

# Essential oil composition of *Taxus wallichiana* Zucc. from the Northern Himalayan region of India†

Merajuddin Khan,<sup>1</sup> S. C. Verma,<sup>1</sup> S. K. Srivastava,<sup>1\*</sup> A. S. Shawl,<sup>2‡</sup> K. V. Syamsundar,<sup>3</sup> S. P. S. Khanuja<sup>1</sup> and Tej Kumar<sup>2‡</sup>

<sup>1</sup> Central Institute of Medicinal and Aromatic Plants, PO CIMAP, Lucknow 226015, India

<sup>2</sup> Regional Research Laboratory, Santnagar, Srinagar 190005(J & K), India

<sup>3</sup> Central Institute of Medicinal and Aromatic Plants, Field Station, GKVK PO Bangalore 560065, India

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**ABSTRACT:** The leaves of Indian yew *Taxus wallichiana*, growing in Gulmarg, Jammu and Kashmir, on hydro-distillation, gave 0.025% oil on a fresh weight basis. GC and GC-MS analysis of the oil resulted in the identification of 62 constituents, representing 93.3% of the oil. The main constituents identified in the leaf oil were (*E*)-2-octen-1-ol (14.5%), *n*-pentacosane (8.1%), caryophyllene oxide (7.1%), 1-octanol (6.5%), hexanoic acid (5.5%) and (*Z*)-3-hexenol (4.1%). Copyright © 2006 John Wiley & Sons, Ltd.

**KEY WORDS:** *Taxus wallichiana* Zucc.; Taxaceae; essential oil composition; (*E*)-2-octen-1-ol; *n*-pentacosane; caryophylleneoxide; 1-octanol; hexanoic acid; (*Z*)-3-hexenol

## Introduction

*Taxus* is a genus of evergreen trees or shrubs, distributed in the Northern Hemisphere, i.e. Europe, North America, Northern India, China and Japan. Some species are grown in gardens for their graceful foliage and scarlet fruits. The typical tree-like form is not much planted for ornamental purpose due to its slow growth, but shrubby garden forms are popular. In India one species of Himalayan yew, *Taxus wallichiana* Zucc. (sometimes referred to as *T. baccata*), is found as an evergreen tree, in the temperate Himalayas at altitudes between 1800 and 3300 m and in the hills of Meghalaya and Manipur at an altitude of 1500 m.<sup>1</sup>

In contrast to the other yews, the Himalayan yew has a remarkable history of medicinal uses. It is also interesting to note that Himalayan yew does not contain the toxic taxine, which is present in the European yew, *T. baccata*. A medicinal tincture made from the young shoots of Himalayan yew has long been used for the treatment of headache, giddiness, feeble and falling pulse, coldness of the extremities, diarrhoea and severe biliousness. The leaves are credited with emmenagogue and anti-spasmodic properties. They are employed for the treatment of hysteria, epilepsy and nervousness, and as a lithic in calculas complaints. The aqueous extract of leaves shows a depressant effect on the central nervous system in rats, indicating the presence of a tranquilizing

effect. In a study on the antifertility activity of the leaves, some fractions of the petroleum ether, alcoholic and aqueous extracts inhibited pregnancy in albino rats, and some others exhibited partial or complete resorption at term.<sup>1</sup> *T. baccata* has been reported to be the source of the drug Zarnab, which is very frequently prescribed in the Unani system of medicine.<sup>1–3</sup> All parts of the tree are poisonous; it has been used as a poison since the time of Julius Caesar. However, the fleshy aril part of the plant is nonpoisonous, hence it is eaten by tribal populations. It is credited with carminative, expectorant and stomachic properties. Extracts of *T. baccata* can be added to cosmetics, such as hair-lotions, rinses, beauty and shaving creams and dentifrices.<sup>1</sup> It is also used as a colouring matter and its wood is burnt for incense.<sup>4</sup>

After the novel discovery of anticancer drug Taxol from *T. brevifolia*, by Wani and Wall<sup>5</sup> in 1971, tremendous work has been carried out on the chemical investigation of almost all parts (needles, bark, roots, seeds and heartwood) of several yew species,<sup>4,6–18</sup> resulting in the isolation and characterization of over 300 taxoids. Besides the widespread occurrence of taxoids, the yew also contains steroids like ecdysteroids, responsible for insect moulting activity, terpenoids like rhodoxanthin, responsible for the red colour of the aril surrounding the yew seeds, biflavones like amento-flavones, which bind the GABA receptor at the benzodiazepine binding site, lignans with different biological activities, sugar derivatives and other important compounds like uncharacterized pro-anthocyanidins. Compounds of this class probably colour the red paste made from the bark of Himalayan yew, used by the Brahmins of India to mark their foreheads with a red dot. To the best of our knowledge essential oil composition and

\* Correspondence to: S. K. Srivastava, Central Institute of Medicinal and Aromatic Plants, PO CIMAP, Lucknow 226015, India.  
E-mail: santoshkumar\_1955@yahoo.com

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‡ Previously at CIMAP, Field Station Pulwama, Srinagar (J & K).

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