



# Notes on the harvest of *Cryptocoryne spiralis* rhizomes in Southern Tamil Nadu, India

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## Notes on Ethnobotany

### Abstract

**Background:** *Cryptocoryne spiralis* (Retz.) Fisch. ex Wydler, is a helophytic genus of Araceae; its rhizomes have traditionally been used in Southern India as a substitute for Indian Atees (*Ativisha*), a valued crude drug of Indian medicine. This study documents the harvesting practices of *C. spiralis* rhizomes from the wild in the Tirunelveli district, Tamil Nadu, India.

**Methods:** Field surveys were conducted between February and May, 2025, and information was recorded from local people involved in the collection of *C. spiralis*.

**Results:** The collectors usually harvest the rhizomes during summer; one group that comprises about 7-10 persons can collect about 75 kg of dried material per season. The produce was marketed to the local *mandis*, through the middlemen. The collectors received a daily wage of around ₹300 (≈3.15 USD) per person. According to the market trend of May 2025, the cost of dried *C. spiralis* rhizome was around ₹2,500 (≈26 USD) per kilogram; this cost was about 40% lower than that of *A. heterophyllum* rhizomes. Increasing demand had led to overharvesting and a reduction in the natural regeneration of the rhizomes.

**Conclusion:** The study underscores the need for systematic assessments on the local uses, trade, ecological impact, cultivation strategies, and conservation measures to ensure the sustainable utilisation of *C. spiralis*.

**Key words:** Ayurveda; *Aconitum heterophyllum*; *Ativisha*; Nattu Athividayam; Siddha

### Background

*Cryptocoryne* Fisch. ex Wydler is a helophytic genus of Araceae; it is native to the tropical and subtropical regions of South and Southeast Asia. This genus comprises 77 species, of which seven are reported in India (Sasikala 2000). Among them, *Cryptocoryne spiralis* (Retz.) Fisch. ex Wydler is well-known for its ornamental and medicinal applications; it is naturally distributed in Sri Lanka, Southern India, Bangladesh and China. It has long been recognised as a substitute for Indian Atees (*Ativisha* or *Athividayam*), particularly in Southern India (Anandakumar et al. 1982) and Sri Lanka (Petch 1928); it is locally known as 'Nattu Athividayam'.

In *Ayurveda*, certain herbs are considered substitutes for authentic botanical sources; they were known as '*abhava-pratinidhi dravyas*' (unavailable and substitute drugs) (Venkatasubramanian et al. 2010). Based on similarities in the constituents and pharmacological actions, these substitutes are selected; they differ greatly from the adulterants. The authentic botanical source of Indian Atees is the rhizomes of *Aconitum heterophyllum* Wall. ex Royle (API 1986); however, the use of *C. spiralis* in place of *A. heterophyllum* is predominant across Southern India. Previous studies have recorded the use of *C. spiralis* as a substitute for Indian Atees and have developed pharmacognostic and cytomorphological methods for its identification (Anandakumar et al. 1982; Prasad et al. 2012; Adams et al. 2013; Nagarajan et al. 2015a,b). However, the knowledge associated with the harvesting practices of *C. spiralis* rhizomes received little attention. This study documented the collection practices of *C. spiralis* rhizomes in Southern Tamil Nadu.

## Materials and Methods

Several groups harvest *C. spiralis* in the waterbodies of the Tirunelveli district (Tamil Nadu) and its environs, between March and May. Four teams (each comprising about 7-10 members) that actively collect *C. spiralis* were identified through inquiries with herbal *mandi* owners in Tirunelveli district. These teams were met in person; the aim and objective of this study were explained to them in lay terms, and they were requested to elaborate on the method of harvesting *C. spiralis* rhizomes. After obtaining prior informed consent, interviews were conducted in accordance with the code of ethics recommended by the International Society of Ethnobiology (2009). This study documented the inputs given by 35 members across the four teams. The members were asked about the suitable time for collection, its methodology, post-harvest processing, economics and challenges associated with the collection of *C. spiralis*. The interviews were conducted in Tamil, recorded as field notes, and subsequently translated into English. This field survey was conducted between February and May 2025. Yield estimates were done at Pirancheri Lake in Tirunelveli district during May, 2025; five quadrats (1 × 1 m) were randomly established, the collectors were asked to harvest the rhizomes and process them. Cleaned rhizomes were brought to the laboratory, and masses of fresh and sun-dried rhizomes were documented. Representative herbarium specimens were gathered and deposited in the herbarium of St Xavier's College under voucher numbers XCH 41025, 41239, and 41274.

## Results

Collection of *C. spiralis* rhizomes usually begins in March, when water levels in water bodies begin to recede (Figures 1a,b). A few senior persons among the collectors monitored the status of the water bodies in the area, took samples to assess the growth of the rhizomes, and fixed the area for collection. After selecting the area where *C. spiralis* was in full growth, the collectors removed the aerial parts of *C. spiralis* and the clayey floor was dug using a spade (Figures 1c-f). The rhizomes were collected along with the roots and sun-dried. Once dried, they were trampled to remove the clay particles and the roots. The rhizomes were then separated by winnowing (Figure 1g); this final product was stored in gunny bags. The produce was sold to the *mandis* through the middleman; the informants did not know much about the *mandis*.

