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CASE STUDY



## Prospecting the potential of black turmeric herbal tea: Cultivation, processing, preparation and marketable characteristics

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#### ABSTRACT

*Curcuma caesia* Roxb. locally called Kali Haldi in India, is a well-known medicinal herb, traditionally used in the management of many health problems including high blood pressure, stomach pain, diarrhea, muscle stiffness, nerve injury, ulcer, cancer, acidity, stomach bloat, gastric, weight management and joint pain. This herb is found to be grown in almost all Indian kitchen yard without any product to be sold in market. The present work explores the potential of unexplored *C. caesia* in the domain of sustainable agro-farming, the herbal tea industry, its cultivation, processing, preventive medicine, and marketable features for the employment generation. The major objectives of this study were to explore the potential of the shoot parts of the *C. caesia* as an herbal tea and explore the potential of *C. caesia* as a means of alternative livelihood, development of a healthy alternative beverage. Manual labour activities were used in cultivation, hybrid methods of dehydration and maceration were used in the processing of herbal tea and packaging were done manually, Door to door marketing and word of mouth were used in the marketing of *C. caesia* herbal tea. For the first time, the study reports the leaves of *C. caesia* as a source of herbal tea, the study also reports potential of *C. caesia* in relation with agro industry prospects, sustainable development, preventive medicine, employment generation and healthy beverage. The present study is a contribution to the mankind in the introduction of *C. caesia* as herbal health tea and put forwards the lines "Let Tea Be a Medicine and Medicine Be a Tea".

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#### INTRODUCTION

Advent from food gatherer to a food producer during the Neolithic age is one of the highest cultural evolutions of man in his history. Since then, the discovery of the tea plant (*Camellia sinensis*) by Shennong dated back to 2737 BC as a hot beverage is considered as another milestone in the history of bringing plant resource into utility, it brought phenomenal assimilation of tea culture in the society and made tea as the highest consumed liquid after water (FAO, 2022). Today the tea industry is a source of livelihood for millions, particularly in developing countries. Global tea production amounts annually to over USD 17 billion, while world tea trade is valued at about USD 9.5 billion,

accounting for an important source of export earnings (FAO, 2022). Like tea plant as a source of revenue and livelihood, there is need of exploration of other herbs that has the potential of livelihood, economy boosting, revenue generation, sustainable agro based industry and better products innovations. Indian Ayurveda Texts, Egyptian Papyrus Ebers and Mesopotamia Cuneiforms from Iraq provide an evident that other than staple food, plant has always been a part of medication and beverage. Using herbs as an herbal tea is as old as the history of man himself, Herbal tea in China originated from Shennong (Lin *et al.*, 2024), Indian herbal tea is as old as the Ayurveda texts of Charak samitha and Sushruta in which decoction and infusions used as herbal tea is found (Rivera & Obon, 2024).

Herbal tea industry is an Agro based industry that provides rural livelihood, revenue generation and cater beverage industry. Herbal tea is considered as better than regular tea (*Camelina chinensis*) in terms of health benefits with the absence of caffeine. Herbal tea is known as tea made of herbs other than *C. chinensis*. Plant materials used in herbal teas include fresh or dried roots, stems, leaves, fruits, flower, seeds, bark, or whole plants from one or more herbal tea plant species (Liu *et al.*, 2013). Herbal Tea has a variety of benefits for human health. Traditional herbal teas are widely consumed by locals for their therapeutic effects due to the biological properties, such as anti-oxidation, anti-inflammatory, antibacterial, anti-diabetes, and anti-cancer activities in presence of polyphenols, flavonoids, terpenoids volatile oils, alkaloids etc. (Ye *et al.*, 2015). Chemomile flower, Rose petals and blue pea flowers are some of the commonly used herbal teas.

