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# *Chamaecyparis lawsoniana*: A review of literature

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**Abstract**
The aerial part of *Chamaecyparis lawsoniana* is often employed in traditional medicine. The drug is mentioned in the homoeopathic literature and used clinically for severe pain in stomach, keloid, tumors, lipoma of thigh and warts. The present article shows the history and usage of *Chamaecyparis lawsoniana* in bacterial and viral infection.

**Keywords:** *Chamaecyparis lawsoniana*, homoeopathic, viral

## Introduction

*Chamaecyparis lawsoniana* (Murr.) Parl. 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. In India, it is grown in gardens of the hills of West Bengal and Nilgiris of India [1].

The aerial part of *Chamaecyparis lawsoniana* is often employed in traditional medicine. The drug is mentioned in the homoeopathic literature 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 [2].

Port-Orford-cedar (*Chamaecyparis lawsoniana*) grows naturally in a limited area in coastal northern California and southern Oregon. Distribution is spotty and limited to those sites with the most consistent summer moisture. It grows on sites with a wide variety of soil types (often poor), with a wide range of temperatures, and with many other tree species. Port-Orford-cedar grows, and can dominate some stands, in all vegetation zones within its range from the coastal Sitka spruce-western hemlock forests to high elevation true fir forests and open pine-dominated forests on ultramafic soils in the interior [3]. Cedar usually grows with several other conifers. It is most dominant on wet, cool sites on ultramafic soils, but reaches its largest size and commercial value on productive soils along the coast near the northern end of its range. Except on the most music, productive soils and some ultramafic areas, understory vegetation is shrubby and dense.

Port-Orford-cedar has few biotic enemies that cause widespread serious damage, although effects of browsing are variable. The exception is a root rot caused by Phytophthora lateralis that has spread throughout much of the cedar's range since 1952. Stands have been eliminated from. some habitats, and the commercial status of the species is threatened throughout its range [4].

The root rot attacks only Port-Orford-cedar, and it kills trees of all sizes in all environments where the species is exposed to it. The root rot spread from an unknown source into ornamental plantings outside the native range, from there throughout the northern part of the commercial range, and now has reached all but the more remote areas of the range of the cedar. There is no known genetic resistance or established chemical control. The root rot moves in water via aquatic spores; as spores in mud transported by people, machinery, or animals; or by growing through root grafts between adjacent trees. Dry conditions reduce the danger of spread by spores but do not kill the fungus or its resting spores. The few data available indicate that soil at an infected site will contain infectious spores for 3 years after the last host tree has died [5].

Wood from Port-Orford-cedar has been used for many purposes, but its use has been limited by its supply, first to the Pacific Coast; then to certain specialty products; and, since the 1950's, to the export market, particularly Japan. High prices have been paid for it almost throughout its history. Production peaked in the 1920's and has generally declined since, although prices have continued to rise. Harvest has been accelerated by the effects of root rot and presently exceeds growth [6].

Appropriate future management of Port-Orford-cedar will differ substantially from that of other species. It must include consideration of (1) the market peculiarities, which for cedar differ from those of other commercial timbers; (2) cedar's potential uses, which are not reflected in the current export-dominated market; and (3) the details of the major disease, which limits the commercial range and complicates production [7].

## History of Use

The primary uses and markets for Port-Orford-cedar changed drastically within its first century of use as a commercial timber. Aboriginal Americans and European settlers, who entered the range of cedar in the early 1850's, used it for a variety of purposes, including housing, furniture, and fuel. A mechanical sawmill produced lumber for coastal Oregon gold mines (Oregon Historical Records Survey 1942), and a second mill, at Port Orford, sawed the first lumber shipped to San Francisco in 1853 [8].

Cutting for the California market expanded to mills along the Coquille River and around Coos Bay; by the late 1860's the latter area produced most of the cedar lumber cut. Early consumption of Port-Orford-cedar wood was apparently limited to the Pacific coast: two prominent dendrologists from the eastern United States made a special side trip to Coos Bay to see whether cedar lumber used in Portland, OR, came from the tree they knew as the ornamental Lawson's cypress. The species had become a popular garden tree in Europe after British plant collectors obtained seed from interior California in 1854 [9].

