spread population and thus is not at significant risk of extinction.

Propagation methods

Propagation of *R. prinoides* is easily achieved through the production of seedlings from seeds. Two alternative propagation methods for *R. prinoides* include direct seeding and mass germination in flower pots.

Cultivation in botanic garden

The species was planted at AHRI-ALERT botanic garden in June 2024 from seedlings obtained from the Gullele Botanic Garden (Accession number 0087).

Ethnomedicinal uses

R. prinoides is a well-known medicinal plant in the country as it is widely used to human and animal illnesses. The leaves are burned in an oven, crushed, combined with butter, and applied topically to the skin to treat tinea capitis, itching, and skin rashes. The leaves are boiled in water and the resulting solution is used as gargle to rinse the throat. Fresh leaves are also rubbed directly onto infected skin to treat infections. The crushed leaves are combined with pure butter and applied as a dressing to the eczema-affected areas. Crushed and powdered leaves are combined with butter and applied as a cream to wounds to treat scabies. Chopped leaves are combined with a little water, filtered, and then taken orally to treat intestinal parasites and animal diarrhea. The powdered seeds are also used to treat ringworm. Beyond medicinal use, the leaves and stems of *R. prinoides* are used in Ethiopia to add flavour in the preparation of traditional alcoholic beverages such as *Tella* and *Tej*. The leaves and stems of the plant also serve as a commercial hopping agent in the brewery industry that can be used as an alternative substitute of hop.

Major phytoconstituents

Emodin, emodinanthrone, physcion, emodinbianthrone, chrysophanol, and musizin are among the identified anthraquinones. Emodin is present in the fruits, leaves, and stems, while emodinanthrone occurs in the leaves, stems, and fruits. Physcion is also distributed across

these parts, and emodinbianthrone is mainly found in the fruit. Musizin and β -sorigenin are also isolated from the leaves and roots part of the plant.

Pharmacological and safety evidences

Preclinical evidences

Antimicrobial effect: The methanol and chloroform leaf extracts of *R. prinoides* showed moderate antibacterial activity against important human pathogens such as *S. aureus*, *S. pyogenes*, *S. pneumoniae*, with additional evidence of biofilm inhibition in selected bacterial strains. The plant also exhibited antimalarial activity against both chloroquine-sensitive and chloroquine-resistant *Plasmodium falciparum* strains. Furthermore, leaf and root bark extracts showed chemo-suppressive effects against chloroquine-resistant, blood-stage *Plasmodium* infection in animal models.

Wound healing effect: *In vivo* animal studies revealed that the hydroalcoholic extracts of the leaves of *R. prinoides* exhibit significant wound-healing activity, as evidenced by accelerated wound contraction and a reduced epithelialization period.

Other pharmacological effects: Antioxidant, anti-inflammatory, insecticide, cardioprotective, anti-

atherosclerotic, cytotoxic and antimutagenic effects were reported from different parts of *R. prinoides*.

Clinical evidences

No clinical trials reported.

Safety

In vivo acute toxicity study showed that the LD₅₀ of *R. prinoides* is greater than 5000 mg/kg body weight. Moreover, repeated doses of the plant extract didn't show overt sign of toxicity.

Research gaps and recommendations

The standardization of the phytochemicals needs to be done. Further *in vivo* studies on the extracts and isolated compounds of *R. prinoides* are needed, along with clinical investigations, to support the development of potential drug candidate molecules.

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Rumex abyssinicus Jacq.

അക്സരക്

***Rumex abyssinicus* Jacq.**

Local and common names: ጠቅጠቆ Meqmeqo (Amh: Gur); Momokkoo, Dhagaa ofolaa (Oro); ጠቅጠቆ Meqmoqo (Tig); Spinach Rhubarb (Eng)

Voucher number and identification:
GA069/AHRI/2025

Synonyms: *H. abyssinica* is known by 12 synonyms, among which *Acetosa abyssinica*, *R. abyssinicus* var. *calystegiifolius* and *R. abyssinicus* var. *retrorsilobatus* are the later published names.

Varieties recorded in Ethiopia: There are no recognized infraspecific taxa or registered varieties of this species in Ethiopia.

Family: Polygonaceae

Botanical and habitat distribution

R. abyssinicus is perennial herb that can grow up to 3-4 m in height, and has a fleshy rhizome. Its stem is green or reddish-green hairless, hollow, ribbed, cylindrical, furrowed and smooth. The stem can reach up to 3 cm in diameter. Ochreae (dry sheath) are funnel-shaped, brownish, and easily torn. Leaves have petioles often as long as the blades; the blades are thin and hastate (narrow triangular in shape), with basal leaves reaching up to 25 × 20 cm and displaying palmate venation, while stem leaves are much

smaller. The inflorescence forms a large, richly branched panicle up to 40 cm long. Flowers occur in clusters on slender pedicels up to 5 mm long. The outer tepals are about 1.5 mm long, brown, membranous, persistent, and reflexed in fruit. The inner tepals are cordate (heart-shaped), 1–1.5 mm long during flowering enlarging up to 6 mm in fruit, and are green with red margins and distinct reticulate veins, turning red-brown when mature. The nut measures 3–4 mm in length, sharply trigonous, and dark brown. In Ethiopia, it is widely distributed across the country at altitudes of 1200-3300 masl.

Conservation status

R. abyssinicus is not currently included in the IUCN Red List. However, POWO reports that the species is not threatened, which broadly corresponds to the IUCN category of Least Concern.

Propagation method

R. abyssinicus is commonly propagated by its seeds. Once the seedlings are large enough to handle, they can be transplanted into individual pots. When they are well established, they can be planted out in the field. The species can also be propagated vegetatively through root cuttings, a method used when for rapid multiplication required or when seed availability and germination is limited.

Cultivation in botanic garden

The plant was established in the AHRI-ALERT botanic garden in October 2024 using a whole plant collected from the former mini medicinal plant garden at the Ethiopian Public Health Institute (Accession number 0091).

Ethnomedicinal uses

In Ethiopia, the roots are predominantly employed for treating gonorrhoea, tuberculosis, hepatitis, and gastrointestinal disorders. The leaves and aerial parts are also used to treat conditions such as scabies, malaria, hypertension, diabetes mellitus, skin infections, and eye problems. In veterinary medicine, the plant is used to treat livestock diseases such as scabies and blackleg. Beyond its medicinal value, the young shoots and tubers of the plant have food and cosmetic (used to paint the feet, nails, palms of the hands, and different materials) values, respectively. The roots are also used as a condiment in butter when processing butter by boiling, as they impart colour, flavour and taste to it.

Major phytoconstituents

Emodin, chrysophanol, physicon, helminthosporin, emodic acid, emodin-8-*O*- β -D-glucopyranoside, physicon-8-*O*- β -Dglucopyranoside, and 6-hydroxyemodin are among the major compounds

reported from the rhizome, root, and tuber parts of *R. abyssinicus*. It also contains flavanols (epicatechin, epicatechin-3-*O*-gallate, and epicatechin-3-*O*-(4''methyl) gallate), and terpenes (betulone).

Pharmacological and safety evidences

Preclinical evidences

Antimicrobial effect: Various solvent extracts of *R. abyssinicus* roots and rhizomes exhibited pronounced antibacterial activity against *Staphylococcus aureus*, *Streptococcus pneumoniae*, *Escherichia coli*, and *Pseudomonas aeruginosa*. Similarly, isolated compounds, such as emodin, produced zones of inhibition comparable to those of the standard antibiotic gentamicin. With respect to antifungal activity, methanolic leaf extracts demonstrated inhibitory effects against *Candida albicans* and *Trichophyton mentagrophytes*. Antiviral investigations revealed that methanolic root extracts exerted inhibitory activity against Coxsackie virus B3 and Influenza A virus. Additionally, methanol rhizome extracts showed *in vitro* inhibitory effects against *Trypanosoma brucei* cells.

Anti-diabetic effect: The hydromethanolic crude root extract of *R. abyssinicus* demonstrated significant glucose-lowering effects in both normoglycemic and streptozotocin-induced diabetic mice, in a dose- and

time-dependent manner. In addition, isolated compounds were shown to inhibit α -glucosidase and α -amylase, key enzymes involved in carbohydrate digestion, while the combination of isolated compounds epicatechin and rutin exhibited pronounced antihyperglycemic activity.

Anti-inflammatory effect: Methanol extracts of *R. abyssinicus* roots and rhizomes demonstrated significant anti-inflammatory activity in both in vitro cyclooxygenase (COX) inhibition and in vivo carrageenan-induced rat paw edema models. Numerous compounds isolated from this plant have also shown promising anti-inflammatory effects. For instance, epicatechin reduces diet-induced human C-reactive protein and inhibits NF- κ B *in vivo*.

Wound healing effect: In animal models, wound treated with 5% and 10% (w/w) hydroalcoholic extract ointment of the plant exhibited significant wound healing activity in incision and excision models, as evidenced by increased wound contraction, shorter epithelization time, higher tissue breaking strength and increased hydroxyproline content.

Other pharmacological effects: Cytotoxic effect, anti-Alzheimer's activity, hepatoprotective and neuroprotective properties, and antioxidant potential.

Clinical evidences

There are no reported clinical trials

Safety

The acute oral toxicity evaluation of methanolic rhizome extracts of *R. abyssinicus* in female Swiss mice revealed no mortality at a dose of 2000 mg/kg, suggesting that the LD₅₀ exceeds this level. In contrast, sub-acute administration at doses of 1000 and 1500 mg/kg body weight induced notable gross and histopathological alterations in the liver, kidney, lung, and small intestinal tissues.

Research gaps and recommendations

The standardization of the phytochemicals has not been done so far. Pharmacological studies remain largely preclinical, with no clinical trials to validate efficacy or safety in humans. Additionally, toxicological data are mainly limited to acute and sub-acute studies, with minimal information on chronic, reproductive, or genotoxic effects. Additionally, there are no registered pharmaceutical products derived from the plant. Therefore, future research should prioritize standardization of extracts, advanced toxicological and pharmacokinetic evaluations, and well-designed clinical trials to establish therapeutic efficacy and safety.

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***Ruta chalepensis* L.**

ጤና አዳጭ

***Ruta chalepensis* L.**

Local and common names: ጥጥር አዳም T'iena-addam (Amh); Cilaatama, Ciiraakoota (Oro), ጨናአዳም Ch'enaaddam (Tig); Rue, Herb of grace, Fringed rue (Eng)

Voucher number and identification:
GA063/AHRI/2025

Synonyms: *R. chalepensis* is known by four synonyms, among which *R. chalepensis* subsp. latifolia, *R. chalepensis* var. *latifolia* and *R. latifolia* are the later published names.

Varieties recorded in Ethiopia: There are no recognized infraspecific taxa or registered varieties of this species in Ethiopia.

Family: Rutaceae

Botanical and habitat distribution

R. chalepensis is a blue-green strongly aromatic perennial subshrub that can grow up to 1 m tall. The lower part of the stem is somewhat woody, while the upper stem remains herbaceous. The leaves are arranged alternately along the stem and are divided into many narrow, delicate segments, giving the plant a fine feathery appearance. The plant produces small yellow flowers at the tip of the branches, each with 4-

5 petals that have slightly fringed or finely toothed edges. The fruit is small, lobbed capsule that opens at the top when mature and contains several small black seeds. *R. chalepensis* is widely grown in the Ethiopian highlands, particularly in areas above 1500 meters above sea level, where it is commonly cultivated for its aroma and traditional uses.

