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# Essential oil composition of *Thymus linearis* Benth. Collected from J&K region of India

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**Abstract**
*Thymus linearis* Benth. was collected from Faculty of Forestry, Benhama, Watlar, Ganderbal, SKUAST-Kashmir during the summer season. The hydro-distilled essential oil was analysed by gas chromatography (GC) and gas chromatography–mass spectrometry (GC–MS). A total of 15 constituents, representing % of the total oil composition, were identified. Some major components found were thymol, p-cymene, α-terpinene and ϒ-terpinene. Also significant amounts of carvacrol, borneol, terpinen-4-ol and thymyl methyl ether were found present in this essential oil. The presence of high phenol and essential oil contents in this species make it a suitable substitute for common thyme oil.

**Keywords:** *Thymus linearis* Benth, essential oil, GC–MS; thymol, α-terpinene, ϒ-terpinene; p-cymene

## Introduction
*Thymus linearis* Benth. Commonly known as 'Himalayan-thyme'. It belongs to family Lamiaceae and is distributed usually in the Himalayan region of India [1]. It is used against asthma, worm, weak-vision, oral problems eczema, psoriasis and for the treatment of menstrual problems also [2-4]. This plant has been reported for its antimicrobial, anticancer, antioxidant and antimalarial properties [5, 6]. Essential oil of *Thymus linearis* Benth. Plant mainly consists of chemicals like thymol, γ- terpinene, and p-cymene [7]. The essential oils of Thymus species are complex combinations of a varied variety of molecules mainly thymol and carvacrol. Due to presence of these phenolic compounds essential oil of this species shows antibacterial and antifungal activities [8, 9]. *Thymus linearis* Benth. is also reported to substantial activity against different bacterial and fungal and viral strains [10-12]. The above facts reinforce the opportunity of its profitable commercial cultivation of *Thymus linearis* Benth. in Kashmir.

## Materials and Methods
### Isolation of essential oil
Fresh parts of the plant *Thymus linearis* Benth. were collected from Faculty of Forestry, Benhama, Ganderbal, SKUAST-Kashmir. Air-dried aerial parts of *Thymus linearis* Benth. were submitted to hydro distillation, using Cleavage-type apparatus for 3 hours, according to the standard procedure with following observations to be recorded.

### GC-MS analysis
GC-MS analysis of the oil was performed on a Perkin Elmer SQ8 C MS with Clarus 680 GC coupled with Elite 5 MS using (30m x 0.25mm x 0.25um) Capillary Column, with oven programming 60 to 240 at the rate 3°C / min Helium was used as carrier gas (flow rate 1 mL/min), injector temperature was at 290°C. The MS were recorded under EI ionization conditions (70eV) with split ratio 1:100.The compounds were identified by matching their mass spectra to those recorded in NIST/ Wiley Library and published literature and comparing with GC retention indices [13].

## Results
The constituents found in the oil were fifteen in number viz., α-terpinene, ρ-cymene, linalool, ϒ-terpinene, Thymol, Thymyl methyl ether, Carvacrol, Thymol acetate, Caravacrol acetate, Carophylene, β – carophylene, α –Humulene, Syn α-carophyelene, β –Bisabolene and Syn-Bisabolene.

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