It was observed that collection in about 1 m<sup>2</sup> area yielded about 500 g of fresh rhizomes; upon drying, it yielded about 200 g of rhizomes. According to the informants, one group consisting of 7-10 members could harvest nearly 75 kg of dried *C. spiralis* rhizomes in a season. During the time of the interview, these workers informed that they receive a daily wage of around ₹300 (≈3.15 USD) per person from the middleman. At the end of the season, the middleman transfers the produce to *mandis* at a cost of about ₹1,500 (≈15.5 USD) per kilogram; this price varies depending on the availability and market demand. According to the market trend of May 2025, the cost of dried *C. spiralis* rhizome was around ₹2,500 (≈26 USD) per kilogram; this cost was about 40% lower than that of *A. heterophyllum* rhizomes.

The informants opine that a minimum buffer period of two years and a perennial water source are required to obtain quality produce. The upsurge in market demand caused a substantial increase in the harvest of *C. spiralis* rhizomes. This reduced the buffer period for the regeneration of the natural population and led to poorly developed rhizomes. Furthermore, the regeneration of *C. spiralis* has also been challenged by the associated arborescent grasses and sedges. Therefore, in recent years, *C. spiralis* has been sold along with its rootlets to meet the demand.



Figure 1: Collection of *C. spiralis* in Pirancheri lake, Tirunelveli district of South Tamil Nadu; a) habitat of *C. spiralis*; b) habit of *C. spiralis*; c) clearing the site by removing the aerial parts of *C. spiralis* and digging d-f) harvesting the underground parts and g) the final product

### Discussion

Indian Atees (*Ativisha*) is an important crude drug in *Ayurveda* and *Siddha*; the tubers of *A. heterophyllum* are the accepted source of it. In the southern parts of India, the rhizomes of *Cyperus rotundus* L., and *C. spiralis* have long been used as substitutes for Indian Atees; among them, the use of the latter is predominant. The rhizomes of *C. spiralis* are traditionally

used to treat diarrhoea, vomiting, fever, cough and jaundice (Prasad et al. 2014). The alcoholic extract of *C. spiralis* showed antimotility and antisecretory effects in animals with castor oil-induced diarrhoea (Prasad et al. 2014). This preliminary pharmacological evidence supported the use of *C. spiralis* as a substitute for *A. heterophyllum*; however, more studies are needed to substantiate it.

In the study area, collection of *C. spiralis* rhizomes is a minor but well-known source of seasonal employment. Fresh rhizomes taste acrid, and accidental chewing irritates due to the presence of calcium oxalate raphides. Until recently, these rhizomes were used locally as a minor flavouring additive in tobacco products to impart a sharp taste. In parts of Karnataka, the rhizomes of *C. spiralis* are used as a substitute for Indian Valerian (*Granthika Tagara*; *Valeriana jatamansi* Jones ex Roxb.) (Yoganarasimhan and Shantha 2003); these evidences warrant the need of documenting the economic importance and local uses of *C. spiralis*.

This study indicated that the harvesting pattern was not sustainable, which threatens not only *C. spiralis* but also other associated taxa. *Cryptocoryne tambraparaniana* was reported from the banks of Tamrabharani at Cheranmadevi and Karunkulam in the Tirunelveli district (Rajakumar et al. 2010); this survey revealed that the type locality of *C. tambraparaniana* also falls within the active harvest sites of *C. spiralis*. Mass harvesting of *C. spiralis* might also affect the population of *C. tambraparaniana*, a stenoendemic taxon of the study area; more studies are needed in this regard.

Unsustainable harvest of medicinal plants was identified as one of the major factors for the erosion of medicinal plant genetic resources across the world (Nachiappan et al. 2022); in India, most of the medicinal plant resources were obtained from the wild. A study from Himachal Pradesh indicated that about 80% of these practices were destructive, and such practices caused a serious threat to about 40% of the medicinal plant species (Sharma & Kala, 2022). Since *C. spiralis* is predominant in unprotected wetlands, its unsustainable harvest has received little attention. Comparable exploitation of *C. wendtii* by the aquaculture industries has been reported in Sri Lanka (Dissanayake et al. 2010).

This preliminary observation has a few limitations, as it did not provide quantitative data about *C. spiralis* harvesting across the area, its actual demand, supply chain, and its long-term impact on biological diversity. Nevertheless, it provides the first account of the harvesting practices of *C. spiralis* in Southern Tamil Nadu and highlights the need for detailed ethnobotanical, ecological, and market-based investigations to develop sustainable harvesting strategies and conservation measures for this medicinally important species. Studies on identifying superior varieties, optimising agro-climatic requirements and developing cultivation technologies are also important for reducing stress on wild resources.

## Conclusion

Many taxa of *Cryptocoryne* are cultivated as aquarium plants and valued for their aesthetic appeal. Among them, *C. spiralis* holds additional significance due to its therapeutic usage. To the best of our knowledge, this is the first report documenting the harvesting practices of *C. spiralis* rhizomes from the wild. This preliminary field survey highlighted the need for detailed investigations into the demand-supply dynamics of this bio-resource, since the collection depends solely on the wild resources. Further efforts should focus on documenting its local applications, the ecological and economic impact of current harvesting methods. Development of agrotechniques for the cultivation of *C. spiralis* might reduce the stress on wild resources while providing quality raw material.

## Declarations

**List of abbreviations:** Nil

**Ethics approval and consent to participate:** The protocols were reviewed and accepted by the Research Advisory & Ethics Committee of Xavier Research Foundation, St Xavier's College, Palayamkottai, Tamil Nadu, India.

**Consent for publication:** Obtained -all people shown in images agreed to have their image published.

**Availability of data and materials:** Data will be shared upon a reasonable request.

**Competing interests:** The authors declare that they have no conflict of interest.

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**Author contributions:** VC and PP did the field work; PP and SI drafted the manuscript.

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