In traditional medicine, *Curcuma caesia* Roxb. (Zingiberaceae) is a herb used in various health problems, The rhizomes of *C. caesia* is traditionally used in the treatment of various ailments and metabolic disorders like leukoderma, asthma, tumors, piles, bronchitis, rheumatic arthritis/joint pain, gastric problem, cut/injury to stop bleeding, inflammation, fever, cough, infection, allergy, snake bite, insect bite, toothache, vomiting, impotency, cancer, relax muscle, menstrual disorder, aphrodisiac, inflammation, gonorrhoeal discharges etc. in Indian system of medicine (Das *et al.*, 2013; Pathan *et al.*, 2013). The rhizome is recorded to be antioxidant and antimutagenic (Devi *et al.*, 2015). Methanolic extract of *C. caesia* rhizome prevents the toxicity caused by cyclophosphamide (chemotherapeutic drug) in bone marrow cells by reducing the micronuclei formation; it also prevents the hepatotoxicity and nephrotoxicity caused by cyclophosphamide, it is a supplement in cancer treatment with cyclophosphamide (Devi & Mazumdar, 2016). *Curcuma caesia* rhizome contain 2.82% curcumene, 28.3% camphor, 12.3% arturmerone, 8.2% (Z)- ocimene, 8.2% ar-curcumene, 4.8 % elemene, 4.4% borneol, and 3.3% bornyl acetate (Pandey & Chaudhury, 2003). *Curcuma caesia* is antioxidant and antimicrobial (Monica *et al.*, 2021). Essential oil contains at least 35 volatile oils (Makunthan *et al.*, 2014). Despite the various uses of the *C. caesia* in healing various health issues with recorded useful biological properties, the above ground parts of this herb have not been explored. Therefore, the present work was taken up to explore the potential of *Curcuma caesia* shoot in the category of herbal tea, as a source of rural livelihood and a new sustainable agro based industry.

## MATERIALS AND METHODS

### Plant material

*Curcuma caesia* Roxb. is a rhizomatous herb, reaching a height of 70–100 cm. The inner part of rhizome is blackish blue, verging towards grey, the blue colour is highly variable, depending upon the nature of the soil and age of the rhizome, strongly aromatic; sessile tubers branched, roots fleshy; numerous root tubers. petiole as long as lamina, oblong lanceolate, tip acute, base acuminate,

glabrous, blackish along the sides on the upper half of the mid rib. Inflorescence flowers during monsoon, lateral, bracts large, pink to violet, lower ones streaked green, distributed from North Eastern India to Thailand, Malaysia, Indonesia, and Northern Australia (Orang *et al.*, 2024). It is grown in almost all Indian kitchen yard, despite the various use of this herb in traditional medicine, the potential *C. caesia* shoot has not yet been explored particularly as a herbal tea. The present work is the first of its kind in which *C. caesia* shoot is explored as a wellness product. The tea of kali haldi is useful in the management of stomach bloat, acidity, gastricity, joint pain, weight management, cancer preventive, muscle stiffness, nerve problems, sugar problem, liver problem and high blood pressure, the author put forward the lines “Let tea be a medicine and Medicine be a Tea” in this work. Field propagation, collection of plant material, making of product as an herbal tea, packaging and marketing were carried.

**Cultivation:** The initial experimental plant material was cultivated in the Kitchen garden of the author in the year 1999 at Tadin Village of West Siang District of Arunachal Pradesh by the authors. The commercial pilot cultivation of *Curcuma caesia* was cultivated in a personal plot of the author at Mone Village of East Siang District of Arunachal Pradesh in an area of 500sqm in the month of February 2022 (Figure 1). Rhizomes with eyes were planted by maintaining about one 30cm distance from plant to plant and 70 cm between row to row. Manual weeding were carried out twice in the month of April and June. The mature shoots were collected four times in a year and used in further processes.

**Processing:** Shoots were collected, cleaned in running water; drying methods as mentioned in (Shaw *et al.*, 2016; Ceylan & Gurel, 2016; Arslan & Ozcan, 2012; Janjai & Balan, 2012) were used, withering and maceration were followed as mentioned in (Sharma & Dutta, 2018, Aaqil, M. *et al.*, 2023) to achieve finished product, the finished product sizes ranged from very fine particles to 2mm. These powdered materials were sieved into smaller than 0.1mm (category A), used as herbal tea granule and above categories, more than 0.5 to 1mm sized finished products were used as loose herbal tea (category B).

