

Review on ethnobotanical knowledge and socio-economic value of Anchote (*Coccinia abyssinica*) cultivation and processing in major growing areas of Ethiopia

B.T. Abebe* and A.F. Dejenu

Ethiopian Biodiversity Institute, Ethiopia

*Corresponding author email: bachatamiru12@gmail.com

ABSTRACT

Anchote (*Coccinia abyssinica* (Lam.) Cogn.) is an indigenous and commonly cultivated root crop in Ethiopia that is highly valued for its nutritional, medicinal, and socioeconomic benefits. Despite its importance, the crop is still underutilized and understudied in terms of indigenous knowledge and traditional processing techniques. This review synthesizes existing indigenous knowledge on *C. abyssinica* cultivation, traditional food processing methods, socioeconomic role, and opportunities for enhancing its utilization. By systematically compiling published literature, technical reports, and academic works, this review provides a consolidated overview of the *C. abyssinica*'s ethnobotanical and socio-economic dimensions in its major growing regions of Ethiopia, particularly Oromia. The analysis focuses on its major growing regions in Ethiopia, particularly areas within the Oromia region, to draw context-specific conclusions and identify prevailing research gaps. The analysis confirms that *C. abyssinica* has deep cultural and traditional importance among local communities and has been cultivated for centuries using indigenous farming techniques. The crop is rich in essential nutrients, particularly calcium, and is an important dietary component. *C. abyssinica* plays an important role in household food security, income production, and cultural identity. Traditional processing procedures, such as boiling and drying improve its flavor and nutritional content. However, issues such as limited market access, a lack of superior cultivars, and dwindling cultivation all pose threats to its long-term viability. Strengthening conservation efforts and boosting value addition can help *C. abyssinica* play a bigger role in rural livelihoods and food security.

Keywords: cultural practices, traditional food system, tuber, nutritional value, value addition.

INTRODUCTION

Ethiopia has diversified agro-ecological conditions that are suitable for the production of various types of crops (Ayalew, 2020). Farmers in Ethiopia, like many other developing countries, have developed and maintained several diverse and locally adapted root and tuber cultivars of crops because no single cultivar can satisfy their basic needs (AbaDura *et al.*, 2021; Mariutti *et al.*, 2021). Among these, a root and tuber crop *C. abyssinica* is widely cultivated in different parts of Ethiopia (Duresso, 2018). Anchote [*Coccinia abyssinica* (Lam.) Cogn.] is a trailing vine tuberous crop, belongs to the Cucurbitaceous family and is grown annually (AbaDura *et al.*, 2021). It is an indigenous root crop extensively produced and highly employed in the socio-economic area across the South and South Western in Wollega,

Ilubabor, Kafa, and Sidamo in Ethiopia (Regessa, 2022). It is a subsistence crop commonly produced to fill food security gaps during the hunger seasons (June to September) in Ethiopia (Abera and Haile, 2015).

Coccinia abyssinica here after called (*C. abyssinica*) is a climate-resilient indigenous root crop that grows in a cultivar of agro-ecological zones in Ethiopia (Ashebir, 2022). Proper agronomic management and cultivation techniques are required to increase yield, improve tuber quality, and ensure long-term production (Wakjira *et al.*, 2024). It flourishes best in mid to high-altitude locations with evenly distributed rainfall and mild temperatures, as well as well-drained, fertile loamy or sandy loam soils rich in organic matter (Leta *et al.*, 2017; Gudeta, 2022).

C. abyssinica production has deep cultural ties with the Oromo people; it is utilized as a cultural meal during the Meskel Festival, which celebrates the discovery of the genuine cross (Temam, 2021; Anbesse and Hailegeorgis, 2021). According to Negassa and Amenu (2016), *C. abyssinica* tubers are high in nutritious content and extremely important. *C. abyssinica* tuber and leaf, like other root crops, provide significant nutrients and are being promoted for increased consumption to improve human nutrition. *C. abyssinica* is rich in minerals and fiber. It contains a lot of calcium, which is essential for our bones and teeth (Regessa, 2022). *C. abyssinica* is also thought to improve the health and strength of breastfeeding women (Temam, 2021). *C. abyssinica* juice contains saponin, which is used to cure gonorrhea, TB, and cancer (Regasa *et al.*, 2018). *C. abyssinica* is high in potassium and iron. As a result, it has the potential to help the country's food security (Gebeyehu *et al.*, 2024).

C. abyssinica tuber produces around 27 culinary products, which are classified as boiled, dehydrated, or soup (Parmar *et al.*, 2017). Another study discovered that “defeki” (paste), “moqa” (soup), and “chufata” (boiled and peeled *C. abyssinica* tuber cut and eaten with kochkocha) are traditional *C. abyssinica* recipe preparation methods in western Oromia (Gebeyehu *et al.*, 2024). Different cultivars of traditional foods made from *C. abyssinica* tubers and leaves need to be thoroughly explored and documented, including preparation methods, ingredients, and motivations for consuming *C. abyssinica* food products (Keno, 2024).

