



Alpine Medicinal and Aromatic Plants in the Western Himalaya, India: An Ecological Review

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Abstract: The Indian Himalayan region harbours rich array of Medicinal and Aromatic plants (MAPs) owing to its diverse topography and climatic conditions. However, under the contemporary changes in the Himalaya, viz., excessive resource use, changing climate, increasing developmental and tourism activities, a little is known about the alpine vegetation response to these changes. Hence, there is a need to assess the availability, quality, sufficiency and directionality of past and ongoing research on MAPs of the alpine region of Western Himalaya). Over 300 research articles to consolidate the knowledge on population status, ethno-botany, biotechnology, anthropogenic pressure, information gaps and future scope for research we scrutinized. The results reveal that there are 350-400 MAPs reported from the alpine region of the Uttarakhand state of which ca.30-35 species are in high use and commercially traded. There are over 82 alpine meadows range in size from a few to 400 km², however, most of the studies (45%) are site-specific covering <8% of the total reported meadows. Modern technology based studies has dominance over field based studies having maximum 23% study on chemical extraction and secondary metabolite (biochemistry) followed by *in-vitro* cultivation (biotechnology-12.2%) and ethnobotany (9.4%). The abundance (individuals meter⁻²) of 31 MAPs were assessed in a few meadows so far having only 1-2 individuals meter⁻². About 16 species have been attempted for *in-vitro* cultivation however, none of them has succeeded in producing seedling at large scale. Limited information on extent (geo-spatial distribution), habitat suitability, demand and supply ratio, climate change impact, lack of clear management and monitoring strategies for MAPs are identified as areas of immediate concern and future scope of research.

Keywords: Alpine, Medicinal plants, Population status, Diversity, Conservation