Conservation status

R. chalepensis is not currently included in the IUCN Red List, although POWO reports that the species is not threatened, which broadly corresponds to the IUCN category of Least Concern. The species is commonly cultivated in homegardens for various uses in Ethiopia, a practice that contributes to its continued conservation (Accession number 0094).

Propagation methods

R. chalepensis can be propagated from seeds, stem cuttings or by splitting older plants. Seeds should be sown in well-drained soil and kept moist until germination. Stem cuttings taken from healthy plants root readily, and older plants can carefully divided to produce new individuals. This species is adaptable and grows in a wide range of soils, provided the soil is not waterlogged, which can damage the roots and inhibit growth.

Ethnomedicinal uses

R. chalepensis has been widely used in traditional medicine in Ethiopia. The root is utilized to treat leishmaniasis by grounding into powder, and then mixed with black teff dough to create a paste for topical application on affected areas until recovery. The cooled decoction obtained from boiling the dry and fresh leaves is taken orally to treat malaria. Diarrhea is treated by chewing a fresh leaf mixed with salt, while common cold symptoms are relieved by inhaling the vapour of crushed fresh leaves through the nose. In veterinary practices, coccidiosis in hens is treated by crushing the bark and leaves of *R. chalepensis* with the root of *Justicia schimperiana* and mixing the paste with injera before feeding it to the birds. Additionally, for cough, *Cussonia ostinii* is used to pound *R. chalepensis* leaves, and the resulting mixture is also consumed with injera. *R. chalepensis* is commonly cultivated in most households in Ethiopia for its use in culinary and medicinal uses. Its local name (T'iena-addam) reflects its medicinal significance.

Major phytoconstituents

The essential oil of *R. chalepensis* contains 2-undecanone, 2-nonanone, 2-dodecanone, 1-nonene, α -phellandrene, and 2-methyl-octyl acetate as major constituents. In addition, the aerial part of the plant is

rich in xanthotoxin, psoralen, rutin, hesperidin myricetin, rutin, and isorhamnetin. In addition, alkaloids such as dictamnine, pteleine, skimmianine, rutacridone, isogravacridonechlorine, maculosidine, graveoline, and graveolinine are also reported from the plant.

Pharmacology and safety evidences

Pharmacological evidences

Antimicrobial effect: In disc diffusion and broth dilution assays, ethanol extracts of the aerial parts of *R. chalepensis* demonstrated strong antibacterial activity against *Proteus penneri* and *Staphylococcus aureus*, as well as antifungal activity against common fungi, including *Candida albicans*. In addition, the ethanolic extract of dried leaves exhibited dose-dependent *in vivo* antimalarial activity against *Plasmodium berghei* in animal models.

Antidiabetic effect: Leaf infusion extracts of *R. chalepensis* demonstrated concentration-dependent inhibition of α -amylase and α -glucosidase enzymes and also exhibited insulinomimetic activity.

Antidiarrheal effect: The 80% methanol leaf extract of *R. chalepensis* showed significant, dose-dependent antidiarrheal activity in a castor oil-induced diarrhea model in mice. Doses of 200 and 400 mg/kg effectively delayed diarrhea onset and reduced both

defecation frequency and fecal output, comparable to the standard drug loperamide.

Others pharmacological effects: Anthelmintic, antioxidant, anticoagulation, anticonvulsant, cytotoxic, anti-hypertensive, anti-inflammatory.

Clinical evidence

There are no clinical trials reports so far.

Safety

Oral administration of the crude ethanolic extract of *R. chalepensis* to mice elicited signs of toxicity, including lacrimation, reduced appetite, and depressive behavior, at a dose of 3000 mg/kg, although no mortality was observed at this dose.

Research gaps and recommendations

In addition to standardizing the plant, additional isolation and characterisation of the phytoconstituents from different plant portions should be carried out. Correlation study between the phytoconstituents and their pharmacological properties should be carried out.

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***Rydingia integrifolia* (Benth.)
Scheen & V.A.Albert**

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***Rydingia integrifolia* (Benth.) Scheen & V.A.**

Albert

Local and common names: ተንጃት Tunjit (Amh); Xuunjitii (Oro); Tunjite, Chendog, Shankud (Tig); Abyssinian Rose (Eng)

Voucher number and identification:

GA059/AHRI/2025

Synonyms: *R. integrifolia* is known by two synonyms, namely *Otostegia integrifolia* and *Moluccella integrifolia*.

Varieties recorded in Ethiopia: There are no infraspecific taxa and officially registered varieties of *H. abyssinica* in Ethiopia.

Family: Lamiaceace

Botanical and habitat distribution

R. integrifolia is an indigenous plant of Ethiopia. It is a shrub which grows up to 3 m tall. The shrub is characterized by its angled stems, which often bear paired spines at the nodes, and its nearly sessile or shortly petiolate leaves that are aromatic. The flowers are two-lipped, featuring an upper petal lip that is typically white or cream-colored, and a lower petal lip with a distinct yellow or yellow-orange color. The plant grows in the wild but is also cultivated in

gardens. It grows in montane bush lands and woodlands, particularly on grazed slopes, at elevations of 1300-2800 masl.

Conservation status

R. integrifolia is not currently included in the IUCN Red List. However, POWO reports that the species is not threatened, which broadly corresponds to the IUCN category of Least Concern. In Ethiopia, the plant is reported to be overexploited for various purposes with no documented conservation measures. Therefore, it requires attention to ensure its sustainable use and protection.

Propagation method

Limited and unauthenticated literature indicates that *R. integrifolia* is primarily propagated by seed. Vegetative propagation through cuttings has also been reported. However, further verified research is required to guide effective multiplication of the species.

Cultivation in botanic garden

The plant was planted in AHRI-ALERT botanic garden in June 2024 from seedlings donated from Gullele Botanic Garden (Accession number 0079).

Ethnomedicinal uses

The leaves, roots, stems, and essential oil are utilized for human and livestock ailments, as well as for cultural practices in Ethiopia. The leaf part is used for the treatment of malaria, tonsillitis, uvulitis, hypertension, stomachache and common cold. The dried leaves and wood are burned on a traditional charcoal stove, especially in the early evening, to create smoke that kills or repels insects. The aerial parts are used for fumigating houses against disease and for fumigating vessels used in beer brewing.

Major phytoconstituents

GC-MS analysis of *R. integrifolia* indicated the presence of (+)-1-methyl-4-(5, 9-dimethyl-1-methylene-deca-4, 8-dienyl)-cyclohexene as the major component. Further chromatographic and spectroscopic analysis revealed the presence of terpenoids (+)-axinyssene, otostegindiol, preotostegindiol and pentatriacontane from the air-dried leaves of *R. integrifolia*.

Pharmacological and safety evidences

Preclinical evidences

Antimicrobial effect: The leaf extract of *R. integrifolia* has shown antibacterial activity against Gram positive and Gram-negative bacteria while the

essential oil has shown activity against different fungal species.

Antimalarial effect: 80% methanol extract and isolated compound, otostegindiol, have produced significant antimalarial activity in 4-days chemo suppressive test in mice.

Antioxidant effect: The leaf extract of *R. integrifolia* has shown free radical scavenging activity against DPPH and Ferric reducing antioxidant power (FRAP) assay.

Other pharmacological effects: The leaves extract has shown analgesic, anti-inflammatory, antidiabetic, hypoglycemic and anticancer effect.

Clinical studies

There are no clinical trials reported to date.

Safety

In acute oral toxicity study, the administration of 80% of methanol extract to mice at a dose of 5000 mg/kg did not show any signs of toxicity. However, in a sub-acute toxicity study, a slight increment in weight and reduction in packed cell volume (PCV) was observed.

Research gaps and recommendations

The formulation and clinical studies on this species are largely absent. Therefore, research on this area is highly recommended.

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***Senna alexandrina* Mill**

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Photo: zellerag.ch, Dictionary of
Medicinal Plants

***Senna alexandrina* Mill**

Local and common names: Sanu (Afa); Jelalovel (Som); Muka-arbaa (Oro); ሰነጦኪ, Sene-mekki (Tig); Alexandrian senna (*S. alexandrina* var. *alexandrina*) and Tinnevelly senna and Indian senna (*S. alexandrina* var. *obtusata*) (Eng)

Voucher number and identification:

GA075/AHRI/2025

Synonyms: The species is recognized by two infraspecific taxa (varieties), each associated with different synonyms. *S. alexandrina* var. *alexandrina* is the most widely referenced variety and has 23 recorded synonyms, including the commonly used names *Cassia acutifolia*, *C. angustifolia*, *S. angustifolia*, and *C. senna* var. *eriocarpa* (Maire) Maire., *Senna alexandrina* var. *obtusata* (Brenan) Lock is known by the synonym *C. senna* var. *obtusata* Brenan.

Varieties recorded in Ethiopia: Two infraspecific taxa (varieties) of *S. alexandrina* are recorded in Ethiopia and Eritrea, as well as globally: *S. alexandrina* var. *alexandrina* and *S. alexandrina* var. *obtusata*.

Family: Fabaceae

Botanical and habitat distribution

S. alexandrina is a small to medium sized, often straggly shrub that can reach a height of 0.2-3 m in arid habitats. Its leaves are compound, featuring a wide range of 4-13 pairs of small leaflets that are narrow and can be described botanically as lanceolate or elliptic. The plant produces showy, erect clusters of bright yellow to orange-yellow flowers. Following flowering, the plant develops flattened, papery, slightly curved, oblong pods that measure about 3-7 cm long and 1.5-2.5 cm wide. Two infraspecific varieties exist: *S. alexandrina* var. *alexandrina* has leaflets that are usually pointed, and its pods have only a light covering of fine hairs. In contrast, *S. alexandrina* var. *obtusata* is distinguished by its broader, slightly leathery leaflets with tips that are consistently blunt or rounded, and it possesses more densely hairy pods and flower stalks. *S. alexandrina* is a lowland species that grows from sea level up to about 1300 masl.

Conservation status

According to IUCN Red List, *S. alexandrina* is categorized globally as a species of Least Concern.

Propagation method

S. alexandrina naturally grows in dry lowland regions of Ethiopia, such as Afar (where *S. alexandrina* var.

alexandrina commonly occurs) and Somali (where *S. alexandrina* var. *obtusata* is found). The plant is currently collected from the wild for its traditional uses in Ethiopia, and there is no documented information on its cultivation in the country. Therefore, the information presented below is based on verified literature sources.

S. alexandrina is propagated exclusively from seeds, which have hard seed coat and therefore require pre-treatment to improve germination. Pre-soaking in warm water for 12-24 hours or mechanical scarification, such as incision of testa, can enhance germination, although treatment with sulphuric acid is reported to be more effective for larger quantities of seed. For small scale propagation, the seed can be sown in containers, whereas in field production, treated seed is generally broadcast at a rate of 15-25 kg/ha and placed shallowly at a depth of about 1-2 cm depth in well-drained soil. Early weed control is required before canopy closure, and although *S. alexandrina* is often managed as an annual crop, stands may be retained for up to 2-3 years to allow repeated harvests when branching is encouraged.

Cultivation in botanic garden

S. alexandrina is not currently cultivated in the AHRI-ALERT botanic garden because the agroecological

conditions of Addis Ababa are not suitable for its growth. It is included in this compendium due to its strong potential for development and commercialization as a herbal purgative in Ethiopia.

Ethnomedicinal uses

S. alexandrina is an important medicinal plant in Ethiopian traditional medicine, widely recognized for its laxative and purgative properties. The leaves and pods (fruits) are the main parts used for this purpose. These plant materials are prepared as “senna,” traditionally administered for short term relief of constipation and for bowel cleansing. The use of pod infusions as purgative specifically for pregnant women is also documented.

