

## ORIGINAL ARTICLE

# Pharmacognostic study of *Chamaecyparis lawsoniana* (Murr.) Parl.: A drug used in Homoeopathy

Anshu Rathi, D. Suresh Baburaj<sup>1</sup>, E. N. Sundaram, Sunil Kumar, Anil Khurana<sup>1</sup>, Raj K. Manchanda<sup>1</sup>

### ABSTRACT

The pharmacognostic profile of crude drug has a key role in standardization for quality, purity and drug identification. The present study deals with pharmacognostic evaluation of aerial part of *Chamaecyparis lawsoniana* (Murr.) Parl. a drug used in homoeopathic system of medicine for diverse clinical uses such as terrible pain in stomach, tumors, keloid, warts and lipoma of thigh. The study includes collection, identification, macroscopy, microscopy and organoleptic characteristics of aerial part of *Chamaecyparis lawsoniana*. Anatomically the leaf is distinguishable into a layer of the epidermis followed by parenchymatous mesophyll and resin duct in the parenchymatous cortex. Powder microscopy shows the presence of epidermal cells, parenchymatous cells and tracheids. These observations may be used as pharmacopoeial standards for identification of *Chamaecyparis lawsoniana*.

**Keywords:** *Chamaecyparis lawsoniana*, Pharmacognosy, Resin duct

### INTRODUCTION

*Chamaecyparis lawsoniana* (Murr.) Parl. (Synonym: *Cupressus lawsoniana* Murr.) of the family Cupressaceae, is a large tree 43–55 m in height. The plant is known by the name Port-Orford-Cedar or Lawson's cypress. Its distribution is restricted to the coastal forests of Southwestern Oregon and Northern California in the USA.<sup>[1]</sup> In India, it is grown in gardens of the hills of West Bengal and Nilgiris of South India. Leaves are scaly 3–5 mm long, opposite in pairs, closely appressed to the branchlets, with narrow white markings on the underside. The lateral leaves are much longer than facial leaves. Flowers are monoecious, minute, at the ends of the branchlets. Female cones are globose, green at first but turn brown when mature, about 8 mm diameter, with 6–10 scales, each subtending 2–5

winged seeds. The male cones are 3–4 mm long, dark red, turning brown after pollen release in early spring. The bark is reddish brown and fibrous to scaly in vertical strips. The wood has a characteristic pungent, "ginger-like" odor.<sup>[2,3]</sup>

The aerial part of *Chamaecyparis lawsoniana* is often employed in traditional medicine. The drug is mentioned in the homoeopathic literature<sup>[4,5]</sup> and used clinically for severe pain in stomach, keloid, tumors, lipoma of thigh and warts. Its characteristics have been proved in a fragmentary way by Burnett, who had to relinquish the proving on account of the "terrible pains it caused in the stomach." He concludes from his experience that the action is very like that of *Thuja*, and he has successfully used it as a variant of that remedy and of *Sabina* in the cure of tumors: Cocks-comb growth in the mouth; lipoma of thigh;

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Senior Research Fellow, Research Officer/Scientist-4, Former Assistant Director, Central Research Institute (H), Noida, Uttar Pradesh, Survey Officer, Deputy Director, Director General, Central Council for Research in Homoeopathy, Janak Puri, New Delhi, India

##### Address for correspondence:

Dr. Anshu Rathi,  
Drug Standardization Unit,  
Central Research Institute (H),  
Noida, Uttar Pradesh, India.  
E-mail: [anshurathi@rediffmail.com](mailto:anshurathi@rediffmail.com)

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keloid.<sup>[6,7]</sup>

Chemical compounds of *Chamaecyparis lawsoniana* have been reported to demonstrate antioxidant, antiviral, antibacterial and antifungal properties.<sup>[8-16]</sup> Earlier publications have shown that *Chamaecyparis lawsoniana* wood has excellent decay and termite resistance.<sup>[17-20]</sup> Chemically, the plant is reported to have essential oils, viz. Terpinen-4-ol (22.0%), Sabinene (21.0%), camphor (7.8%), Citronellol (7.3%),  $\gamma$ -Terpinene (7.0%), Diterpenes viz. Ferruginol, Pisiferol and its epimer 5-episiferol, formosanoxide, trans-communic acid, torulosal, sesquiterpene oplopanonyl acetate and the germacrane 4b-hydroxygermacra-1 (10)-5-diene.<sup>[21,22]</sup> However, literature reveals that there are no pharmacognostic standards recorded especially for aerial part of this drug. In view of this fact and importance of *Chamaecyparis lawsoniana* in Homoeopathy, the present study has been carried out involving, macroscopical and microscopical analyses of stem, leaf and cone of the plant<sup>[23]</sup> and the microscopical method is one of the best methods for establishing the correct identification of the source of material.<sup>[24]</sup> The results of this study may be useful in the determination of characters for its quick identification and quality assurance of raw drug.