Industrialization is now rising at a considerably higher rate, and so are food processing sectors (Regessa, 2022). As a result, it is necessary to process a cultivar of locally available raw materials such as potato, carrot, beetroot, sweet potato, yam, garlic, and others (Habtamu, 2013). Among these several root crops, *C. abyssinica* plants are included in this category (Regessa, 2022) and selected for this review work. *C. abyssinica* flour contains more nutrients and crude fiber than wheat flour (Gebeyehu *et al.*, 2024). Biscuits made from a blend of *C. abyssinica* and wheat may have good potential for a cultivar of reasons, including increasing *C. abyssinica* consumption and encouraging farmers; the products will be a more acceptable healthy alternative because they are enriched with dietary fiber and minerals (Regessa, 2022). Despite its promise, *C. abyssinica* is still a neglected and underutilized crop (Abdena and Aga, 2023). Documenting the indigenous knowledge surrounding its cultivation and utilization is crucial for preserving cultural heritage and enhancing food security. This review explores indigenous knowledge surrounding its cultivation, processing, and socio-economic contributions to communities in its major growing regions.

Indigenous Knowledge in *Coccinia abyssinica* Cultivation

C. abyssinica cultivars are chosen based on tuber yield, disease resistance, and environmental adaptability (Duresso, 2018). Landrace cultivars are widely planted in Ethiopia and nearby areas, where farmers choose high-yielding plants with ideal tuber size, texture, and storage quality (Negash, 2019). Gutema (2019) found that 97.8% of growers in Gimbi and 98.3% in Ayira district prefer to plant white *C. abyssinica* (Fig. 1). This is because

white *C. abyssinica* has a soft texture, is easy to cook, contains less fiber, has a white tuber color, has a good taste, and has a higher market demand (Parmar *et al.*, 2017).

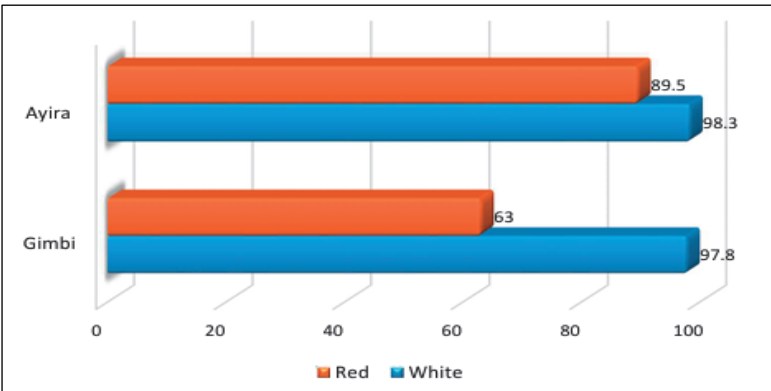


Figure 1. Local cultivars of *C. abyssinica* preference for growers (Source: Gutema, 2019)

Ethiopian farmers have produced and maintained multiple different and regionally adapted crop cultivars on their small piece of land (Belay *et al.*, 2017). Research is undertaken to improve the crop's genetic diversity and breeding potential, with the goal of generating cultivars that are more resistant to pests and diseases while keeping high nutritional value (Duresso, 2018). Choosing the proper cultivar results in increased output and adaptability to certain agro-ecological circumstances (Feyissa, 2020).

Abdena and Aga (2023) researched the evaluation of underutilized cultivated six (6) *C. abyssinica* accessions and identified higher storage root yield above 101 tons/ha. They also reported higher marketable storage root yield (ton/ha), and higher dry matter content production, indicating good performance and adaptation in Ethiopia's West Shewa central highland. The report focused mostly on agronomic performance, but there is limited information on post-harvest attributes, consumer preferences, and value-added processing capabilities, all of which are critical for market expansion and food security.

A genetic diversity analysis of 12 *C. abyssinica* populations using Inter Simple Sequence Repeat (ISSR) markers revealed that the Illubabor and Gimbi populations exhibited the highest genetic variation, underscoring their significance as key reservoirs for conservation and the selection of superior landraces. As interest in the preservation and sustainable utilization of traditional crops continues to grow, there is an increasing imperative to document, enhance, and promote high-yielding and resilient cultivars to ensure food security and biodiversity conservation (Ficiciyan *et al.*, 2018; Karri and Nalluri, 2024).

C. abyssinica L. is typically propagated through both seeds and vegetative means (Sisay *et al.*, 2020). However, seed propagation is less common due to its slow and inconsistent germination rates, making vegetative propagation via tuber or stem cuttings the preferred method for achieving faster and more uniform plant establishment (AbaDura *et al.*, 2021). Farmers carefully select quality fruits for seed production depending on their size and tuber composition. *C. abyssinica* plants with larger fruits generate smaller tubers; hence, smaller fruits are used as planting material (Feyissa, 2020). This is because using smaller fruits as planting material may lower the number of resources allocated to fruit formation, freeing up more energy for tuber growth. Tuber propagation entails selecting healthy, disease-free tubers that are sliced into portions with at least one viable bud and then planted in moist, well-prepared soil (Saraswathi and Thingalmaniyan, 2017). This method ensures genetic uniformity, promotes rapid growth, and facilitates early tuber formation, making it a highly efficient strategy for *C. abyssinica* cultivation.

