INTRODUCTION

1.1 Background

People who live in and around the forest acquire intimate relationship with the forest and forest products, as worldwide more than 2 billion people's livings depend on the forest (UNDP, 2000). This association has resulted in the accumulation of extensive knowledge about various uses of plants and their interrelationship with the environment (Johnsy et al., 2012). Since existence, the native people have been familiar with the utility of medicinal and aromatic plants (MAPs) for preventing, healing and curing of several human as well as animal diseases (Borchardt, 2002). Of the estimated 391,000 vascular plant species, 30,000 plant species have at least one documented use and about 17,810 are used as medicines (Kew, 2016). According to WHO (1993), 3.5 billion people in the developing countries avail MAPs regularly, which accounts 80% of the total utilisation value of MAPs. The use of plant-based traditional knowledge by the native people is supported by socio-cultural practices such as worship of plants, groves and landscape since the prehistoric time (Kala, 2005a).

In India, about 4,635 ethnic communities, including over one million folk healers, use around 8,000 species of MAPs (WWF, 2007). The amount of traditional knowledge that has travelled to modern times is the result of exchange of knowledge between these communities in different regions (Gazzaneo et al., 2005). The traditional knowledge not only helps to preserve the cultural heritage and environment but it also helps to create livelihood and income (Impey, 2002). In Asia, India and China are two largest countries with the highest number of relatively important MAPs (Dirzo and Raven, 2003), reflecting the historical importance of MAPs for Indians and Chinese.

The major part of the traditional systems of herbal medicine, which includes folk health tradition, has transformed into trade over the period of time (Kala, 2009). The global herbal trade stands over at US$ 120 billion and is expected to reach US$ 7 trillion by 2050 with the maximum contribution by China,
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India and Germany (240,000 tonnes, 80,000 tonnes, 58,000 tonnes per year). The total number of MAPs in the international trade has been estimated to about 2500 species (Olsen, 1998), of which 880 species are commonly used for trade in India (Tondon and Yadav, 2016). The value of MAPs trade in India was about 5.5 billion US$ (Exim Bank Report, 1997) which has increased with the annual average growth rate of 9.2% in the value of export from 2001-2014 (Vasisht et al., 2016).

1.2 Traditional Medicinal Systems in India

The Indian medicinal system comprising Ayurveda, Siddha, Unani and Homeopathy have been extensively using MAPs since long time (Nadkarni, 1996). The practice of ethno botanical pharmacology has been complied in Ayurveda between 2500 and 600 BC (Mishra et al., 2001). The medicinal preparations in Ayurveda are invariably complexes derived from plant and animal products as well as minerals and metals (Samhita and Samhita, 2009). The Ayurveda literature is a very foundation stone for the Indian Medicinal System, probably, Charak Samhita (900 B.C.) comprising of comprehensive therapeutics, Sushruta Samhita (600 B.C.) dealing particularly with surgery, Ashtang Haridaya (700 A.D.) focus on principles and practices of medicines, Madhava Nidana (800-900 A.D) dealing with diagnosis, and Bhoja Prabandha (980 A.D) containing reference to inhalation of medicaments before surgical operations are milestones in the ancient Indian medicinal system (Saraf and Parihar, 2007). The classical treatments by Charak, Dhanwantri, Sarangdhar and Bhavpraksh imply the effective combinations of natural drugs (Ranade and Desai, 2005).

Similarly, Siddha system was developed during the Indus valley civilisation from where it was brought by Dravidians to South India (Krishnamurthy and Mouli, 1984). The system is based on combination of old medicinal practices and spiritual disciplines along with alchemy and mysticism (Rao and Veluchamy, 1983). Unlike ayurveda, siddha medicine gives importance to the conjunctive use of plants and minerals and also, the siddha medicine system recognizes Vaadham, Pitham and Kabam in childhood, adulthood and old age, respectively, whereas in Ayurveda, it is totally reversed, Kabam is dominant in childhood, Vaatham in old age and Pitham in adults (Subbarayappa, 1997).
The Unani Medicinal System, practiced by Mughals in India (13\textsuperscript{th} century), is influenced by Sushruta and Charaka and the practitioners of this medicinal system were referred as Hakims (Syed and Zillur, 2001). Unani system is the second most famous medical system after ayurveda in the country using MAPs. Homeopathy, an important medicinal system, was introduced in India by Roman Dr. John Martin Honigberger in 1835. Homeopathy as a whole uses animal, plant, mineral and synthetic substances in the preparations (Mathei, 2003). Naturopathy, revived in India in the year 1894, when Shri. D. Venkat Chelapati Sharma translated the book "New Science of Healing" by Louis Kuhne from Germany (AYUSH, 2013). This medicinal system is based on vitalism and self healing. The system focuses on eating and living habits, adoption of purification measures, use of hydrotherapy, baths and massage using MAPs (Shrivastava \textit{et al.}, 2015).