Beyond its primary role in treating gastrointestinal disorders, *S. alexandrina* is used in traditional medicine to manage several other ailments. Pod decoctions are taken to expel intestinal worms and to ease breathing difficulties. Pod infusions are also used to reduce fever, while leaf infusions are used to relieve flatulence, suppress convulsions, and stop nosebleeds. In addition, the leaves are used to treat certain livestock health problems in Ethiopia.

Major phytoconstituents

S. alexandrina is rich in anthraquinone glycosides, particularly sennosides A, B, C, D, E, and F from the leaf and pods parts of the plant.

Pharmacological and safety evidences

Preclinical evidences

Laxative activity: *S. alexandrina*, primarily through its active constituent sennosides, is a well-established stimulant laxative widely used for short-term relief of occasional constipation. It facilitates bowel movements through a combination of mechanisms: accelerating transit through the large intestine, inhibiting the net absorption of water and electrolytes, and stimulating fluid secretion. These actions collectively result in softer, bulkier stools and passage easier. Beyond its use for constipation, senna is also recognized for its efficacy in bowel cleansing prior to diagnostic procedures, such as colonoscopy.

Other pharmacological effects: Antibacterial, antioxidant, organoprotective and anticancer.

Clinical evidences

S. alexandrina and its sennosides are effective stimulant laxatives for short term and chronic constipation, outperforming alternatives like lactulose in geriatric patients. The drug is also used at

high doses for effective bowel cleaning prior to diagnostic procedures.

Safety

Preclinical studies indicate that *S. alexandrina* and its active compounds, the sennosides, can cause gastrointestinal alterations such as epithelial hyperplasia in the cecum and colon. However, chronic toxicity studies in rats reported no carcinogenicity at doses up to 300 mg/kg, highlighting inconsistency across findings. Systemic effects at high exposure levels caused reduced body weight and tissue damage such as kidney lesions and necrosis of cardiac and nerve cells, while metabolites like emodin have shown genotoxic effects by increasing precancerous changes in the colon.

Product registration

S. alexandrina, particularly its leaf and fruit, is recognized worldwide as a stimulant laxative, due to its active compounds, sennosides A and B, and is validated for short term relief of occasional constipation. In the United States and European Union, senna preparations have formal regulatory status: the FDA lists them in the Over-the-Counter (OTC) Monograph M007, while the European Medicines Agency (EMA) classifies them in herbal monographs for both “well established” and

“traditional” medicinal use. Finished products are generally standardized to contain a minimum level of hydroxyanthracene glycosides (sennosides), with a typical adult nightly dose of 10-30 mg (as sennoside B). Despite its native abundance and traditional use, no senna based product is currently registered or officially marketed in Ethiopia.

Research gaps and recommendations

S. alexandrina is a well-established laxative, but several research gaps remain in Ethiopia. Comprehensive ethnomedical documentation of its medicinal uses is lacking, and other gaps include the absence of documented cultivation and propagation methods, limited data on sennoside content and standardization in local varieties, and insufficient long-term safety and toxicity studies. Moreover, there is no information on coppicing practices or regrowth responses after severe cutting, limiting knowledge for sustainable leaf production. No senna based products are also currently registered, highlighting the need for data to support regulatory approval. Drawing on global experience in the United States and European Union, *S. alexandrina* or its sennosides can be recommended for short term relief of occasional constipation, with use limited to brief periods, standardized for sennoside content, and guided by proper dosing. Sustainable cultivation should be

promoted to reduce wild collection and produce quality raw materials that meet WHO GACP, as required by EFDA, ensuring safe and effective use of this medicinal plant. Investigation of the coppicing potential of *S. alexandrina* is recommended to determine whether managed shoot regeneration could enhance leaf yield and reduce re-establishment costs.

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Stephania abyssinica (Quart.-Dill.
& A.Rich.) Walp.

የአይጥ ሐረግ፣ ዕፀ እየሱስ

***Stephania abyssinica* (Quart.-Dill. & A.Rich.) Walp.**

Local and common names: የአይጥ ሐረግ Ye'ayt Hareg፣ ዕፀ እየሱስ Etse Eyesus, እንጎቺት Engochit (Amh); Hidda Kalaalaa, Hidda hantuutaa, Kaalaala, Alaalaa (Oro); ሐረግ ባይታ Hareg bayta, ሞጎጎ ኢፍ Megogo if (Tig); Tale-telling plant (Eng)

Voucher number and identification:
GA053/AHRI/2025

Synonyms: *S. abyssinica* is known by two synonyms, namely *Clypea abyssinica* and *S. hernandiifolia* var. *abyssinica*.

Varieties recorded in Ethiopia: *S. abyssinica* has two infraspecific taxa in Ethiopia, namely *S. abyssinica* var. *abyssinica* and *S. abyssinica* var. *tomentella*.

Family: Menispermaceae

Botanical and habitat distribution

S. abyssinica is a perennial, creeping, or climbing plant with long, slender stems that are usually green and sometimes tinged with purple. It can grow along the ground or climb over shrubs, trees, fences or any available support. Its leaves are large, broad, and almost round, with the petiole attached to the center like the handle of an umbrella. The plant produces small, greenish flowers in umbrella-like clusters at

the points where the leaves meet the stems; male and female flowers are found separately on the same plant but look very similar. The fruits are small, round slightly oval berries that turn reddish or purple when ripe, each containing a single seed. The seeds are horseshoe-shaped, hard, and rough or slightly wrinkled (rugose), enclosed within the fruit. It typically grows in open grasslands, forest edges, hillsides, overgrazed fields, and hedge rows, around cultivated fields and in clearings, and near rivers or wet areas at elevations of 1050-3400 masl.

Conservation status

S. abyssinica is not currently included in the IUCN Red List. However, POWO reports that the species is not threatened, which broadly corresponds to the IUCN category of Least Concern.

Propagation method

S. abyssinica can be propagated from seeds sown in well-drained sandy soil. The outer fleshy layer of the fruit is removed, and the seeds are pressed into and lightly covered with soil. No pre-treatment is required. Additionally, whole plants can be collected and transplanted.

Cultivation in botanic garden

The plant was established in AHRI-ALERT botanic garden in October 2024 using a whole plant collected

from the AHRI-ALERT Health Village Compound (Accession number 0103).

Ethnomedicinal uses

Root powder of *S. abyssinica* is widely used in Ethiopian traditional medicine; the powder is either taken alone or as part of poly-herbal prescriptions mixed with other ingredients, and is administered orally and topically. As a single-herb prescription, root powder is used against wound, gonorrhoea, diarrhoea, and syphilis. It is also employed for conditions including stomach-ache, hand tremor, retained placenta, and impotence. As part of poly-herbal formulations, its root powder is used to treat diseases such as rabies, tapeworm infection, syphilis, and diarrhoea, and is also applied topically as an ointment for eczema. It is also employed for haemorrhoids, frequent miscarriage (ሸተላደ), menorrhagia, and as a traditional remedy to enhance intelligence. Freshly squeezed root juice is used as a remedy for breast cancer, while pulverized root is valued as an aphrodisiac. The leaf is also used medicinally: it is taken orally for insomnia and stomachache, and applied topically as an ointment against eczema and wound. A decoction of fresh leaf is used to treat gastritis and snakebite. Furthermore, the whole plant is used to treat various stomach disorders, syphilis and common cold.

Major phytoconstituents

Alkaloids such as (-)-curine, pseudocurine, isochondrodendrine, (-) pseudoisocurine and (-) 10-oxoaknadinine) and anthraquinone derivatives like chrysophanol, eomdin and physcion were reported from the leaves and roots of the plant.

Pharmacological and safety evidences

Preclinical Evidences

Antimicrobial effect: Dichromethane and methanol root extracts and isolated compounds demonstrated antibacterial activity against *Staphylococcus aureus*, *Escherichia coli*, and *Pseudomonas aeruginosa*.

Antimalarial effect: The hydroalcoholic extracts and chloroform fraction of *S. abyssinica* showed antimalarial activity against *P. berghei* infected mice. Isolated compounds from leaf of *S. abyssinica* such as (-) pseudocurine, (-) pseudoisocurine and (-) 10-oxoaknadinine show antimalarial activity.

Gastroprotective effects: The aqueous and hydroalcoholic leaf extracts of *S. abyssinica* showed gastroprotective activities against experimentally induced gastric ulcer models.

Anti-diarrhea and anti-Spasmodic effects: The root and leaf extracts of *S. abyssinica* also showed antispasmodic activities both *in vivo* and *in vitro*

models. Whereas the extracts significantly prolonged the time of diarrheal induction, increased diarrhea free time, reduced the frequency of diarrhea episodes, decreased the weight of stool, and decreased general diarrheal score in a dose dependent way.

Vasorelaxant effects: The aqueous and methanol extracts of *S. abyssinica* exhibited vasorelaxation effect on KCl-contracted aortic rings.

Other pharmacological effects: The root and leaf extracts of *S. abyssinica* were reported to have antioxidant, anti-inflammatory, analgesic and wound healing activities.

Clinical studies

No clinical trials report so far.

Safety

The aqueous and hydroalcoholic leaf and root extracts of *S. abyssinica* were found safe when given orally up to the dose of 2000 mg/kg. No deaths or signs of gross behavioural toxicity were observed over a 14-day observation period. Moreover, an acute dermal toxicity test of 2000 mg/kg of the 10% w/w crude extract was also found to be safe.

Research gaps and recommendations

Available data are limited and largely confined to Ethiopia, with no systematic review of existing

evidence and no clinical trials. Rigorous pharmacological and phytochemical studies should be prioritized for health conditions supported by ethnobotanical information. Additionally, species specific Good Agricultural and Collection Practices (GACP) should be developed and implemented, to provide standardized, high-quality plant materials for sustainable herbal medicine development and registration.

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Taverniera abyssinica A. Rich.

ጥንተኛ

***Taverniera abyssinica* A. Rich.**

Local and common names: ድንገተኛ Dingetegna (Amh).

Voucher number and identification:
GA071/AHRI/2025

Synonym: *T. abyssinica* is also known by the synonym *Onobrychis simplicifolia*.

Varieties recorded in Ethiopia: Two infraspecific taxa (varieties) of *T. abyssinica* are recorded in Ethiopia and Eritrea: *T. abyssinica* var. *abyssinica* and *T. abyssinica* var. *tomentella*.

Family: Fabaceae

Botanical and habitat distribution

T. abyssinica is a perennial shrub that can reach up to 2 m height and has woody, deep-growing roots. The young stems are covered with hairs. The leaves are usually simple and very rarely pinnately compound (leaflets arranged in central stalk) with 3 leaflets. The upper surface of the leaflet is hairless while the underside is covered with pressed hairs. The flowers are dark pink to purplish-red. The pods are finely hairy and bear spines up to about 1.5 mm long. The species grows in bushland and limestone areas at elevations ranging from 1700-2150 masl. According to the Flora of Ethiopia (Volume 3), it is considered

endemic to Ethiopia but POWO database also lists the species as native to Eritrea, Saudi Arabia, Sudan, and South Sudan, which requires further investigation and confirmation.

Conservation

According to IUCN Red List, *T. abyssinica* is classified globally as a species of Least Concern. However, several sources report that it is considered critically endangered at both local and national levels in Ethiopia, mainly due to over-exploitation of its root and due to habitat loss. The species population in Ethiopia has declined sharply, highlighting the need for urgent conservation measures.