## MATERIALS AND METHODS

The plant materials (aerial part) of *Chamaecyparis lawsoniana* were collected during the month of July 2013 from Kodaikanal hills (Dindigal district, Tamil Nadu,) and taxonomically identified by the Survey of Medicinal Plants and Collection Unit, Emerald, Nilgiris District, Tamil Nadu, India were preserved in Formalin-acetic acid-alcohol fixative and used for anatomical studies following the method of Wallis.<sup>[25]</sup> Epidermal peels were taken by scraping the leaves with a razor blade. Free hand sections were cut and stained in safranin-fast green combination, following the method of Johansen.<sup>[26]</sup>

## OBSERVATIONS AND RESULTS

### Macroscopical Studies

The macroscopical descriptions based on Figures 1(a) and 1(b) is as follows:

#### Twigs

Fan-shaped, flattened, upper surface dark-green, lower surface significantly lighter in color.



**Figure 1:** (a) *Chamaecyparis lawsoniana*, whole plant (b) Twig of *Chamaecyparis lawsoniana*

#### Leaves

Decussate scale such as closely imbricate, ovate, acute, 2–3 mm long, linear to circular, apex acute to acuminate; facial leaves flat and lateral leaves folded.

#### Cones

Purplish to reddish brown, glaucous, globose, 6–12 mm in diameter; scales 5–9, each fertile scale with 2–4 seeds. Seeds 2–5 mm; wing equal to or wider than seed.

### Microscopical Studies

#### Leaf

The Transverse Section (TS) of leaf showed isobilateral structure with obtuse triangular shape in outline [Figure 2a]. The epidermis is single layered, covered with thick cuticle, and traversed with sunken stomata. The hypodermis is single layered as well as multi-layered at the edges. resin ducts vary from 2 to 4 and are present on abaxial side. The mesophyll is differentiated into single layered palisade cells [Figure 2b] and 3–4 layered spongy tissue with small intracellular space. The meristele is present in the center with single vascular bundle which consists of phloem (ph), xylem (xy) and transfusion tissue (tt) [Figure 2c]. Surface study showed stomatal zone at the lower corner of the abaxial surface of a lateral leaf [Figure 2d and e].

#### Stem

The TS of stem showed 3–4 layered more or less lignified tangentially elongated cork cells with occasional patches of single layer of epidermal cell covered with thick cuticle; cortex 8–10 layers of parenchyma, cells polygonal and often contains starch grains and crystal of Calcium oxalate; followed by 3–4 layers of collapsed cork cambium. Endodermis is not distinct. phloem consists of sieve tubes and

parenchyma with alternate layers of isolated phloem fibers and mrs which often interrupt the ph which get widened toward cortex and filled with starch grains. The xylem is broad, and separated by 1–2 seriate and composed of tracheids, early and late wood and pith composed of small parenchymatous cells [Figure 3a-d].

### Seed

The seed coat showed the presence of three layers: The outer most layer is epidermal consisting of round to rectangular papillate cells; the middle layer is tough and stony with wavy margin and have 4 alternate resin vesicles (rvs), innermost layer consists of 2–3 layers of collapsed parenchyma tissue towards the terminal side of the wing. Perisperm consists of papery layer surrounding the embryo. Cotyledons (cots) parenchymatous, thin-walled without any aleurone/starch grains [Figure 4a and b].

### Organoleptic Character

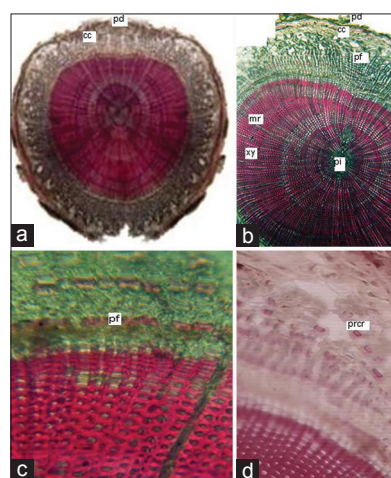
Odor balsamic when rubbed between the fingers; taste camphoraceous, turpentine and bitter.

## DISCUSSION AND CONCLUSION

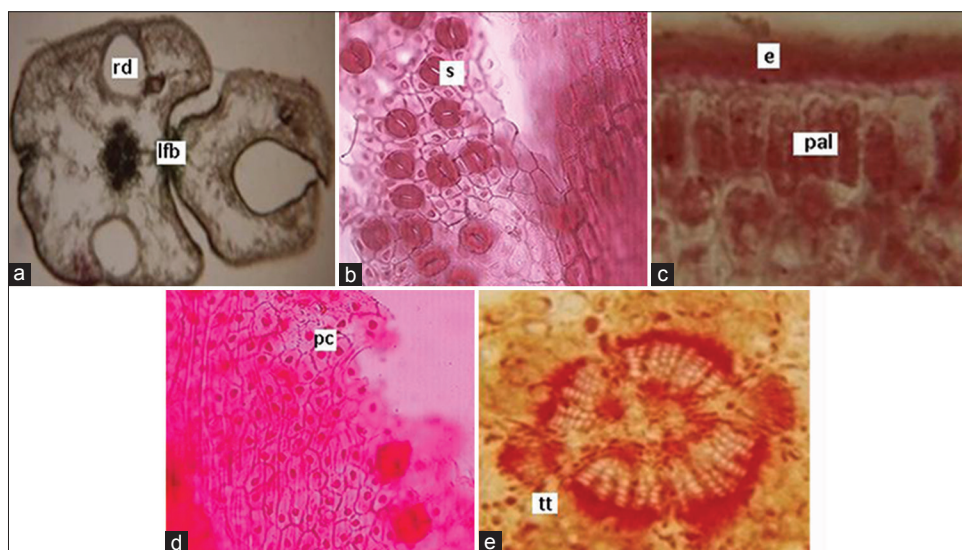
The macroscopic and microscopic methods are the simplest methods for establishing the correct identification of plants or plant raw drugs or plant parts.<sup>[27]</sup> The macroscopic characters of twigs, leaves and cones of *Chamaecyparis lawsoniana* serve as diagnostic parameters. Microscopical studies indicated the presence of meristele in the center with single

