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Low Molecular Weight Volatiles in Western Himalayan Artemisia

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Artemisia is one the most widely studied genus for its chemical composition, morphology and chemical diversity. Artemisia, family Asteraceae, is widely distributed throughout the world, especially in North temperate regions, South Africa and America; most common on arid soils of W. United States and Russian Steppes, with approximately 400 species and 32 in India [1]. Recently, two new species viz., *A. filiformilobulata* Ling *et* Puri and *A. austro-himalayana* Ling *et* Puri from Western Himalaya (Uttarakhand) have been reported. There has been no work report on these two species because of ignorance of new name, or perhaps, the essential oil composition may have been published under different names/species [2,3]. This genus is industrially important due to its antimalarial, insecticidal, antimicrobial and other properties [4]. Among the species studied so far from Western Himalaya, *Artemisia maritima* L, *A. gmelinii* Web. ex Stechm., *A. roxburghiana* Wallich ex Bess, var. *hypoleuca* (Edgew.) Pamp, *A. wallichiana* Bess., *A. myriantha* Wallich ex. Bess. var. *pleiocephala* Pamp., *A. elegantissima* var. *kumaonensis*, *A. indica* var. *indica*, *A. velutina* Pamp., *A. roxburghiana* Wallich ex Bess. var. *purpurascens* (Jacq.) Hook.f., *A. capillaris* Thumb, *A. parviflora* Roxb. ex D. Don (*A. japonica* Thunb.), *A. dracunculus* L. and *A. nilagirica* (C. B. Clarke) Pamp., are worth to mentioned.

One of the authors of this editorial (SC. Singh) has noticed some morphological characters, as key feature to differentiate *A. maritima* and its varieties. *A. maritima* var. *maritima* (syn. *A. brevifolia*, *Seriphidium brevifolium*) is mainly distributed in Uttarakhand, and well differentiated with its open flower heads crowded on the branches, bright yellow heads and ovoid-oblong in shape, whereas *A. maritima* var. *thomsoniana* C.B. Clarke, (syn. *Seriphidium thomsonianum*) is a native of J&K with flower heads lax on the branches, and globose in shape.

Most of these species relate to isolation of essential oils, followed by constituent's identification, using gas chromatography and gas chromatography/mass spectrometry techniques. Moreover, extensive study has also led to the characterization of many new constituents. First such publication on Artemisia appeared from Indian Himalaya in particular, entitled, "Essential Oil Composition of Some Himalayan Artemisia Species", has reported high thujone proportion, which was comprised of α-thujone (63.2%) and β-thujone (65.3%) in *Artemisia maritima* and *A. roxburghiana* var. *hypoleuca*, whereas artemisia ketone (28.2%) and 1,8-cineole (13.0%) were identified in *A. gmelinii* [5]. In addition, high thujone proportion has also been reported from *Seriphidium brevifolium* (Wall.) Y. Ling *et* Y.R. Ling (syn. *A. brevifolia* Wall. ex DC; *A. maritima* Hk. f. non L.) [6,7]. It is worth to mention here that *A. maritima* is one of the important components in most of the incense preparations of the inhabitants (Bhotias) of Western Himalaya. In recent years, variability in volatile pattern are reported in *A. maritima* due to the presence of chrysanthenone, 1,8-cineole, camphor and borneol, germacrene D and isoborneol [8,9]. Shah has studied essential oils, isolated from different *Artemisia* species viz., *A. myriantha* var. *pleiocephala*, *A. wallichiana*, *A. roxburghiana* var. *hypoleuca*, *A. elegantissima* var. *kumaonensis*, *A. indica* var. *indica*, *A. maritima* and *A. gmelinii,* collected from different places of Kumaun and Garhwal regions of Western Himalaya [10].

Till date, many low molecular weight terpenes and their oxygenated derivatives have been reported in moderate to high proportion from various *Artemisia* species from Western Himalaya. Sabinene, β-pinene, limonene, trans-sabinene hydrate and isoborneol were characterized in *A. velutina* [11], caryophyllene oxide, cis-β-elemenone and selin-11-en-4-α-ol in *A. indica* [12], borneol, β-cubebene, trans-guaiene, δ-cadinene and vulgarone B in *A. indica* var. *indica* [13], 1,8-cineole, chrysanthenone, β-eudesmol and β-pinene oxide in *A. myriantha* var. *pleiocephala* [14] and cis-cedryl methylketone, epi-cubebol and davanone identified in *A. elegantissima* var. *kumaonensis* [15]. In addition, β-caryophyllene and germacrene D were common constituents in all studied oils. *A. capillaris* [16] and *A. dracunculus* contained capillene as marker constituent [17], whereas *A. parviflora* contained camphor [18], and β-eudesmol and spathulenol [19], as marker constituents. Even though, most communications revealed consistent volatile compositions in *Artemisia* species. However, altitudinal effect resulted into varying compositions, has also been reported. This factor is supposed to play vital role in species such as *A. nilagirica* [20] and *A. roxburghiana* var. *purpurascens* [21]. Further, few reports showed increase in proportion of major constituents, after domesticated in Indian plain conditions, like *A. myriantha* var. *pleiocephala* [22].

Nevertheless, volatile composition of aromatic plants seems to be directly influenced by climatic condition, including temperature, soil texture, moisture and altitude. Consequently, commercial use may differ accordingly from one place to other. *Artemisia* species are well distributed in Himalayan habitat. Therefore, aerial parts may be potential source for perfumery, incense preparation, oil isolation, etc. Meanwhile, good agricultural practices shall be beneficial to enhance the production of plant herbage and essential oils. Keeping the reported volatile constituents in view, I do believe that *Artemisia* is a most suitable crop of commercial importance, and must be promoted by setting up small scale industries for livelihood upliftment of inhabitants of Western Himalaya.

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