Cultivation in botanic garden

The plant was cultivated in the AHRI-ALERT botanic garden in August 2024 from seedlings obtained in the vicinity of Lemon Town, Oromia region (Accession number 0108).

Ethnomedicinal uses

The roots of *T. abyssinica* are widely used in Ethiopian traditional medicine. They are either chewed or prepared as decoctions to manage cough, sore throat, bronchitis, and other respiratory ailments. Moreover, the roots are used to treat fever, general discomfort, and gastrointestinal problems, including gastritis and abdominal pain, and are valued as a tonic to promote

overall health. The root of *T. abyssinica* is among the plant parts most commonly available in local markets for medicinal purposes across the country.

Major phytoconstituents

From the root extracts of *T. abyssinica* formononetin, afrormosin, tectorigenin, medicarpin, and a novel pterocarpan, 3,4-dihydroxy-9-methoxypterocarpan were isolated.

Pharmacological and safety evidences

Preclinical evidences

Antimicrobial effect: *T. abyssinica* exhibits a wide range of pharmacological activities that support its traditional medicinal use in Ethiopia. Studies showed that its aqueous, methanol, and ethanol root extracts possess notable antimicrobial effects against *Staphylococcus aureus*, *Enterococcus fecalis* and *Escherichia coli* and clinical isolate of *Candida albicans* and *Aspergillus flavus*.

Muscle relaxant effect: An aqueous extract of the roots of *T. abyssinica* antagonized the contractile responses of the guinea-pig ileum to acetylcholine and histamine and the extract relaxed the smooth muscle of the rabbit duodenum, and antagonized the effects of acetylcholine and histamine on this tissue.

Gastroprotective and antispasmodic effects:

Additionally, *T. abyssinica* exhibits gastroprotective and antispasmodic activity, and helping to reduce gastrointestinal discomfort. Moreover, the plant demonstrates anthelmintic activity confirming its role in managing intestinal worm infections.

Anti-inflammatory and analgesic effects:

The plant also demonstrates significant anti-inflammatory activity, moderate analgesic and antipyretic effects which align with its traditional use in alleviating pain and swelling.

Bronchodilator effect:

In traditional practice, the plant is used for respiratory ailments, and scientific findings support antitussive and bronchodilatory effects, probably due to saponins and aromatic constituents that soothe airway mucosa.

Other pharmacological effects:

Preliminary evidence also suggests antidiabetic potential, with extracts showing glucose-lowering effects through improved insulin sensitivity and inhibition of carbohydrate-digesting enzymes.

Clinical evidences

There are no clinical trials reported.

Safety

The toxicological data are minimal. Acute toxicity study revealed that root extract of *T. abyssinica* has a median lethal dose (LD₅₀) of 1409 mg/ml.

Research gaps and recommendations

Although *T. abyssinica* has shown promising pharmacological properties, significant research gaps remain. Comprehensive phytochemical profiling is still incomplete, and systematic toxicological studies are required to establish safety profiles. Mechanistic studies on isolated compounds, particularly smooth muscle relaxants, are needed to clarify their pharmacodynamics. Further optimization of in vitro propagation and agronomic practices is necessary to ensure sustainable use and conservation of this threatened species.

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Trachyspermum ammi (L.)
Sprague

ነጭ አዝሎድ

Photo : Gondar Agricultural Research Center

***Trachyspermum ammi* (L.) Sprague**

Local and common names: ነጭ አዝሙድ Nech-azmud (Amh); Azmuudii-adii, kamunnii (Oro); አዝሙድ Azmud (Tig); Gumur-hurtui (Som); White cumin, Ajwain/Ajowan, Caraway (Eng)

Voucher and identification:

GA058/AHRI/2025

Synonyms: *T. ammi* is also known by 32 synonyms, among which *Carum ammi*, *C. aromaticum* and *C. korolkowii* are the later published names.

Varieties recorded in Ethiopia

There are no recognized infraspecific taxa but numerous landraces of *T. ammi* are reported in Ethiopia. However, only two nationally released (registered) varieties are known: *T. ammi* var. *Takusa-1* and *T. ammi* var. *Dembia-1*. These varieties are characterized by high yield and stable genotypes and are recommended for large-scale cultivation in Ethiopia.

Family: Apiaceae

Botanical and habitat description

T. ammi is an erect annual herb with 10-60 cm height. The plant is much branched near the base. The leaves are also branched, the basal leaves withering early at time of flowering. Flowers are self-fertile, and clustered and born in umbels (numerous flowers

born from the same point of emergence) bearing grayish-brown aromatic seeds. Calyx has short but distinct triangular and pale teeth. Petals are white or tinged with pink. Fruits are ovate (egg-shaped in outline with the broadest part near the base and the narrow part near the apex or tip) and densely covered with white papillae (hairlike structures). The species is widely cultivated at altitudes of 1500-2200 masl, although it prefers below 2000 m.

Conservation status

T. ammi is not currently included in the IUCN Red List. However, POWO reports that the species is not threatened, which broadly corresponds to the IUCN category of Least Concern. In Ethiopia, the plant is mainly cultivated for its culinary use.

Propagation method

T. ammi is propagated from seeds, which require well-drained, loose, and weed-free soil to ensure germination. The land is ploughed two or three times before planting. Seeds are sown by hand drilling at a depth of about 1 cm, either in rows or broadcasting. Row planting with spacing of 40 cm between rows and 10 cm between plants gives optimal seed yield, using a seeding rate of 4-4.5 kg/ha, while broadcasting requires 12kg/ha. The crop can be grown as a monocrop, mixed crop, or in double

cropping systems often with safflower, barley, or teff in Ethiopia. Sowing time varies by region, typically from mid- to late July in Arsi, Showa, and Wollo, and from late July to mid-August in Dembia and Takussa of Gondar. Climatic conditions during sowing are reported to influence seed productivity. It grows best at altitudes below 2000 meters above sea level.

Botanic garden information

The plant was cultivated in AHRI-ALERT botanic garden in July 2024 using seeds of *T. ammi* var. *Dembia-1*, which were procured from the Gondar Agricultural Research Center (Accession number 0112).

Ethnomedicinal uses

The fruit and roots of *T. ammi* are used in various polyherbal preparations for the treatment of stomach complaints. The fruit is further employed as a vermifuge and as an abortifacient. Roasted and pulverized seeds are commonly taken to relieve stomach ache or discomfort. Fresh or dried leaves are boiled, and the resulting decoction is taken orally for asthma relief. In veterinary practice, the root is crushed in water and administered orally to animals to treat blackleg disease. In Ethiopia, although noted for its medicinal uses, *T. ammi* is cultivated and sold

for its fruits, which are widely available in markets and mainly used in culinary purposes.

Major phytoconstituents

The major bioactive constituent of *T. ammi* seeds is the essential oil (EO), which contains more than 20 compounds. Thymol, p-cymene, and γ -terpinene together constitute over 90% of the oil. Their relative proportions, as well as the total EO yield (2.2%-10% in Ethiopia), vary depending on genotype, environmental conditions, agronomic practices, growth stage, post-harvest handling, storage, and extraction methods.

Pharmacological and safety evidences

Preclinical evidences

Antimicrobial effect: The essential oil of *T. ammi* and crude *T. ammi* seed extracts demonstrated broad-spectrum antibacterial activity against both Gram-positive (such as *Staphylococcus aureus* and *Enterococcus faecalis*) and Gram-negative (*E. coli*, and *Salmonella spp.*) pathogens. Both the oil and its crude extract demonstrated antifungal (*Candida albicans*, *Trichophyton spp.*) activity.

Antiprotozoal effect: The essential oil of *T. ammi* demonstrated strong larvicidal efficacy against the *Aedes aegypti* mosquito larvae, achieving 100% mortality in laboratory tests.

Anthelmintic effect: Aqueous extract of seeds of *T. ammi* exhibited *in vitro* anthelmintic activity against Indian adult earthworms, *Pheretima posthuma*. Crude powder and aqueous crude extract of seeds of *T. ammi* also demonstrated modest anthelmintic activity against strongyle-type nematodes in infected donkey.

Other pharmacological effects: antioxidant, cytotoxic, antinociceptive, hypolipidaemic, antihypertensive, antispasmodic, broncho-dilating, antilithiasis, diuretic and antifilarial Activity.

Clinical evidences

In a double-blind, controlled clinical trial involving 92 patients with neuropathic conditions, the plant's 10% topical cream demonstrated a statistically significant reduction in burning sensations of the feet, as well as improvements in numbness, tingling, and allodynia when compared with the placebo group.

Safety

Acute and sub-acute toxicity assessments reported no observable signs of toxicity in either study phase, as evidenced by normal relative organ weights and the absence of pathological alterations on histological evaluation. However, some components of *T. ammi* essential oil may pose specific risks.

Product registration

Thymol, one of the major components of the essential oil, is widely used in the formulation of toothpastes, mouth washes, and elixirs due to its antiseptic and antimicrobial properties.

Research gaps and recommendations

The phytoconstituents identification was limited to GC-MS analysis. Further chromatographic and spectroscopic analysis on the phytoconstituents is recommended.

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Verbascum sinaiticum Benth

የአሕያ ጅሮ፣ ቀጠጢና

***Verbascum sinaiticum* Benth**

Local and common names: የአሕያ ጃሮ Ye'ahya Joro, የፈረስ ዘንግ Ye'feres Zeng, ቀጠጢና Ketetina (Amh); Gurra Harree, Abookeena (Oro); Sinai Mullein, Mullein (Eng)

Voucher number and identification:
GA065/AHRI/2025

Synonyms: *V. sinaiticum* is known by five synonyms, among which *V. nubicum*, *V. somaliense* and *V. barradense* are the later published names.

Varieties recorded in Ethiopia: There are no recognized infraspecific taxa or registered varieties of this species in Ethiopia.

Family: Scrophulariaceae

Botanical and habitat distribution

V. sinaiticum is a biennial herbaceous plant. It is an herb growing 60–150 cm (occasionally up to 2 m) tall. It often forms a rosette of leaves in its first year, followed by an erect, flowering stem in the second year. The flowering stem is generally tall and covered with dense, yellowish-white hairs (tomentose or lanate). The leaves, especially the basal ones, are large, often described as felted or woolly due to the dense covering of hairs. The flowers are arranged at the top of the stem. They are bright yellow colored, have five lobed corolla (colored part of the flower),

and often are radially symmetrical (actinomorphic). The stamens are typically five, with hairy filaments. The species commonly grows in cultivated fields and grasslands at elevations of 1300-3300 masl.

Conservation status

V. sinaiticum is not currently included in the IUCN Red List. However, POWO reports that the species is not threatened, which broadly corresponds to the IUCN category of Least Concern.

Propagation method

V. sinaiticum can be propagated naturally by seeds. *In vitro* propagation methods using tissue culture have also been reported.

Cultivation in botanic garden

The plant was planted in the AHRI-ALERT botanic garden in October 2024, using a whole plant collected from the former mini medicinal plant garden at the Ethiopian Public Health Institute (Accession number 0114).

Ethnomedicinal uses

In Ethiopian folkloric medicine, the primary and most consistently documented traditional use of the plant is for the management of wounds. The root is the predominantly utilized plant part; it is crushed or powdered and mixed with butter to prepare a cream

or ointment, which is applied topically to wounds caused by fire burns and other external injuries. Infusions are taken orally to treat diarrhea, abdominal colic, and anthrax; leaf smoke or teas are used to alleviate blood pressure and asthma; and leaf filtrates are administered into ears or nostrils to treat trypanosomiasis in livestock. Other ailments treated with preparation of the plant include syphilis, tumors, liver disorders, diabetes, scabies, fever, hemorrhage and viral infections. Beyond its medicinal value, fibers of the plant are used to make cordage and it also serves as an important source of fodder during dry season.