Land Preparation and Intercropping Practices

Land preparation for *C. abyssinica* aims for a fine tilth for optimal tuber expansion. Tillage is the mechanical manipulation of soil with tools and implements to generate ideal soil conditions for better seed germination and subsequent crop growth. The frequency of tillage is determined by the type of soil, climate, and planting material size (Belissa, 2021). Tillage frequency for *C. abyssinica* is not recommended at this time; however, experiments on *C. abyssinica* show that the land should be crushed and a fine seed bed developed (Abera and Haile, 2015; Duresso, 2018). Seeds are commonly utilized for planting (Belissa, 2021). Farmers traditionally plant *C. abyssinica* by broadcasting and mixing with soil (Mekbib and Deressa, 2016), but in experimental plots, row planting is used. For example, in an experiment conducted in Jimma University College of Agriculture and Veterinary Medicine (JUCAVM) and East Wollega, where the spacing between plants is 10 cm and 40 cm between rows (Gudeta, 2022). Similarly, Anbesse and Hailegeorgis (2021) observed that increasing intra-row separation from 10 to 30 cm reduces root yield by 137%, while increasing row spacing from 40 to 100 cm results in a 37% loss in production.

Intercropping *C. abyssinica* with other crops is a widely adopted practice that enhances land productivity, improves soil fertility, and reduces pest pressure (Zerihun, 2022). *C. abyssinica* is frequently intercropped with cereal crops like maize and sorghum, as well as legumes like beans and peas and various crops like cereals (such as wheat, “teff”, maize, sorghum) (Gurmu, 2019). Leguminous intercrops in particular give nitrogen to the soil via biological nitrogen fixation, lowering the demand for synthetic fertilizers (Kebede, 2021). Proper spacing and crop arrangement are critical for reducing competition and ensuring that all crops receive enough sunlight and nutrients (Yimer and Babege, 2018). Successful *C. abyssinica* intercropping systems are intended to maximize resource utilization while avoiding excessive shade or root competition (Gebremedhin *et al.*, 2015). Rotational intercropping of deep-rooted and shallow-rooted crops can improve soil structure while lowering the danger of nutrient depletion (Shekhar *et al.*, 2024). Farmers frequently use mixed cropping tactics, in which *C. abyssinica* is produced alongside fast-growing vegetables such as cabbage or onions, allowing for early harvests before *C. abyssinica* matures (Bekele, 2019). This method not only boosts farm productivity but also improves food security by varying harvests throughout the growing season.

C. abyssinica cultivation also benefits from integrated soil fertility and moisture management. The crop thrives in well-drained loamy soils high in organic matter and with moderate soil moisture levels (Gebeyehu *et al.*, 2024). Organic fertilizers, such as compost and farmyard manure, improve soil structure and nutrient availability, resulting in increased tuber bulking and quality (Belissa, 2021). Mulching and the installation of soil conservation features such as ridges and bunds assist in retaining moisture and reducing erosion in moisture-stressed areas.

To summarize, adequate site preparation and intercropping are critical for increasing the growth, productivity, and sustainability of *C. abyssinica* farming. Fine seedbed preparation, proper spacing, and the use of organic fertilizers all improve soil fertility and tuber quality. Intercropping with grains, legumes, or vegetables increases land productivity, conserves moisture, and promotes sustainable farming practices.

Weeding and Fertilization

Weeding is an important agronomic practice in the cultivation of *C. abyssinica* because it reduces competition for nutrients, moisture, and sunlight, ensuring optimal plant growth and tuber formation (Belissa, 2021). The first weeding is usually done two to three weeks after planting, when the weeds are still small and simpler to handle (Wakjira *et al.*, 2024). Manual weeding using hand tools like hoes is the most frequent method, however, mulching with organic materials can also help inhibit weed development while conserving soil moisture.

Research on soil nutrient management for *C. abyssinica* is limited, despite observations that the crop requires nutrient-rich soil for optimal growth and development (Duresso, 2018). According to Duresso (2018), research conducted in Gimbi and Ayira revealed that 71.1% and 59.7% of growers, respectively, rely on natural fertilizers such as manure and compost. Farmyard manure (FYM) and blended fertilizer (NPSB) have been shown to alter days to physiological maturity, vine number, vine length, marketable root production, and other characteristics (Belissa, 2021). The highest overall root production was recorded at 175 kg ha⁻¹ NPSB and 10 t/ha FYM (Biratu, 2019). However, Abera and Guteta (2007) reported that the maximum root yield was recorded at 8 t/ha of farm yard manure (FYM), and the yield began to fall when the FYM rate was increased to 10 t/ha. Inorganic fertilizer application resulted in the highest yield at a nitrogen rate of 46 kg/ha and a phosphorus rate of 20 kg/ha (Abera and Haile, 2015), respectively.