vascular bundle which consists of phloem, xylem and transtution tissue in leaves. Resin ducts vary from 2 to 4 and are found on abaxial side of leaves. Four alternate resin vesicles, epidermis papillate and thin cots parenchymatous are seen in seed. Broad xy composed of tracheids and parenchymatous cells and elongated cork cells with occasional patches of a single layer of epidermal cells covered with thick cuticle of stem are the important diagnostic characteristics of the plant *Chamaecyparis lawsoniana*.

The pharmacognostic evaluation of *Chamaecyparis lawsoniana* which comprises of macroscopic and microscopic characteristics is the important features



**Figure 3:** (a) Transverse section of stem X4 (b) Transverse section of stem X10 (c) Transverse section of stem showing alternate layer of phloem fibre X40 (d) Transverse section of stem showing prismatic crystal X40. c-cortex, pf-phloem fiber, prcr- prismatic crystal, pd-periderm, xy-xylem, mr-medullary rays, pi-pith



**Figure 2:** (a) Transverse section of leaf scale X4 (b) Transverse section of leaf scale through lamina showing single layer of palisade X40 (c) Transverse section of leaf scale showing vascular bundle X40 (d) Surface views of leaf with papillate epidermal cells X10 (e) Surface views of leaf with stomata X40. rd-resin duct, lfb- leaf bundle, s-stomata, e-epidermis, pal-palisade, tt-transition, xy-xylem, pc-papillate cells





**Figure 4:** (a) Transverse section of seed  $\times 10$  (b) Transverse section of leaf seed a portion enlarged  $\times 40$ . rd-resin duct, n-nucellus, em-embryo, pe-papillate epidermis, stc-stone cells, cpr-collapse parenchyma

for selection of genuine raw drug or plant parts. Therefore, the pharmacognostic standards laid down for the first time in this study would be useful in identification and standardization of the plant material toward quality assurance of raw drug and for preparation of monograph on the plant, which may also act as reliable pharmacognostical markers in determining authenticity and identifying adulteration of crude drug.<sup>[28]</sup> The drug manufacturers can also utilize above described characters for identification and authentication of raw drug material for preparation of homoeopathic drug *Chamaecyparis lawsoniana*.

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## होम्योपैथी में प्रयुक्त औषधि कैमीसाइपेरिस लासोनियाना का भेषज अभिज्ञानी अध्ययन

### सार

अपरिष्कृत औषधि की भेषज अभिज्ञानी प्रोफाइल की गुणता, शुद्धता तथा औषधि निर्धारण हेतु मानकीकरण में प्रमुख भूमिका होती है। वर्तमान अध्ययन भयंकर पेट दर्द, अर्बुद (ट्यूमर), कीलॉइड, चर्मकील (मस्से) तथा ऊरु वसाबुंद जैसे विविध नैदानिक उपयोगों हेतु होम्योपैथिक आयुर्विज्ञान प्रणाली में प्रयुक्त औषधि कैमीसाइपेरिस लासोनियाना अथवा क्यूप्रेसस लासोनियाना (कुल: क्यूप्रेससी) के वायवी भाग के भेषज अभिज्ञानी मूल्यांकन से संबंधित है। अध्ययन में कैमीसाइपेरिस लासोनियाना के वायवी भाग के संग्रह, निर्धारण, स्थूलदर्शिकी, सूक्ष्मदर्शिकी तथा इंद्रियग्राही अभिलक्षण सम्मिलित हैं। शारीर की दृष्टि से पर्ण बाह्यत्वचा की किसी परत में विभेद्य होती है, जिसके नीचे सार-ऊतकी पर्णमध्योतक तथा सार-ऊतकी प्रांतस्था में रेजिन वाहिनी होती हैं। चूर्ण सूक्ष्मदर्शिकी अधिचर्म कोशिकाओं, रेजिन वाहिनी, सार-ऊतकी कोशिकाओं तथा वाहिनिकायों की उपस्थिति दर्शाता है। इन प्रेक्षणों का उपयोग कैमीसाइपेरिस लासोनियाना के निर्धारण हेतु मान्य औषधकोशीय मानकों के रूप में किया जा सकता है।

**मुख्य शब्द:** कैमीसाइपेरिस लासोनियाना, भेषज अभिज्ञान, रेजिन वाहिनी।