Major phytoconstituents

Major bioactive phytochemicals were isolated from the aerial parts of *V. sinaiticum*. Compounds such as iridoids glycoside (ajugol, harpagoside and aucubin), and flavonoid constituent such as luteolin and chrysoeriol-7-O-glucoside have been isolated. Furthermore, six phenylethanoid glycosides including Verbascoside, Eukovoside, Martynoside, Jionoside D, Campneoside I and Campneoside II were reported.

Pharmacological and safety evidences

Preclinical evidences

Antimicrobial effect: Acetone, aqueous, and ethanol root extracts of *V. sinaiticum* exhibited broad-

spectrum *in vitro* antibacterial activity against both Gram-positive (*Bacillus subtilis*) and Gram-negative bacteria (*Klebsiella aerogenes*, *Escherichia coli*, and *Vibrio cholerae*). Additionally, *in vivo* studies demonstrated trypanocidal activity in *Trypanosoma*-infected Swiss albino mice.

Antidiarrheal effect: In castor oil-induced diarrhea, enteropooling, and intestinal motility test models, the crude extract of the root of *V. sinaiticum* and its aqueous and ethyl acetate fractions, at 400 mg/kg, delayed the onset of diarrhea and produced significant reductions in the volumes of intestinal content. The plant also suppressed the intestinal transit of charcoal meal and peristaltic index compared to the negative control.

Wound healing effect: Ointments (5% and 10% w/w) of the 80% methanolic leaf extract of *V. sinaiticum* significantly accelerated excision wound contraction by 92%, shortened epithelialization time, and enhanced tensile strength in the incision wound model in rats.

Antidiabetic effect: The 80% methanolic leaf extract of *V. sinaiticum* significantly reduced blood glucose at 400 mg/kg. The aqueous residue and ethyl acetate fractions showed even stronger antihyperglycemic effects without causing hypoglycemic shock in

normoglycemic mice. Furthermore, both the crude extract and its fractions of *V. sinaiticum* exhibited significant glucose-lowering activity in streptozotocin-induced diabetic mice.

Other pharmacological effects: Anti-inflammatory, analgesic, antioxidant, hepatoprotective and cytotoxic effect

Clinical evidences

There are no reported clinical trials so far.

Safety

Solvent extracts from various parts of *V. sinaiticum* exhibited no observable toxicity in Swiss albino mice, with an LD₅₀ exceeding 2000 mg/kg. Furthermore, topical application of the highest ointment concentration (10% w/w) produced no signs of inflammation or edema in rodent models.

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***Withania somnifera* (L.) Dunal**

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***Withania somnifera* (L.) Dunal**

Local and common names: ግዙብ Gizawa, ጊዙብ Gizewa (Amh); Kuumoo, Gizaawwaa (Oro); ኣጎል Agoll (Tig); Indian ginseng, Winter cherry, Poisonous gooseberry, Ashwagandha (Eng)

Voucher number and identification:
GA054/AHRI/2025

Synonyms: *W. somnifera* is known by 27 synonyms, among which *W. chevalieri*, *W. somnifera* subsp. *obtusifolia* and *W. kansuensis* are the later published names.

Varieties recorded in Ethiopia: There are no interspecific taxa and officially registered varieties of *W. somnifera* in Ethiopia.

Family: Solanaceace

Botanical and habitat distribution

W. somnifera is an erect, much branched perennial shrub or subshrub, typically reaching up to 2 m in height. The stem is branched. The roots are fleshy and cylindrical; when dried, they are whitish to pale brown, with a brownish outer surface and a creamy to yellow interior. The aerial parts are often covered with fine, grayish, woolly hairs. Leaves are simple, elliptic-ovate, dull green, and borne alternatively on the stem. The flowers are small, greenish-yellow, bell-shaped and produced in axillary clusters. The fruit is

a smooth, spherical, orange-red berry that contains numerous seeds. The species occurs mainly in dry to seasonally moist open habitats at elevations ranging near sea level to up to about 2000-2300 masl.

Conservation status

W. somnifera is not currently included in the IUCN Red List, although POWO reports that the species is not threatened, which broadly corresponds to the IUCN category of Least Concern.

Propagation method

It is a drought-tolerant plant and grows in dry soil, once established. For cultivation, plant seeds 2 cm deep and 10 cm apart when the temperature is around twenty degrees. Seeds will germinate in two weeks.

Cultivation in botanic garden

The plant was cultivated in the botanic garden in October 2024, from a whole plant dug up at the AHRI-ALERT Health Village (Accession number 0118).

Ethnomedicinal uses

The root is chewed orally to treat cancer while the leaf powder is used to treat diarrhea whereas the decoction from the fresh leaves is also used to treat febrile illness. The aerial part is used in the management of extended flow of menstruation and

gallstone, epilepsy, psychosis, and malaria. The root is used as diuretic, narcotic, astringent, thermogenic and aphrodisiac. The seed is used in hysteria, memory loss, anxiety and claimed to increase sperm count.

Major phytoconstituents

Steroidal lactones such as withaferin A, withanolide A, 27-deoxywithaferin A, viscosalactone B, jaborosalactone D and 27-hydroxywithanolide B are among the major constituents reported from *W. somnifera* extracts.

Pharmacological and safety evidences

Preclinical evidences

Antianxiety and antidepressant effects: *W. somnifera* root extract showed anxiolytic activity in rats. The extract also demonstrated an antidepressant effect comparable to imipramine.

Antioxidant effect: In an *in vivo* study, *W. somnifera* increased the levels of several natural antioxidants, including glutathione peroxidase, superoxide dismutase, and catalase, on rat brains.

Other pharmacological effects: Cardioprotective, antimalarial, and antidiarrheal effects, antidiabetic and cytotoxic.

Clinical evidences

The hypoglycemic, diuretic, and hypocholesterolemic properties of *W. somnifera* root were evaluated in human participants. Six individuals with mild type-2 diabetes and six with mild hypercholesterolemia received root powder for 30 days. The reduction in blood glucose was comparable to that achieved with an oral hypoglycemic agent. Treatment also resulted in increased urinary sodium and volume, alongside significant reductions in serum cholesterol, triglycerides, LDL, and VLDL levels. No adverse effects were reported, suggesting the root's therapeutic potential across these indications. However, the available clinical data are not considerably enough to provide novel and sufficiently robust evidence for the use of *W. somnifera* in managing DM.

Other trial including prospective open-label non-randomized comparative clinical trial which was conducted on patients with breast cancer, *W. somnifera* have shown a notable anticancer activity. Moreover, in a randomized control trial involving male with infertility problems, *W. somnifera* extract was shown to repair seminal plasma metabolites and recovers quality of semen.

Safety

The oral administration of different extracts of the whole plant and parts of *W. somnifera* root extract up

to 2000 mg/kg in rats did not show toxicity signs. *W. somnifera* is generally considered safe for most healthy adults when used in moderate doses for short periods (up to 3 months).

Products registration

This plant has registered and commercially available herbal products named as ashwagandha tincture.

Research gaps and recommendation

As medicinal products based on this plant have been marketed via import for public use, Strict regulation on these products should be in place.

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Zingiber officinale Roscoe

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***Zingiber officinale* Roscoe**

Local and common names: ዝንጅብል Zinjibil, ጅንጅብል Jinjibel (Amh, Tig); Jinjiibila (Oro); Sinjibil, Sinsibila (Som); Ginger (Eng)

Voucher number and identification:
GA067/AHRI/2025

Synonym: *Z. officinale* has eighteen known synonyms, among which *Zingiber sianginensis*, *Z. officinale* var. *rubrum* and *Z. sichuanense* are the later published names.

Varieties recorded in Ethiopia

There are no interspecific taxa recorded in the Flora of Ethiopia and Eritrea. However, a wide range of *Z. officinale* varieties are cultivated globally, of which Ethiopia maintains substantial genetic diversity. Much of this diversity originates from germplasms introduced from abroad, while some others consist of locally collected farmers varieties and landraces. However, only two varieties, Boziab and Yali, which were developed by Tepi Agricultural Sub-Center (now Tepi National Spice Research Center) of Jimma Agricultural Research Center, have been officially registered and released for multiplication.

Family: Zingiberaceae

Botanical and habitat distribution

Z. officinale is a perennial herb that produces fleshy, branched rhizomes with a distinct spicy aroma. Its pseudostems, formed by leaf sheaths, rise to about one meter in height. The leaves are lanceolate, narrow, and arranged alternately, typically reaching 15-30 cm in length. Inflorescences are borne separately on shoots emerging from the rhizome, producing cone-like spikes with overlapping green bracts, often tinged with purple. The small flowers are yellowish-green with purple lips and creamy markings. It is predominantly cultivated in the lowland areas of Ethiopia, at altitudes ranging from 500-1500 masl, mainly under bimodal rainfall conditions.

Conservation status

The IUCN Red List reports that data are deficient to determine the conservation status of *Z. officinale*. However, POWO reports that the species is not threatened, which broadly corresponds to the IUCN category of Least Concern.

Propagation method

Z. officinale is propagated vegetatively through rhizome division since it rarely produces viable seeds. Healthy rhizome pieces containing viable buds are selected and planted in moist, fertile, and well-

drained soil. The crop thrives in warm, humid climates and benefits from partial shade. Regular watering is essential during the growing season, and harvesting generally takes place eight to ten months after planting, once the aerial shoots wither.

Cultivation in botanic garden

The plant was established in AHRI-ALERT botanic garden in April 2024 using seedlings donated by the Tepi National Spice Research Center (Accession number 0120).

Ethnomedicinal uses

In the Ethiopian traditional medicine, *Z. officinale* is used as decoctions or powdered rhizome for the treatment of colds, sore throat, headache, and respiratory infections. It is also employed as a digestive aid and stimulate appetite. In addition, its warming properties make it a common household remedy for flu-like symptoms and as part of spiced tea preparations. Globally, *Z. officinale* has long been valued for the management of nausea, vomiting, motion sickness, and indigestion. It poultices and oil are also applied externally to reduce joint and muscle pains and is widely integrated into culinary practices for both its flavour and health-promoting purposes.

Major phytoconstituents

The rhizome contains a diversity of bioactive constituents, notably gingerols (6-gingerol, 8-gingerol, 10-gingerol), shogaols, paradols, and zingerone and sesquiterpenes such as zingiberene, β -bisabolene, and monoterpenes including camphene and borneol.

Pharmacological and safety evidences

Preclinical evidences

Antimicrobial effect: Alcoholic extracts and essential oil of ginger rhizome showed antimicrobial effect against Gram-positive and Gram-negative bacteria including *Pseudomonas aeruginosa*, *Staphylococcus aureus*, *Bacillus subtilis*, *Bacillus licheniformis*, *Klebsiella pneumoniae* and *Escherichia coli*. It also found to suppress the growth of fungal species such as *Fusarium oxysporum*, *Penicillium oxalicum*, and *Trichoderma viride*.

Antiemetic effect: Ginger extracts were found antiemetic. The bioactive compounds in ginger, such as gingerols, suppress vomiting by improving stomach motility. By increasing gastric tone and accelerating the rate of stomach emptying, these constituents provide a peripheral defense against nausea.