C. abyssinica responds well to integrated nutrient management, which blends organic and inorganic fertilizers to promote long-term productivity. Organic inputs that increase soil structure and moisture retention, and mineral fertilizers like NPSB provide necessary nutrients for strong growth and tuber development (Belissa, 2021; Biratu, 2019). Balanced fertilization improves yield and soil health, although efficiency varies depending on soil type, moisture, and planting density, highlighting the importance of site-specific recommendations (Abera and Haile, 2015; Wakjira *et al.*, 2024).

Crop protection and Harvesting Techniques

Agronomic research on *C. abyssinica* in Ethiopia has primarily concentrated on aspects such as fertilization, spacing, and earthing-up to improve growth and yield. However, there is a notable lack of studies addressing pest and disease management. As highlighted in a review by Belissa (2021), despite the crop's commercial importance, formal agronomic research has largely overlooked the protection of *C. abyssinica* from diseases and insect pests.

Traditionally, farmers rely on indigenous knowledge to manage pests and protect their crops. For instance, to control bacterial leaf blight and powdery mildew, farmers often use botanical extracts from neem (*Azadirachta indica*), garlic (*Allium sativum*), and chili pepper (*Capsicum annuum*), which have antifungal and antibacterial properties. To deter insect pests like beetles, growers commonly practice intercropping with repellent plants such as marigold (*Tagetes* spp.) or Ethiopian mustard (*Brassica carinata*), which help reduce pest infestations naturally (Negash, 2019).

Farmers typically sow *C. abyssinica* seeds in April and harvest the tubers between July and August, making the growing period approximately four to five months (Belissa, 2021). Unlike most tubers, *C. abyssinica* is not harvested for home storage; instead, farmers leave the tubers in the field, harvesting only to meet immediate needs. One of the *C. abyssinica*'s unique characteristics is its long-term edibility compared to other local tubers such as yams and Oromo potatoes, whose underground organs become inedible after a year or so (Wayessa, 2018). Farmers strategically adjust harvesting periods based on household food needs and storage techniques, relying on tubers when other food sources are scarce (Abera and Haile, 2015). This significant increase in yield indicates that postponing harvest permits tubers to accumulate more biomass and minerals, increasing their nutritional value. Such approaches are consistent with traditional methods, in which farmers alter harvesting periods based on household food requirements and storage strategies, using tubers when other food sources are scarce. As a result, *C. abyssinica* is available all year, and leaving *C. abyssinica* tubers unharvested for several years increases its medicinal and nutritional worth (Mosissa *et al.*, 2019). It has been reported that the date of harvest and in situ storage affect tuber yield. Studies indicate that prolonging the harvest period from the fourth to the seventh month can increase fresh and dry tuber yield by an average of 450%, a trend also observed in crops like sugar beet (Abera and Haile, 2015).

People have traditionally believed that appropriate land management (adhering to taboos and prohibitions in land preparation procedures) appeases the spirit of the land (“*dachee*”) and results in a good crop (Wakeway *et al.*, 2023). The Oromo also observe the “*Irreessa*” festival (Oromo’s national Thanksgiving Day), during which people congregate in sacred sites to thank God (“*Waaqa*”) for the good crop and other favors they think they got over the previous year (Bulcha 2015). During “*Irreessa*” events, friends, family, and relatives gather in joyful celebration, bringing people closer together and strengthening social bonds. *C. abyssinica* is a ritualized food offered on this auspicious day (Wayessa, 2018).

Traditional Food Processing of *Coccinia abyssinica*

C. abyssinica is deeply culturally and nutritionally significant in Ethiopia, notably among the Oromo, who have grown and consumed it for generations. The crop is both a staple and a ceremonial food, prized for its high energy content and medicinal characteristics believed to promote bone health and disease recovery (Belissa, 2021). Despite their importance, traditional processing methods are typically local and family-based, passed down through generations. These indigenous procedures are intended to increase edibility, nutrient preservation, and tuber flavor and digestibility before consumption (Wayessa, 2018).

Harvested *C. abyssinica* tubers require further preparation for cooking, which includes peeling the outer inedible layer using a knife and cleaning them (Wayessa, 2018). Boiling is the most frequent way to prepare *C. abyssinica* tubers since it softens the harsh texture and increases nutritional availability (Abdisa, 2021). Traditional preparation frequently involves boiling *C. abyssinica* with little water to retain its high nutritious content, which includes carbohydrates, calcium, and iron (Bikila *et al.*, 2020). After boiling, the tubers can be peeled and eaten simply, mashed, or combined with other ingredients like butter, spices, or milk to add taste.

In Wollega, tubers are cooked in clay pots (Fig. 2). In this region, pottery-making is the domain of women, and men’s participation is restricted by taboos. Women employ axes and hoes in both agriculture and clay mining, and the two activities are frequently described using the same etymology (Wayessa, 2018). According to Wayessa (2018), each ethnolinguistic group in the southern Ethiopian highlands has a distinct technical style, separate material identity based on parts of or suites of technological decisions.