**Herbal tea preparation:** About 1 gram of processed herbal tea was boiled for two to three minutes in a cup of water and filtered to use (Figure 2), the prepared tea was tested, the powdered herbal tea (category A) was packed in tea bag and used as dipping tea and compared with loose as well as bagged green tea available in the local market of Pasighat town of Arunachal Pradesh, India for the tea characteristics as given in the Table 1.

**Pilot marketing:** A door-to-door pilot marketing along with word of mouth was carried out in the five Districts of Arunachal Pradesh, namely East Siang district, West Siang District, Lower Dibang Valley District, Papum Pare District of Arunachal Pradesh, India. For the pilot marketing, two thousand packets of Black Turmeric Loose Herbal tea and one hundred dipping tea



Figure 1. *Curcuma caesia* plant.



Figure 2. Black turmeric tea packets & prepared teacup.

Table 1. Comparative analysis of *C. caesia* and *C. sinensis* tea.

S. No.	Parameters	Turmeric tea ( <i>C. caesia</i> )	Green tea ( <i>C. sinensis</i> )
1	Colour	Yellowish green	Greenish
2	Taste	Bitter	Bitter
3	Aroma	Turmeric aroma	Tea aroma
4	Change in colour after 4Years	No change in colour and aroma	Brownish within one year

bags were prepared; the packet was branded under the tagline “Let Tea Be a Medicine & Medicine Be a Tea”. One stands up Pouch weighing 50g was sold at 250 Indian Rupee and twenty-eight tea bags in a packet costing Indian Rs 350/-. Presently, under the technical support and Advisory Chairmanship of Temin Payum, the MS Herbiologist, manufacture and sells *C. caesia* herbal tea locally, on Amazon India, website of herbiologistindia.com and Flipkart marketplace.

**Training:** The author has started giving training (2035 trainees) in the villages of Arunachal Pradesh from January 2024 to February 2025 to address sustainable agriculture, livelihood and village industry on the cultivation, harvesting, manufacturing and selling of *Curcuma caesia* herbal tea. The Author, Temin Payum is lovingly known as the “Man of Black Turmeric” among the trainees and customers.

#### Marketable characteristics of *C. Caesia* herbal tea

**Characteristic bitter taste:** The Curcuma Tea taste bitter, the degree of bitterness can be adjusted by using less or more tea leaves as per the taste of user. It can also be used with or without sugar.

**Attractive yellowish colour:** The colour of *Curcuma caesia* tea is yellowish green in colour, that attracts the user, this herbal tea retains its colour for more than four years, whereas the colour of green tea turns into brownish within one and half years.

**Appealing and refreshing aroma:** Another marketable characteristic of *Curcuma caesia* tea is due to its appealing natural turmeric aroma.

**Useful in addressing health:** The *Curcuma caesia* herbal tea is useful in addressing various health issues; it is very popular among the users as the best remedy for stomachache, constipation, regulation of high blood pressure and arthritis.

**Availability of raw material:** The raw material is easily available on cultivation.

**Easiness of cultivation:** Easiness of cultivation is another factor that favours *Curcuma caesia* as an alternative source of herbal health tea. It grows well in all soil types except water logging areas.

**Blend able with other herbs:** Another favorable character of *Curcuma caesia* tea is that it goes very well with other herbs on blending; it can be blended with almost all herbal and regular tea.

**Consumers/ market demand:** Due to the presence of all above characteristics in *Curcuma caesia* herbal tea, there is high demand in market among the consumer.

#### RESULTS AND DISCUSSION

##### Characteristics of *C. caesia* herbal tea and green tea

Table 1 showed the least four outstanding characters of *Curcuma caesia* herbal tea. The colour of both the tea ranges from light green to light yellowish, it has also familiar bitter taste like green tea, *C. caesia* is tea develop characteristic curcuma aroma whereas green tea has a characteristic camellia aroma, but it is found to show vast differences in the change of colour over the time, the *C. caesia* tea retain its green-yellowish colour up to four years but green tea starts to decolors within one and half year.