Analgesic and Anti-inflammatory effects: The essential oil of ginger prolonged the latency time toward thermal stimulus in mice. It also blocks the synthesis of inflammatory mediators such as prostaglandins and inhibits nitric oxide production. The anti-inflammatory effect is largely attributed to gingerols and shogaols, which modulate cyclooxygenase and lipoxygenase pathways.

Antihyperlipidemic effect: The hydroalcoholic ginger extract improved the lipid profile by lowering triglycerides, total cholesterol, and LDL, while simultaneously boosting HDL levels, in hyperlipidemic animals.

Antioxidant effect: *Z. officinale* exhibits antioxidant properties through the direct sequestration of superoxide and hydroxyl radicals. Furthermore, freeze-dried aqueous extract exhibited DPPH scavenging activity.

Other pharmacological effects: Ginger extract is reported to exhibit as a bronchodilator and providing cardioprotective, neuroprotective, and anti-proliferative effects. Ginger was also found to play an important role in the inhibition of type 1 hypersensitivity reaction.

Clinical evidences

Several trials have shown ginger's efficacy in reducing nausea and vomiting related to pregnancy, chemotherapy, and motion sickness. Meta-analyses further indicate its benefits in alleviating pain and improving function in osteoarthritis patients. Ginger has also been shown to aid digestion, reduce bloating, and improve gastric emptying in functional dyspepsia.

Safety

Ginger is generally considered safe when taken at the recommended dose. Ginger oil's oral LD50 values in several animals surpass 5000 mg/Kg. Most adverse effects are mild and dose-dependent, including gastrointestinal discomfort such as heartburn or diarrhoea. At high doses, mouth irritation has been reported. Because of its mild antiplatelet activity, ginger should be used with caution in patients on anticoagulant therapy such as warfarin.

Product registration

In India, ginger has been used as common ingredients in many registered traditional herbal medicinal products, dietary supplements and cosmetics.

Research gaps and recommendations

Despite global recognition of ginger's medicinal potential, there is a scarcity of clinical research

specific to Ethiopia that evaluates its effectiveness in locally relevant disease contexts such as respiratory infections and febrile illnesses. Furthermore, traditional preparations vary widely in dosage and method of administration, and thereby awaiting standardization. Future research should focus on validating traditional Ethiopian uses through controlled clinical studies, developing dosage guidelines, and exploring opportunities for value addition, such as the production of standardized ginger extracts, teas, or phytopharmaceuticals that can contribute to both public health and economic development.

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Appendix 1: List of Medicinal Plants Cultivated in AHRI-ALERT Botanic Garden

S.No.	Medicinal plant Species	Popular name	Family	Habit	Origion	Conservation status	Management status
1	<i>Acanthus polystachyus</i> Delile	Koshishila	Acanthaceae	Shrub	Native but not endemic	Not evaluated(Not threatened)	Wild
2	<i>Achyranthes aspera</i> L.	Telenj	Amaranthaceae	Shrub	Native but not endemic	Not evaluated (Not threatened)	Wild
3	<i>Aframomum corrorima</i> (A. Braun) P.C.M.Jansen	Korerima	Zingiberaceae	Herb	Native but not endemic	Least concern	Wild/Cultivated
4	<i>Afrocarpus falcatus</i> (Thunb.) C.N.Page	Zigba	Podocarpaceae	Tree	Native but not endemic	Least concern	Wild/Cultivated
5	<i>Agave sisalana</i> Perrine	Sisal (Eng)	Asparagaceae	Herb	Exotic	Not evaluated (Not threatened)	Cultivated
6	<i>Ajuga integrifolia</i> Buch.-Ham. ex D.Don	Armagusa	Lamiaceae	Herb	Native but not endemic	Not evaluated (Not threatened)	Wild
7	<i>Albizia gummifera</i> (J.F.Gmel.) C.A.Sm.	Sesa	Fabaceae	Tree	Native but not endemic	Least concern	Wild/Cultivated
8	<i>Allium cepa</i> L.	Qey-shinkurt	Amaryllidaceae	Herb	Exotic	Not evaluated (Not threatened)	Cultivated
9	<i>Aloe benishangulana</i> Sebsebe & Tesfaye	Eret	Asphodelaceae	Herb	Endemic	Critically endangered	Wild
10	<i>Aloe debrana</i> Christian	Eret	Asphodelaceae	Herb	Endemic	Least concern	Wild
11	<i>Aloe pirottae</i> A. Berger	Eret	Asphodelaceae	Herb	Native but not endemic	Least concern	Wild
12	<i>Aloe tewoldei</i> M.G.Gilbert & Sebsebe?	Eret	Asphodelaceae	Shrub	Endemic	Near threatened	Wild
13	<i>Aloe trichosantha</i> A.Berger	Wond Eret (Am)	Asphodelaceae	Herb	Native but not endemic	Least concern	Wild
14	<i>Aloe vera</i> (L.) Burm.f.	Aloe vera (Eng)	Asphodelaceae	Herb	Exotic	Not evaluated (Not threatened)	Cultivated
15	<i>Aloysia citrodora</i> Paláu	Lemon verbena (Eng)	Verbenaceae	Shrub	Exotic	Not evaluated (Not threatened)	Cultivated
16	<i>Amaranthus hypochondriacus</i> L.	Amaranthus	Amaranthaceae	Herb	Exotic	Not evaluated (Not threatened)	Wild & invasive
17	<i>Argemone mexicana</i> L.	Mexican poppy	Papaveraceae	Herb	Exotic	Not evaluated (Not threatened)	Wild & invasive
18	<i>Artemisia absinthium</i> L.	Ariti	Asteraceae	Herb	Exotic	Not evaluated (Not threatened)	Cultivated
19	<i>Artemisia abyssinica</i> L.	Chikugn	Asteraceae	Herb	Native but not endemic	Not evaluated (Not threatened)	Wild/Cultivated
20	<i>Artemisia afra</i> Jacq. ex Willd.	Chikugn	Asteraceae	Herb	Native but not endemic	Not evaluated (Not threatened)	Wild
21	<i>Artemisia annua</i> L.	Artemisia	Asteraceae	Herb	Exotic	Not evaluated (Not threatened)	Cultivated
22	<i>Arundo donax</i> L.	Shenbeko (Am)	Poaceae	Herb	Exotic	Least concern	Cultivated
23	<i>Asparagus sp</i>		Asparagaceae	Herb	Native but not endemic	Not assessed	Wild
24	<i>Bersama abyssinica</i> Fresen.	Azamir	Francoaceae	Shrub	Native but not endemic	Least concern	Wild
25	<i>Beta vulgaris</i> L.	Beetroot	Amaranthaceae	Herb	Exotic	Not evaluated (Not threatened)	Cultivated
26	<i>Brucea antidyssenterica</i> J. F. Mill.	Abalo	Simarobiaceae	Tree	Native but not endemic	Least concern	Wild/Cultivated
27	<i>Caesalpinia sp.</i>	Qentefa	Fabceae	Tree	Native but not endemic	Not assessed	Wild
28	<i>Calpurnia aurea</i> (Aiton) Benth.	Digita	Fabaceae	Tree	Native but not endemic	Least concern	Wild
29	<i>Canna indica</i> L.	Set Akuri	Cannaceae	Herb	Exotic	Not evaluated (Not threatened)	Cultivated/Wild
30	<i>Capsella bursa-pastoris</i> (L.) Medik.	Ye'beg lat	Brassicaceae	Herb	Exotic	Not evaluated (Not threatened)	Wild

S.No.	Medicinal plant Species	Popular name	Family	Habit	Origin	Conservation status	Management status
31	<i>Capsicum annuum</i> L.	Berberie	Solanaceae	Herb	Exotic	Least concern	Cultivated
32	<i>Carissa spinarum</i> L.	Agam	Apocynaceae	Shrub	Native but not endemic	Least concern	Wild
33	<i>Catharanthus roseus</i> (L.) G.Don	Madagascar periwinkle (Eng)	Apocynaceae	Shrub	Exotic	Not evaluated (Not threatened)	Cultivated
34	<i>Chenopodium album</i> L.	Amednado	Amaranthaceae	Herb	Exotic	Not evaluated (Not threatened)	Wild
35	<i>Cinnamomum verum</i> J.Presl	Qerefa	Lauraceae	Tree	Exotic	Vulnerable	Cultivated
36	<i>Clausena anisata</i> (Willd.) Hook.f. ex Benth.	Limich	Rutaceae	Shrub	Native but not endemic	Least concern	Wild
37	<i>Clematis longicauda</i> Steud. ex A.Rich.	Ye'ezo hareg	Ranunculaceae	Climber	Native but not endemic	Not evaluated (Not threatened)	Wild
38	<i>Clutia abyssinica</i> Jaub. & Spach	Feyelefej	Peraceae	Shrub	Native but not endemic	Least concern	Wild
39	<i>Clutia</i> sp.	Feyelefej	Euphorbiaceae	Shrub	Native but not endemic	Not assessed	Wild
40	<i>Coffea arabica</i> L.	Bunna	Rubiaceae	Shrub	Native but not endemic	Endangered	Cultivated/Wild
41	<i>Coleus barbatus</i> (Andrews) Benth. ex G.Don		Lamiaceae	Shrub	Native but not endemic	Not evaluated (Not threatened)	Cultivated/Wild
42	<i>Coleus maculosus</i> (Lam.) A.J.Paton		Lamiaceae	Herb	Native but not endemic	Not evaluated (Not threatened)	Wild
43	<i>Colocasia esculenta</i> (L.) Schott.	Godere	Araceae	Herb	Exotic	Least concern	Cultivated
44	<i>Commelina benghalensis</i> L.		Commelinaceae	Herb	Native but not endemic	Least concern	Wild
45	<i>Commelina</i> sp.		Commelinaceae	Herb	Native but not endemic	Not assessed	Wild
46	<i>Cordia africana</i> Lam.	Wanza	Boraginaceae	Tree	Native but not endemic	Least concern	Wild/Cultivated
47	<i>Coriandrum sativum</i> L.	Dimbilal	Apiaceae	Herb	Exotic	Not evaluated (Not threatened)	Cultivated
48	<i>Corymbia citriodora</i> (Hook.) K.D.Hill & L.A.S.Johnson	Shito bahir zaf	Myrtaceae	Tree	Exotic	Least concern	Cultivated
49	<i>Crinum abyssinicum</i> Hochst. ex A.Rich.	Ye'jib Shinkurt	Amaryllidaceae	Herb	Native but not endemic	Not evaluated (Not threatened)	Wild
50	<i>Croton macrostachyus</i> Hochst. ex Delile	Bisana	Euphorbiaceae	Tree	Native but not endemic	Least concern	Wild/Cultivated
51	<i>Cucumis ficifolius</i> A. Rich.	Ye'Midir Embuay	Cucurbitaceae	Climber/ Creeper	Native but not endemic	Not evaluated (Not threatened)	Wild
52	<i>Cucumis</i> sp.		Cucurbitaceae	Climber/ Creeper	Native but not endemic	Not assessed	Wild
53	<i>Curcuma longa</i> L.	Erid	Zingiberaceae	Herb	Exotic	Data Deficient (Not threatened)	Cultivated
54	<i>Cymbopogon citratus</i> (DC.) Stapf	Lemon grass	Poaceae	Herb	Exotic	Not evaluated (Not threatened)	Cultivated
55	<i>Cymbopogon martini</i> (Roxb.) Will. Watson	Palmarosa	Poaceae	Herb	Exotic	Not evaluated (Not threatened)	Cultivated
56	<i>Cymbopogon nardus</i> (L.) Rendle	Citronella grass	Poaceae	Herb	Exotic	Not evaluated (Not threatened)	Cultivated
57	<i>Cynoglossum</i> sp.	Chegogit	Boraginaceae	Herb	Native but not endemic	Not assessed	Wild
58	<i>Cyperus rotundus</i> L.	Engicha	Cyperaceae	Herb	Native but not endemic	Least concern	Wild
59	<i>Datura ferox</i> L.	Datura (Eng)	Solanaceae	Herb	Exotic	Not evaluated (Not threatened)	Wild
60	<i>Datura stramonium</i> L.	Astenagir	Solanaceae	Herb	Native but not endemic	Not evaluated (Not threatened)	Wild
61	<i>Daucus carota</i> L.	Carrot	Apiaceae	Herb	Exotic	Least concern	Cultivated