Several factors influence how potters choose and use raw materials to manufacture pots. The most important of these is their learning network, which fosters and sustains relationships between potters and their daughters (Wayessa, 2018). Daughters learn pottery-making from their moms and other female relatives (apprenticeships outside the family are uncommon); therefore, technological choices are taught and passed down through generations.



Figure 2. *C. abyssinica* tuber harvested and being cooked (source: Wayessa, 2018)

The ethnic community prefers to utilize pots manufactured by its own potter. It has been noted that Oromo women frequently steam tubers in pots created by Oromo potters. Furthermore, until recently, *C. abyssinica* consumption was limited to Oromo people; non-Oromo people rarely

ate *C. abyssinica*. The coupling of a certain technological style with specific tuber residues can aid in linking tuber-use to various social groupings (Wayessa, 2018). Similarly, culinary traditions, such as ceramic vessel types and heat treatments for processing culturally unique food products, leave signs of the cultural group's identity. In Wollega, *C. abyssinica* is steamed in a pot filled one-third with water. When the water in the pot boils appropriately, washed tubers are placed in it, and the mouth is covered with huge leaves and a clay lid, which is carefully sealed with a layer of fresh cow dung to reduce heat loss. Extremely huge tubers are cut to fit inside the pot and for uniform cooking (Wayessa, 2018) (Fig. 3).

Wollega has three types of cooking pots: stew, porridge, and steaming pots. Cooking pots undergo a number of use-related changes over time, the most frequent of which are oxidation, carbonization, and residue encrustation. Oxidation and carbonization are the most prevalent use-related changes observed on the external walls of all cooking pots in Wollega. Carbon accretion gradually covers the pot from the bottom to the top. People in the study region prefer to steam tubers until the water in the pot has completely evaporated. This is primarily because the presence of water is thought to make the steamed tuber oily and less appetizing. Steaming tubers until the moisture has been completely cooled off causes scorching and encrustation of the contents on the internal walls of the steaming pots (Wayessa, 2018).

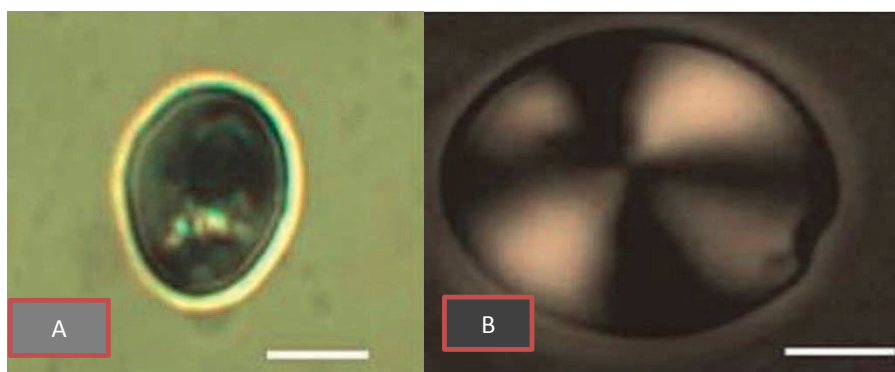


Figure 3. Morphology of cooked (A) and uncooked (B) of *C. abyssinica* starch under Microscope (Source: Wayessa, 2018).

Drying and Powdering

Post-harvest processing of *C. abyssinica* is crucial for increasing shelf life, improving food safety, and market value. Drying and powdering fresh tubers can extend their shelf life and increase their use in diets (Fufa and Bada, 2017). Erku *et al.* (2024) found that using these approaches increases the crop's versatility, enabling it to be used in a cultivar of food products and creating opportunities for rural value-added initiatives.

Drying and Powdering *C. abyssinica* is traditionally preserved in a way that increases its shelf life and makes it more useful in a cultivar of dishes (Shebabaw, 2013). To speed up the drying process, the tubers are washed, peeled, and sliced into thin pieces. Sun drying is the most typical way, however newer approaches like solar or mechanical drying can help retain more nutrients (Wayessa, 2018). *C. abyssinica* powder is highly prized for its ease and adaptability, since it may be rehydrated for porridge, blended into soups, or used in baked goods. This processing procedure preserves the tuber's high nutritional value, which includes carbohydrates, calcium, iron, and dietary fiber, making it a viable option for food security and value-added products.

C. abyssinica's rich nutrient composition, particularly its high levels of carbohydrates, calcium, and iron, make it suitable for powder processing. This transformation preserves the crop's essential nutritional qualities, but also improves its shelf stability, transportability, and adaptability in the development of value-added food products such as porridges, soups, and baked goods (Gebeyehu *et al.*, 2024).