**Table 2.** Comparative cultivation characteristics of *C. caesia* and *C. sinensis*.

S. No.	Parameters	<i>C. caesia</i> (Turmeric tea)	<i>C. sinensis</i> (Green tea)
1	Major plant component	Curcumol	Caffeine
2	Planting materials	Rhizome	Seedling
3	Plot preparation	Simple tilling	Organized seed bed and well drained field
4	Life of plant	Annual	Perennial
5	Processing	Simple dehydration	Lengthy processing involving vapour heating and pressing before dehydration
6	Utility of plant	Rhizome as well as leaves are used in herbal medicine	Only the tender shoots are used.
7	Labour engagement	Low	Intensive
8	Equipment's	Simple drying machine	Costly heavy machines
9	Farming diversity	Mixed farming with almost all agricultural, horticultural and forestry farming.	Almost monoculture



**Figure 3.** Seven favorable interrelationships of *C. caesia*.

**Comparative cultivation characteristics of *C. caesia* and *C. sinensis***

Table 2 indicated the cultivation processes in which *C. caesia* has various advantages over the tea cultivation. Rhizome is used the cultivation of curcuma tea whereas seedling is needed for the cultivation of green tea; simple plough of land is required in the cultivation of Curcuma tea whereas a systematic drainage system in between the rows are needed to cultivate green tea; Curcuma tea is an annual plant that need no pruning and cutting whereas the Camellia tea need cutting and pruning every year to maintain reachable height. Curcuma tea processing is very simple and whereas the green tea processing needs heavy machinery and long processes including vapour heating and rolling. The whole plant of *Curcuma caesia* can be used in tea and herbal medicine whereas only the tender shoot of green is used as a tea and low labour intensive is required in the whole process of curcuma herbal tea whereas green tea manufacturing is a labor-intensive occupation; further, curcuma is a known immunity booster herb.

**Cost and benefit analysis**

Plantation, wedding, harvesting, processing and packaging was carried out with the help of the family members (as mentioned under acknowledgement) of the author; therefore, no extra money was spent, Ten Thousand two hundred Indian rupees were used in Printing and packaging, fifty Rupees margin per packet were given to the seller.

Gross profit= Rs. 2000 × 250= 4,50,000/-

Total amount given to seller: Rs.2000 × 50=100,000/-

Total Investment =Rs. 10,200/-

Net Profit was calculated by deducting total investment and margin amount given to the sellers from the gross profit  
Gross Profit- Total Investment in pouch printing+ Total margin earned by sellers

Rs. 4,50,000- 10,200+100,000

Rs. 4,50,000-1,10,200 = 2,39,800/-

All the prepared herbal Tea packets were sold out in four months (November 2024 to February 2025) with 61% repeat order.

Not even Shennong, the Chinese emperor-who discovered *C. chinensis* leaves would imagined that tea would be the highest consumed liquid after water, nobody would imagined that tea would be one of the highest agro-based industry in which it encompass revenue generation in the global economy, livelihood for millions of tea garden workers, business for the millions of tea manufacturers, tea sellers, tea stall, the source of income for millions of people engaged in tea business and would be the means of celebration in any occasion, gesture of welcome to guest at home (Lin et al., 2024). The *C. caesia* herbal tea is expected to be the next agrobased industry by the author of this paper. It has the potential of agribusiness, manufacturing industry, cultivation, marketing and related profitable business that address the workers in *C. caesia* farm, manufacturing industry, and marketing with ultimate achievement of revenue generation and healthy tea (Figure 3). There is a need for awareness, education, publication, campaigns and other related activities to make the best use of *C. caesia*.

**Conclusion**

The present work concludes that *C. caesia* is a useful herb that can be used as one of the best alternative option for herbal tea lovers, *C. caesia* has a huge potential that can be explored as a herbal tea industry due to its easiness in cultivation, easiness in propagation, low labour intensive occupation, simple processing with appealing aroma, attractive colour, light bitter taste. The Author concludes that *C. caesia* herbal tea is the next sustainable agro based healthy herbal industry that has the potential to

address livelihood, sustainable agriculture, healthy beverage and revenue generation. Having said that there is need for further investigation, the whole plant part has the potential that can be explored into utility products.

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## DECLARATIONS

### Author contribution statement

Conceptualization, Methodology, Software and validation, Formal analysis and investigation, Resources, Data curation, writing-original draft preparation, Writing review and editing, Visualization, Supervision, Project administration, funding acquisition: T.P.

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