S.No.	Medicinal plant Species	Popular name	Family	Habit	Origion	Conservation status	Management status
62	<i>Dioscorea bulbifera</i> L.	Boye (Kef)	Dioscoreaceae	Herb	Native but not endemic	Not evaluated (Not threatened)	Wild/Cultivated
63	<i>Dodonaea viscosa</i> subsp. <i>angustifolia</i> (L.f.) J.G.West	Kitkita	Sapindaceae	Shrub	Native but not endemic	Least concern	Wild
64	<i>Doyyalis abyssinica</i> (A.Rich.) Warb.	Koshim	Salicaceae	Shrub	Native but not endemic	Least concern	Wild/Cultivated
65	<i>Dracaena forskaliana</i> (Schult. & Schult.f.) Byng & Christenh.	Qancha (Oro)	Dracaenaceae	Shrub	Native but not endemic	Not evaluated (Not threatened)	Wild/Cultivated
66	<i>Dracaena hamingtonii Baker</i>	Aalgee (Bir)	Dracaenaceae	Shrub	Native but not endemic	Not evaluated (Not threatened)	Wild/Cultivated
67	<i>Dracaena steudneri</i> Engl.	Etsepatos	Asparagaceae	Tree	Native but not endemic	Not evaluated (Not threatened)	Wild/Cultivated
68	<i>Dysphania ambrosioides</i> (L.) Mosyakin & Clemants	Amedmado	Amaranthaceae	Herb	Exotic	Not evaluated (Not threatened)	Wild & invasive
69	<i>Echinops kebericho</i> Mesfin	Kebericho	Asteraceae	Shrub	Endemic	Near threatened	Wild/Cultivated
70	<i>Ehretia cymosa</i> Thonn.	Ulaga	Boraginaceae	Shrub	Native but not endemic	Least concern	Wild
71	<i>Embelia schimperi</i> Vatke	Engqogo	Primulaceae	Climber	Native but not endemic	Least concern	Wild
72	<i>Ensete ventricosum</i> (Welw.) Cheesman	Enset	Musaceae	Tree	Native but not endemic	Least concern	Cultivated/Wild
73	<i>Eriobotrya japonica</i> (Thunb.) Lindl.	Woshmela	Rosaceae	Tree	Exotic	Not evaluated (Not threatened)	Cultivated/Escaped
74	<i>Erythrina brucei</i> Schweinf.	Korch	Fabaceae	Tree	Endemic	Least concern	Wild/Cultivated
75	<i>Eucalyptus camaldulensis</i> Dehnh.	Qey-bahirzaf	Myrtaceae	Tree	Exotic	Near threatened	Cultivated
76	<i>Eucalyptus globulus</i> Labill.	Nech bahir-zaf	Myrtaceae	Tree	Exotic	Least concern	Cultivated
77	<i>Eucllea divinorum</i> Hiem	Dedeho	Ebenaceae	Shrub	Native but not endemic	Least concern	Wild
78	<i>Euphorbia abyssinica</i> J.F.Gmel.	Kulkual	Euphorbiaceae	Tree	Native but not endemic	Not evaluated (Not threatened)	Wild/Cultivated
79	<i>Euphorbia depauperata</i> Hochst. ex A.Rich.	Guri (Oro)	Euphorbiaceae	Shrub	Exotic	Least concern	Cultivated
80	<i>Euphorbia muriei</i> N.E.Br.	Kulkual	Euphorbiaceae	Tree	Exotic	Least concern	Cultivated
81	<i>Euphorbia tirucalli</i> L.	Kinchib	Euphorbiaceae	Tree	Exotic	Least concern	Cultivated/wild
82	<i>Ficus sur</i> Forsk.	Shola	Moraceae	Tree	Native but not endemic	Least concern	Wild/Cultivated
83	<i>Foeniculum vulgare</i> Mill.	Ensilal	Apiaceae	Herb	Native but not endemic	Not evaluated (Not threatened)	Cultivated/Wild
84	<i>Gomphocarpus sp</i>		Apocynaceae	Shrub	Native but not endemic	Not assessed	Wild
85	<i>Gymnanthemum amygdalinum</i> (Delile) Sch.Bip.	Girawa	Asteraceae	Shrub	Native but not endemic	Not evaluated (Not threatened)	Wild/Cultivated
86	<i>Gymnosporia arbutifolia</i> (Hochst. Ex A. Rich.) Loes	Atat	Celastereae	Shrub	Native but not endemic	Least concern	Wild
87	<i>Hagenia abyssinica</i> (Bruce) J.F.Gmel.	Koso	Rosaceae	Tree	Native but not endemic	Least concern	Wild/Cultivated
88	<i>Haplocarpha rueppellii</i> (Sch.Bip.) Beauverd	Taseta (Yem)	Asteraceae	Herb	Native but not endemic	Not evaluated (Not threatened)	Wild
89	<i>Hibiscus sabbdariffa</i> L.	Karkade	Malvaceae	Herb	Exotic	Not evaluated (Not threatened)	Cultivated
90	<i>Hypericum revolutum</i> Vahl	Amija	Hypericaceae	Shrub	Native but not endemic	Least concern	Wild
91	<i>Hypoestes sp.</i>		Acanthaceae	Herb	Native but not endemic	Not assessed	Wild
92	<i>Jasminum abyssinicum</i> Hochst. ex DC.	Tembebel	Oleaceae	Climber	Native but not endemic	Not evaluated (Not threatened)	Wild

S.No.	Medicinal plant Species	Popular name	Family	Habit	Origin	Conservation status	Management status
93	<i>Justicia schimperiana</i> (Hochst. ex Nees) T.Anderson	Sensei	Acanthaceae	Shrub	Native but not endemic	Not evaluated (Not threatened)	Wild
94	<i>Kalanchoe densiflora</i> Rolfe	Endahula	Crassulaceae	Shrub	Native but not endemic	Least concern	Wild
95	<i>Kalanchoe sp</i>	Endahula	Crassulaceae	Herb	Native but not endemic	Not assessed	Wild
96	<i>Kniphofia foliosa</i> Hochst.	Abelbila	Asphodelaceae	Herb	Endemic	Not evaluated (Not threatened)	Wild
97	<i>Lagenaria siceraria</i> (Molina) Standl.	Kil	Cucurbitaceae	Climber	Native but not endemic	Not evaluated (Not threatened)	Cultivated/Wild
98	<i>Lavandula angustifolia</i> Mill.	Lavander	Lamiaceae	Shrub	Exotic	Least concern	Cultivated
99	<i>Leonotis ocymifolia</i> (Burm.f.) Iwarsson	Ye'feres zeng/Ras Kimir	Lamiaceae	Shrub	Native but not endemic	Not evaluated (Not threatened)	Wild
100	<i>Linum usitatissimum</i> L.	Telba	Linaceae	Herb	Exotic	Not evaluated (Not threatened)	Cultivated
101	<i>Lippia abyssinica</i> (Otto & A.Dietr.) Cufod.	Koseret/Kesse	Verbenaceae	Shrub	Native but not endemic	Not evaluated (Not threatened)	Wild/Cultivated
102	<i>Lupinus albus</i> L.	Gibto	Fabaceae	Herb	Exotic	Least concern	Cultivated
103	<i>Maesa lanceolata</i> Forssk.	Qelewa	Primulaceae	Shrub	Native but not endemic	Least concern	Wild
104	<i>Malus domestica</i> (Suckow) Borkh.	Apple	Rosaceae	Tree	Exotic	Not evaluated (Not threatened)	Cultivated
105	<i>Mangifera indica</i> L.	Mango	Anacardiaceae	Tree	Exotic	Data Deficient (Not threatened)	Cultivated
106	<i>Manihot esculenta</i> Crantz	Casava (Eng)	Euphorbiaceae	Herb	Exotic	Not evaluated (Not threatened)	Cultivated
107	<i>Matricaria chamomilla</i> L.	Kamomilla	Asteraceae	Herb	Exotic	Not evaluated (Not threatened)	Cultivated
108	<i>Medicago sativa</i> L.	Alfalfa (Eng)	Fabaceae	Herb	Exotic	Least concern	Cultivated
109	<i>Melissa officinalis</i> L.	Lemon balm	Lamiaceae	Herb	Exotic	Not evaluated (Not threatened)	Cultivated
110	<i>Milletia ferruginea</i> (Hochst.) Hochst. ex Baker	Birbirra	Fabaceae	Tree	Endemic	Least concern	Wild/Cultivated
111	<i>Moringa stenopetala</i> (Baker f.) Cufod.	Moringa	Moringaceae	Tree	Native but not endemic	Data Deficient (Threatened)	Cultivated/Wild
112	<i>Musa × paradisiaca</i> L.	Banana	Musaceae	Tree	Exotic	Least concern	Cultivated
113	<i>Mutarda carinata</i> (A.Braun) D.A.German	Ye'habesha gomen	Brassicaceae	Herb	Native but not endemic	Not evaluated (Not threatened)	Cultivated/wild
114	<i>Mutarda nigra</i> (L.) Bernh.	Senafich	Brassicaceae	Herb	Native but not endemic	Not evaluated (Not threatened)	Cultivated/Wild
115	<i>Myrsine africana</i> L.	Kechemo	Primulaceae	Shrub	Native but not endemic	Not evaluated (Not threatened)	Wild
116	<i>Nicotiana tabacum</i> L.	Timbaho	Solanaceae	Herb	Exotic	Not evaluated (Not threatened)	Cultivated/Escape d
117	<i>Nigella sativa</i> L.	Tikur Azmud	Ranunculaceae	Herb	Exotic	Not evaluated (Not threatened)	Domesitacted/Wild
118	<i>Ocimum basilicum</i> L.	Beso-Bila	Lamiaceae	Shrub	Exotic	Not evaluated (Not threatened)	Domesitacted/Wild
119	<i>Ocimum gratissimum</i> Roth	Damakese	Lamiaceae	Shrub	Native but not endemic	Not evaluated (Not threatened)	Wild/Cultivated
120	<i>Ocimum lamifolium</i> Hochst. ex Benth.	Damakese	Lamiaceae	Shrub	Native but not endemic	Not evaluated (Not threatened)	Wild/Cultivated
121	<i>Olea europaea</i> subsp. <i>africana</i>	Woyra	Oleaceae	Tree	Native but not endemic	Not evaluated (Not threatened)	Wild/Cultivated
122	<i>Origanum vulgare</i> L.	Oregano	Lamiaceae	Herb	Exotic	Not evaluated (Not threatened)	Cultivated
123	<i>Osyris lanceolata</i> Hochst. & Steud.	Qeret	Santalaceae	Shrub	Native but not endemic	Not evaluated (Not threatened)	Wild