Food products from *Coccinia abyssinica* and consumption

C. abyssinica based food products are well-known in major growing areas (Table 1). According to different literatures, *C. abyssinica* tubers and leaves are source of various food types (Table 2). There are approximately seven different cultivars of *C. abyssinica* products, six of which are food types manufactured from its tuber (Negassa *et al.*, 2024). According to a survey report by (Parmar *et al.*, 2017), *C. abyssinica* roots and leaves can be used to produce around 27 different cuisines. Those literatures also classified *C. abyssinica* items into four categories: soups, boiled roots, flour, and other primary *C. abyssinica* dishes.

Table 1. Major Anchote (*Coccinia abyssinica*) Growing Areas, Cultivars, and References

Anchote Growing Areas	Cultivars Grown / Local Landraces	References
Western Oromia (East Wollega, West Wollega, Jimma)	White, red, and mixed-flesh landraces (local cultivars distinguished by tuber color and size)	Duresso (2018); Gudeta (2022)
Kellem Wollega and West Shoa Zones	Local cultivars with high moisture tolerance and good tuber quality	Abdena andAga (2023); Temam (2021)
East Wollega (Nedjo, Gimbi, Leka Dulecha)	White and light-red cultivars are often produced for their great yield and market value.	Negassa and Amenu (2016); Wakjira et al. (2024)
South Western Ethiopia (Masha, Bonga)	Locally improved selections adapted to humid conditions	Anbesse and Hailegeorgis (2021); Gutema (2019)
Central Oromia (Ambo, Dendi, Toke Kutaye)	Farmers’ cultivars selected for early maturity and drought resistance	Abdena and Aga (2023); Belissa (2021)
Ilubabor and Kafa Zones	Local red and white landraces	Mekbib and Deressa (2016); Bekele (2019)

In addition, *C. abyssinica* has the potential for innovative food products that fulfill urban and commercial demands. Processing tubers into powder, flour, or packaged ready-to-cook forms extends shelf life and convenience, providing for more market access (Erku *et al.*, 2024). Such value-added products not only diversify household meals but also create small-scale enterprises and income generation in rural areas. Furthermore, adding *C. abyssinica* into modern foods can help to preserve its cultural significance while promoting nutrition-sensitive food solutions.

Table 2. Different types of food products prepared from *C. abyssinica*

No	Food Type (Local Name)	Preparation Method	Consumption Context	References
1	Chufana (Cuffannaa)	Washed, boiled, peeled, and sliced lengthwise.	Consumed during Meskel festival and as a staple.	Keno (2024)
2	Murmura (Murmuraa)	Boiled, peeled, and cut into large pieces.	Eaten as a regular dish.	Keno (2024)
3	Defeki (“Dafaqqii”)	Boiled, peeled, made into a paste with ginger/garlic, and mixed with spiced butter.	Eaten during Meskel; also, for those with malaria or bone problems.	Parmar <i>et al.</i> (2017); Desta <i>et al.</i> (2021)
4	Kori Anchote (“Qorii Ancootee”)	Boiled, peeled, diced, and mixed with ingredients while heating.	Served with bread or injera during Meskel and other times.	Keno (2024)
5	Stew (“Ittoo Ancootee”)	Boiled, peeled, diced, and cooked in a stew with pulses.	A regular household dish and common at gatherings.	Keno (2024)
6	Rafu Anchote (“Raafuu Ancootee”)	Immature buds are collected, washed, chopped, and boiled.	Consumed as a vegetable when the leaves are immature.	Negash (2019); Keno (2024)
7	Soup (“Moqa”)	Washed, sliced, dried, milled, and mixed with other flours for soup.	Specifically for postpartum women and people with bone fractures.	Wayessa (2018); Keno (2024)

Some authors have attempted to characterize *C. abyssinica* foods as “kitifo”, “lankata” (finely ground tuber), “wot”, soup, and “murmura” (cooked tuber sliced into pieces) (Fufa, 2012, Duresso, 2018). Other authors have suggested that *C. abyssinica* stew (locally known as “Ittoo Anchote”) is one of the *C. abyssinica* products (Parmar *et al.*, 2017, Keno, 2024). According to Temam (2021), *C. abyssinica* stew, also known as “Ittoo Anchote”, is prepared on special occasions using only sliced *C. abyssinica* and enough butter. Research report by Keno (2024), remarked that these reports do not provide any information regarding the preparation process, substances, or occasions of their preparation.

Boiled *C. abyssinica* is typically served with “kochkocha”, a fermented side dish made from ground green pepper (Temam, 2021). Amazingly, there is no fermenting procedure required for the manufacture of “kochkocha” (Keno, 2024). Pregnant women and breastfeeding mothers use local traditional medicines (Parmar *et al.*, 2017).

Nutritional Contents of *Coccinia abyssinica*

C. abyssinica is a highly nutritious indigenous crop in Ethiopia that contributes to food security and dietary diversity (Buko, 2024). Plant parts such as tubers, leaves, and fruits contain essential macro and micronutrients, which make them an excellent source of energy, protein, vitamins, and minerals (Regessa, 2022). *C. abyssinica*'s nutritional density supports its use in traditional diets and highlights its potential for generating nutrient-rich food products that can address local malnutrition concerns while improving overall health outcomes (Erku *et al.*, 2024).