**Role in viral infection**

Ethanolic extract of the green part of *Chamaecyparis lawsoniana* was tested for antiviral activity and toxicity in tissue culture. All experiments were carried out in confluent human embryo lung fibroblasts. Treatment of fibroblast cells with extracts after viral inoculation was effective in inhibiting the replication of herpes simplex virus type 2 (HSV-2). The critical time for virus inhibition was 4 to 5 h after virus absorption. The antiviral activity was assayed employing the techniques of viral plaque and yield reduction.[10] Toxicity of *Chamaecyparis lawsoniana* in uninfected cells was studied as alteration of cell morphology, cellular viability and inhibition of host cell DNA synthesis. Herpes simplex virus inhibition occurred in presence of extract concentration of 0.5 micrograms/ml, whereas concentrations exceeding 5 micrograms/ml and 140 micrograms/ml were found to be cytotoxic when evaluated with inhibition of host DNA synthesis and cellular viability respectively. Results suggest that further investigations concerning the isolation of substances responsible for antiviral activity and an effort to define the mechanisms of action are warranted [11].

**Role in bacterial infection**

Multidrug-resistant (MDR) staphylococci have become a major health risk, in terms of both nosocomial and community- acquired infections. Methicillin-resistant Staphylococcus aureus (MRSA) has been headline news in the UK for the past few years, resulting in considerable public awareness of the potentially lethal consequences of an MRSA infection [12].

As part of an on-going project to characterize compounds from immature conifer cones with antibacterial or modulatory activity against multidrug-resistant (MDR) strains of Staphylococcus aureus, eight compounds were isolated from the cones of *Chamaecyparis lawsoniana*. The active compounds were mainly diterpenes, with minimum inhibitory concentrations ranging from 4 to 128 microg/ml against MDR effluxing S. aureus strains and two epidemic methicillin-resistant (EMRSA) clinical isolates.[13] The compounds extracted were the diterpenes ferruginol, pisiferol and its epimer 5-epipisiferol, Formosan oxide, trans-communic acid and torulosal, the sesquiterpene oplopanonyl acetate and the germ crane 4beta-hydroxygermacra-1(10)-5-diene. Some of these compounds also exhibited modulatory activity in potentiating antibiotic activity against effluxing strains and ferruginol, used at a sub-inhibitory concentration, resulted in an 80-fold potentiation of oxacillin activity against strain EMRSA-15. An efflux inhibition assay using an S. aureus strain possessing the MDR NorA efflux pump resulted in 40% inhibition of ethidium bromide efflux at 10 microM ferruginol (2.86 microg/ml) [14].

Several species of Chamaecyparis have been shown to possess insecticidal activity. Termiticidal activity has been reported for the heartwood of C. lawsoniana and seed extracts of this species exhibited juvenilising activity against the yellow mealworm beetle Tenebrio molitor.

*Chamaecyparis lawsoniana* (Murray) Parlatore, also known as Lawson's Cypress or Port-Orford cedar is a native tree of North America. It is found in coastal and mountainous regions of southwest Oregon and northern California. There is very little reported on the use of Chamaecyparis species in traditional medicine [15] The Southern Kwakiutl Indians of British Columbia used the leaves, branch tips and bark of C. nootkatensis to treat sores, arthritis and rheumatism, but the Salish people of British Columbia consider that illness could result from inhaling the strong odour of Chamaecyparis. However, all species have hard, aromatic wood which is highly prized and has been used by Native American peoples to make bows, canoe paddles and dishes [16].

In a recent study, the essential oil extracts of Port-Orford-cedar oil (*Chamaecyparis lawsoniana*) has been evaluated for possible dermal toxic effects on mice and rabbits. Mice were tested for their response to both extracts utilizing a local lymph node assay. a 50% concentration did show a positive response at 3.3. Port-Orford-cedar oil extract did not show a positive response at concentrations of 0.5%, 5% or 50%. An acute dermal irritation study using rabbits had a primary irritation index (PII) of 3.3 with 100% Port-Orford-cedar oil extract [17]. This was reduced to a PII of 0.625 when diluted 1:1 with olive oil. Undiluted western juniper oil extract had a PII score of 2.7. While a 5.0% solution had a PII score of 0.3, a 0.5% solution of western juniper oil was a non-irritant. It would appear that animals bedded on wood shavings have contact with essential oils at concentrations far less than the 2% maximum by weight obtained by steam distillation extraction. These concentrations did not elicit a hypersensitivity response [18].

Anti-staphylococcal activity has been previously demonstrated for many of the isolated compounds but here we report their activity against clinically relevant MDR and MRSA clinical isolates, and report for the first time the resistance modifying activity of some of these compounds against virulent S. aureus strains. Furthermore, we report the full 1H and 13C NMR data for 5-epipisiferol and trans-communic acid. 5- Epipisiferol has previously been synthesized [19].

**Conclusion**

The pharmacognostic profile of crude drug has a key role in standardization for quality, purity and drug identification. *Chamaecyparis lawsoniana* (Murr.) Parl. of the family Cupressaceae is a boon in homeopathy.

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