S.No.	Medicinal plant Species	Popular name	Family	Habit	Origin	Conservation status	Management status
124	<i>Oxygonum sinuatum</i> (Hochst. & Steud. ex Meisn.) Dammer	Daddo(Oro)	Polygonaceae	Herb	Native but not endemic	Not evaluated (Not threatened)	Wild
125	<i>Passiflora edulis</i> Sims	Passionfruit (Eng)	Passifloraceae	Climber	Exotic	Not evaluated (Not threatened)	Cultivated/Escape d
126	<i>Pelargonium graveolens</i> L'Hér.	Geranium	Geraniaceae	Shrub	Exotic	Not evaluated (Not threatened)	Cultivated
127	<i>Pentanema confertiflorum</i> (A.Rich.) D.Gut.Larr., <i>Santos-Vicente, Anderb., E.Rico & M.M.Mart.Ort.</i>	Oyazu (Yem)	Asteraceae	Shrub	Endemic	Not evaluated (Not threatened)	Wild
128	<i>Persea americana</i> Mill.	Avocado	Lauraceae	Tree	Exotic	Least concern	Cultivated
129	<i>Phoenix reclinata</i> Jacq.	Zenbaba	Arecaceae	Tree	Native but not endemic	Least concern	Wild/Cultivated
130	<i>Physalis peruviana</i> L.	Awit	Solanaceae	Herb	Exotic	Not evaluated (Not threatened)	Wild/Cultivated
131	<i>Phytolacca dodecandra</i> L'Hér.	Endod	Phytolaccaceae	Climber	Native but not endemic	Not evaluated (Not threatened)	Wild/Cultivated
132	<i>Pitosporum viridiflorum</i> Sims	Amshiq	Pitosporaceae	Tree	Native but not endemic	Least concern	Wild/Cultivated
133	<i>Plantago lanceolata</i> L.	Gorteb	Plantaginaceae	Herb	Exotic	Not evaluated/Not threatened	Wild
134	<i>Plantago major</i> L.		Plantaginaceae	Herb	Native but not endemic	Least concern	Wild
135	<i>Plumbago zeylanica</i> L.	Amera (Am)	Plumbaginaceae	Shrub	Native but not endemic	Not evaluated (Not threatened)	Wild
136	<i>Portulaca oleracea</i> L.	Selata (Tig)	Portulacaceae	Herb	Native but not endemic	Least concern	Wild
137	<i>Prunus africana</i> (Hook.f.) Kalkman	Tikur enchet	Rosaceae	Tree	Native but not endemic	Vulnerable/	Wild/Cultivated
138	<i>Psidium guajava</i> L.	Zeytun	Myrtaceae	Tree	Exotic	Least concern	Cultivated/Wild
139	<i>Ranunculus multifidus</i> Forssk.	Etse Seol	Ranunculaceae	Herb	Native but not endemic	Least concern	Wild
140	<i>Rhamnus prinoides</i> L'Hér.	Gesho	Rhamnaceae	Shrub	Native but not endemic	Least concern	Cultivated/Wild
141	<i>Rhus sp.</i>		Anacardiaceae	Shrub	Native but not endemic	Not assessed	Wild
142	<i>Ricinus communis</i> L.	Gulo	Euphorbiaceae	Shrub	Native but not endemic	Least concern	Wild
143	<i>Rosa abyssinica</i> R.Br. ex Lindl.	Qega	Rosaceae	Shrub	Native but not endemic	Not evaluated (Not threatened)	Wild
144	<i>Rosa X damascena</i> Herzm.	Damask rose	Rosaceae	Shrub	Exotic	Not applicable	Cultivated
145	<i>Rothea myricoides</i> (Hochst.) Steane & Mabb.	Misirech	Lamiaceae	Shrub	Native but not endemic	Least concern	Wild
146	<i>Rubus apetalus</i> Poir.	Enjori (Am)	Rosaceae	Shrub	Exotic	Not evaluated (Not threatened)	Wild/Cultivated
147	<i>Rumex abyssinicus</i> Jacq.	Meqmeqo	Polygonaceae	Herb	Native but not endemic	Not evaluated (Not threatened)	Wild
148	<i>Rumex nepalensis</i> Spreng.	Tult	Polygonaceae	Herb	Native but not endemic	Not evaluated (Not threatened)	Wild
149	<i>Rumex nervosus</i> Vahl	Embuacho	Polygonaceae	Herb	Native but not endemic	Not evaluated (Not threatened)	Wild
150	<i>Ruta chalepensis</i> L.	Tena-adam	Rutaceae	Shrub	Exotic	Not evaluated (Not threatened)	Cultivated
151	<i>Ruta graveolens</i> L.	Rue (Eng)	Rutaceae	Shrub	Exotic	Least concern	Cultivated
152	<i>Rydingia integrifolia</i> (Benth.) Scheen & V.A.Albert	Tinjut	Lamiaceae	Shrub	Native but not endemic	Not evaluated (Not threatened)	Wild/Cultivated
153	<i>Saccharum officinarum</i> L.	Sugar cane	Poaceae	Herb	Exotic	Not evaluated (Not threatened)	Cultivated
154	<i>Salvia officinalis</i> L.	Sage	Lamiaceae	Shrub	Exotic	Least concern	Cultivated
155	<i>Salvia rosmarinus</i> Spnn.	Rosemary	Lamiaceae	Shrub	Exotic	Least concern	Cultivated
156	<i>Schinus molle</i> L.	Qundoberbere/Turmantri	Anacardiaceae	Tree	Exotic	Least concern	Cultivated

S.No.	Medicinal plant Species	Popular name	Family	Habit	Origin	Conservation status	Management status
157	<i>Searsia natalensis</i> (Bernh. ex C.Krauss) F.A.Barkley		Anacardiaceae	Shrub	Exotic	Least concern	Wild
158	<i>Senna didymobotrya</i> (Fresen.) H.S.Irwin & Barneby		Fabaceae	Shrub	Native but not endemic	Least concern	Wild
159	<i>Senna occidentalis</i> (L.) Link	Yediha Bunna	Fabaceae	Shrub	Native but not endemic	Least concern	Wild
160	<i>Sida schimperiana</i> Hochst. ex A.Rich.	Chifrig	Malvaceae	Shrub	Native but not endemic	Not evaluated (Threatened)	Wild
161	<i>Solanecio gigas</i> (Vatke) C.Jeffrey	Ye'shkokjo gomen	Asteraceae	Shrub	Endemic	Not evaluated (Threatened)	Wild
162	<i>Solanum incanum</i> L.	Embuay	Solanaceae	Shrub	Native but not endemic	Least concern	Wild
163	<i>Solanum lycopersicum</i> L.	Timatim	Solanaceae	Shrub	Exotic	Not evaluated (Not threatened)	Cultivated/Wild
164	<i>Solanum macrocarpon</i> L.	Embuay	Solanaceae	Shrub	Native but not endemic	Not evaluated (Not threatened)	Cultivated/Wild
165	<i>Solanum nigrum</i> L.	Tikur Awit	Solanaceae	Herb	Native but not endemic	Not evaluated (Not threatened)	Wild/Cultivated
166	<i>Solanum sp.</i>	Embuay	Solanaceae	Shrub	Native but not endemic	Not assessed	Wild
167	<i>Spilanthes costata</i> Benth.	Yemidir berberic	Asteraceae	Herb	Native but not endemic	Not evaluated (Not threatened)	Wild
168	<i>Stephania abyssinica</i> (Quart.-Dill. & A.Rich.) Walp.	Etse Eyesus/Ye'ayt areg	Menispermaceae	Climber/ Creeper	Native but not endemic	Not evaluated (Not threatened)	Wild
169	<i>Stevia rebaudiana</i> (Bertoni) Bertoni	Stevia	Asteraceae	Herb	Exotic	Not evaluated (Not threatened)	Cultivated
170	<i>Tagetes erecta</i> L.	Gold coins (Eng)	Asteraceae	Herb	Exotic	Not evaluated (Not threatened)	Cultivated
171	<i>Tagetes minuta</i> L.	Gimic	Asteraceae	Herb	Exotic	Not evaluated (Not threatened)	Wild
172	<i>Tanacetum cinerariifolium</i> (Trevir.) Sch.Bip.	Pyrethrum	Asteraceae	Herb	Exotic	Least concern	Cultivated
173	<i>Taverniera abyssinica</i> A. Rich.	Dingetegna	Fabaceae	Shrub	Native but not endemic	Not evaluated (Not threatened)	Wild
174	<i>Thymus schimperii</i> Ronniger	Tosign	Lamiaceae	Shrub	Native but not endemic	Not evaluated (Not threatened)	Wild
175	<i>Thymus serrulatus</i> Hochst. ex Benth.	Tosign	Lamiaceae	Shrub	Native but not endemic	Not evaluated (Not threatened)	Wild
176	<i>Trachyspermum ammi</i> (L.) Sprague ex Turrill	Nech-Azmud	Apiaceae	Herb	Exotic	Not evaluated (Not threatened)	Cultivated
177	<i>Trigonella foenum-graecum</i> L.	Abish	Fabaceae	Herb	Exotic	Not evaluated (Not threatened)	Cultivated
178	<i>Urtica simensis</i> Hochst. ex A.Rich.	Samma	Urticaceae	Shrub	Endemic	Not evaluated (Not threatened)	Wild
179	<i>Vachellia abyssinica</i> (Hochst. ex Benth.) Kyal. & Boatwr	Girar	Fabaceae	Tree	Native but not endemic	Not evaluated (Not threatened)	Wild/Cultivated
180	<i>Vanilla planifolia</i> Andrews	Vanilla	Orchidaceae	Climber	Exotic	Endangered	Cultivated
181	<i>Verbascum sinaiticum</i> Benth.	Ye'ahya joro/Qetetina	Scrophulariaceae	Shrub	Native but not endemic	Not evaluated (Not threatened)	Wild
182	<i>Verbena officinalis</i> L.	Atuch	Verbenaceae	Herb	Native but not endemic	Not evaluated (Not threatened)	Wild
183	<i>Verbena boraniensis</i> L.		Verbenaceae	Herb	Native but not endemic	Not evaluated (Not threatened)	Wild
184	<i>Vicia faba</i> L.	Baqela	Fabaceae	Herb	Exotic	Not evaluated (Not threatened)	Cultivated
185	<i>Withania somnifera</i> (L.) Dunal	Gizawa	Solanaceae	Shrub	Native but not endemic	Not evaluated (Not threatened)	Wild
186	<i>Xanthium strumarium</i> L.	Dila-nikel	Asteraceae	Herb	Native but not endemic	Not evaluated (Not threatened)	Wild
187	<i>Zea mays</i> L.	Bekolo	Poaceae	Herb	Exotic	Least concern	Cultivated
188	<i>Zehneria scabra</i> (L.f.) Sond.	Aregresa	Cucurbitaceae	Climber	Native but not endemic	Not evaluated (Not threatened)	Wild
189	<i>Zingiber officinale</i> Roscoe	Zinjibil	Zingiberaceae	Herb	Exotic	Data Deficient (Not threatened)	Cultivated
190	<i>Ziziphus mucronata</i> Willd.	Qurqura	Rhamnaceae	Shrub	Native but not endemic	Least concern	Wild
191	<i>Ziziphus spina-christi</i> (L.) Desf.	Geba	Rhamnaceae	Shrub	Native but not endemic	Least concern	Wild

- Notes: 1. All popular names, unless otherwise mentioned, are in Amharic language; Afaan Oromoo (Oro), Biralie (Bir); Kef (Kefigna), Tigrigna (Tig), Yem (Yem), English (Eng)
2. Conservation status categorization: Based on IUCN (POWO)
3. Management status: Main occurrence/Secondary occurrence