When considering a crop as a food source, nutritional content is the primary issue, and *C. abyssinica* plant sections, such as tuber, leaf, and fruit, have valuable nutrients (Regessa, 2022). *C. abyssinica* tubers have much more nutrients than equal weights of potato (*Solanum tuberosum* L.), yam (*Dioscorea abyssinica*), and cassava (*Manihotes culenta*) tubers, Swiss chard, and cucumber (Abera and Haile, 2015).

According to different researchers, *C. abyssinica* demonstrates remarkable nutrients, particularly protein and ash content than most other root and tuber crops (Table 2). About 2.05g of protein per 100g, *C. abyssinica* contains more protein than cassava (0.53g), Enset (0.6g) and sweet potato (13.65g), making it a valuable source of protein in regions where protein deficiency is a concern. And also, in comparison to other tropical root and tuber crops, *C. abyssinica* tubers are richer in protein as well as various minerals such as Ca, Mg, P, Fe, and S (Parmar *et al.*, 2017). The comparative analysis highlights *C. abyssinica* as nutritionally valuable root crops for high protein and mineral content

C. abyssinica tubers are more nutritious compared to several commonly cultivated root and tuber crops, particularly in terms of protein and mineral content (Parmar *et al.*, 2017). This unique nutrient profile not only promotes human nutrition but also establishes *C. abyssinica* as a functional food with potential applications in value-added goods (Mosissa *et al.*, 2019; Gemedé and Urugo, 2025).

In addition to protein, *C. abyssinica* is also rich in macro and micronutrients including calcium (Ca), magnesium (Mg), phosphorus (P), iron (Fe), and sulfur (S), exceeding many other tropical root and tuber crops in mineral density (Gebeyehu *et al.*, 2024). This combination of protein and minerals emphasizes *C. abyssinica*'s potential as a functional food and its importance in food security and nutrition initiatives (Regassa *et al.*, 2024).

Table 3. Proximate nutrient contents of *C. abyssinica* compare with other root and tuber crops

Root and Tuber crops	Nutrient content (g/100g)						References
	Carbohydrate	Gross energy (Kcal/100g)	Fiber	Protein	Fat	Ash	
Potato	21.47	96.78	0.43	1.6	0.1	0.83	Temam (2021)
Beet root	6.99	42	2.56			1.4	Chandrasekara and Josheph (2016)
Cassava	86.25	364.6	1.53	0.53	0.17	1.89	Tiruneh <i>et al.</i> (2021)
Anchote	7.32	111.77	5.95	2.05	15.4	1.1	Gebeyehu <i>et al.</i> (2024), Paulos (2025)
Enset	97.71	394.24	1.04	0.6	0.3	1.05	Wakeway <i>et al.</i> (2023)
Sweet potato	85.97	336.72	7.19	13.65	2.28	7.06	Akomolafe (2025)
Yam	84.07	353.64	4.39	3.3	0.98	1.76	Akalu and Geleta (2019)

Limitations in *C. abyssinica* food preparation

Despite its nutritional and culinary potential, *C. abyssinica* offers various cooking challenges that limit its convenience and acceptability (Desalegn, 2018). The tubers are typically hard and fibrous, which increases cooking time and fuel consumption, especially when using traditional boiling methods (Bikila *et al.*, 2022).

C. abyssinica tuber takes longer to boil due to its hardness. It is stated that old *tuber* takes a long time to boil. The presence of a considerable number of fibers in *C. abyssinica* tubers may also influence the boiling time (Desalegn and Kibr, 2021). Boiling *C. abyssinica* tuber requires a significant amount of fuel wood and may take up to three hours. A large volume of fuel wood is required. However, boiling *C. abyssinica* tubers in a pressure cooker takes only around 45 minutes. Therefore, the white *C. abyssinica* is preferred over the orange because it is easier to boil. The tubers that are difficult to boil are known as “*hiddoo*” (fibrous Anchote) (Keno, 2024). Consumers typically reject and discard this form of *C. abyssinica* since it is difficult to boil. *C. abyssinica* can be used in many ways and has similarities with potatoes. Climate, soil type, and agricultural techniques may all have an impact on *C. abyssinica* harden. *C. abyssinica* cultivars cultivated on fertile, well-aerated soils with adequate rainfall are not as difficult to boil.

Addressing these agronomic and processing constraints through research, improved cultivation practices, cultivar selection, and innovative cooking techniques has the potential to considerably increase *C. abyssinica* production, processing, and consumption (Keno, 2024; Paulos, 2025). Such activities have the potential to increase food security and nutritional value, while also preserving the cultural heritage and promoting sustainable livelihoods in Ethiopia (Erku *et al.*, 2024; Gebeyehu *et al.*, 2024).

Socio-Economic Importance of *Coccinia abyssinica*

Income Generation

C. abyssinica cultivation and sale provide major income-generating opportunities for smallholder farmers, notably in Ethiopia, where the crop is culturally and nutritionally significant (Ashebir, 2022, Fekadu 2011, Guma *et al.*, 2015; Keno, 2024). Due to the high demand in local markets, producers benefit from selling fresh tubers directly to customers, restaurants, and food processors. The growing recognition of *C. abyssinica*'s health benefits, such as its high calcium and iron content, has created a demand for value-added goods such as dried *C. abyssinica* slices and *C. abyssinica* powder (Tiruneh *et al.*, 2021). Farmers and

businesses can increase their profit margins and expand their client base by processing and packaging their products, which includes serving urban consumers and international markets. Furthermore, *C. abyssinica* promotes women's economic empowerment because many women are involved in its production, processing, and marketing. *C. abyssinica*'s promotion as a functional food, combined with improved farming techniques and stronger market links, has the potential to increase its position as a sustainable income source (Negassa *et al.*, 2024).

Contribution to Food Security

C. abyssinica is an important food security crop in Ethiopia, where it is a traditional staple (Zerihun, 2022). Its tubers are high in carbs, dietary fiber, and vital minerals like calcium and iron, making it a very nutritious food item that contributes to a healthy diet (Bikila *et al.*, 2020). *C. abyssinica* has a somewhat long shelf life when stored properly, and its capacity to be dried and processed into powder increases its availability beyond harvest seasons, minimizing food shortages (Abdisa, 2021).

Aside from its immediate nutritional benefits, *C. abyssinica* promotes food security by creating economic opportunities for smallholder farmers (Ashebir, 2022). The crop's expanding market demand encourages farmers to produce it as both a subsistence and cash crop, allowing households to earn money to buy other foods. Furthermore, its compatibility with intercropping systems enables diverse farming, lowering the risks associated with crop failure.

The tubers can be stored for extended periods of time, increasing availability beyond the harvest season and minimizing vulnerability to food shortages (Gebeyehu *et al.*, 2024). The increasing market demand for *C. abyssinica* provides income-generating opportunities for smallholder farmers, allowing households to purchase other food items and diversify their diets (Ashebir, 2022).

Cultural Significance and Medicinal Value

C. abyssinica has significant cultural and medicinal properties, particularly among Ethiopia's Oromo people, who associated it with strength, health, and wealth (Wayessa, 2018). Beyond its nutritional value, *C. abyssinica* is used in social behaviors such as supplementing breastfeeding women's diets and being served at weddings, holidays, and community events (Duresso, 2018; Keno, 2024). As interest in indigenous and traditional cuisines rises, *C. abyssinica* remains a source of cultural pride and a representation of Ethiopia's rich agricultural legacy (Wayessa, 2016).

C. abyssinica is also thought to have medical benefits, including the treatment of bone fractures and back discomfort, most likely due to its high calcium concentration (Parmar *et al.*, 2017; Abdisa, 2021). Consumption is encouraged for young people, pregnant women, and the elderly since seniors associate it with physical power and endurance (Olkaba and Ayalew, 2024). *C. abyssinica* is associated with traditional medicine and indigenous knowledge systems (Temam, 2021; Abdena and Aga, 2023).

In addition to its medical and dietary benefits, *C. abyssinica* encourages community bonding and intergenerational information transfer. Local traditions guide production, preparation, and consuming practices, preserving indigenous agricultural expertise and cultural heritage (Gebremedhin and Admassu, 2022; Temam, 2021). Despite its acknowledged relevance, there is limited scientific study proving *C. abyssinica*'s health advantages and social roles, emphasizing the necessity for ethnographic and qualitative investigations to capture and conserve this traditional knowledge (Abdena and Aga, 2023; Wayessa, 2016).

CONCLUSION

C. abyssinica is a widely used indigenous root crop that has substantial nutritional, cultural, and economic value, particularly in Ethiopia. Its production and use are intimately

connected to traditional knowledge and practices, reflecting the inventiveness and heritage of local communities. Traditional cultural techniques linked with its cultivation, such as land preparation, intercropping, weeding, fertilizing, crop protection, and harvesting, are critical to increasing yield and guaranteeing long-term production. However, obstacles such as a lack of established agronomic techniques, inadequate knowledge on nutrient management, and vulnerability to pests and diseases reduce crop output. Furthermore, traditional food processing procedures including boiling, drying, and powdering, contribute to increased nutritional content and shelf life, while varied preparation techniques reflect profound cultural traditions among the Oromo people. Despite its advantages, restrictions like long cooking periods, high fiber content, and fuelwood consumption prevent widespread use. Addressing these limits through research and innovation can assist in improving *C. abyssinica* production, processing, and consumption levels. Further research is needed to determine the appropriate tillage frequency, planting spacing, and fertilization rates for *C. abyssinica* productivity. Field trials should focus on identifying best practices for various agro-ecological zones. Future research should be directed towards the development of new *C. abyssinica* based food products, such as fortified flour, snacks, and ready-to-eat meals, which can boost market demand and broaden dietary choices.

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