Recently, AYUSH recognised Sowa Rigpa as one of the important medicinal system prevailing in India. This is also named as "Amchi System of medicine", which is well documented. The exportation of Indian medical literature along with Buddhism in the 7th century influenced the advent of this medical system (Namgyal and Phuntsog, 1990). Amchi, commonly known as Tibetan traditional healer, medicinal preparations are plant and animal based using some minerals combination as well (Navchoo and Buth, 1989). The utilisation of plants to cure various diseases, illness and healing wounds through observation, accidents, philosophy, traditions and inference have been the apparent principle of all these medicinal system in India (Nadkarni, 1996; Kala, 2005a).

Currently, the total numbers of registered medical practitioners practicing the traditional medicinal system under Ministry of AYUSH, Government of India, are 7.37 lakh. Of which, Ayurveda practitioners' are 3.99 lakh, Homeopathic-2.8 lakh, Unani-47683, Siddha-8173, Naturopathy-1764 Practitioners and Sowa-Rigpa- 21 dispensaries (AYUSH Report, 2013). Other than the practitioners, total number of registered and licensed manufacturing units in India is about 9000 and 90\% are in cottage and small scale sector (AYUSH Report, 2015). The annual domestic trade of the AYUSH industry is of the order of INR 80 to 90 billion, with
20-25% increase every coming year with maximum contribution from mountain states (AYUSH Report, 2013).

1.3 Traditional Medicinal System in Indian Himalayan Region (IHR)

The Himalayan mountain system treasures rich floral and faunal wealth, wide-range of climatic variations, diverse social culture, ecological differences, and is the reservoir of a rich traditional knowledge (Butt and Price, 2000). The Indian Himalayan region (IHR) supports 8000 angiosperms, 44 gymnosperms, 600 pteridophytes, 1737 bryophytes and 1159 lichens (Pramanik and Bhaduri, 2016). About 1748 are MAPs (23.2% of India) with about 31% native, 15.5% endemic and 14% threatened (Samant et al., 1998). The rich cultural milieu across the IHR comprising more than 139 tribes (Nandy et al., 2006) are well acquainted with traditional knowledge about MAPs. Many traditional medicinal systems are prevailing in the IHR region, including, Ayurveda, Homeopathy, Unani and Tibetan medicinal systems. About 89% of the population relies on these medical systems in the region (Rai et al., 2000). Apart from the rich MAPs diversity and a wide dependence on them, the Himalayan region is center of different herbal manufacturing industries. Out of the total AYUSH manufacturing units, 12% are located in IHR and 55% of the units located at different parts of India are dependent on the MAPs of IHR (AYUSH, 2015). The traditional medicinal systems practiced by vaidyas (Ayurvedic practitioners), amchis (Tibetan Practitioners) and hakims (Unani practitioners) in the IHR is relevant for the well being of local people, resource conservation and socio economic development (Samal et al., 2004). The IHR is a repository of traditional medicinal knowledge which supports the survival of mountain communities living in this region (Kumar and Monga, 2013).

1.4 Medicinal and aromatic plants (MAPs) significance in Himachal Pradesh

Himachal Pradesh, one of the states of India forms a major part in the Himalayan mountain ecosystem, and the place acquires diverse flora including the
MAPs, which have occupied an important position in the socio-cultural and spiritual activities of the rural people for centuries (Ranjana et al., 2008). The state supports 643 medicinal plants, out of which 269 are native, 374 are non-native and 17 are endemic (Dhaliwal and Sharma, 1999; Samant and Pal, 2003). According to the Forestry Statistics India (2011), about 376 MT of medicinal herbs are harvested annually valuing up to 265.75 lakh rupees in Himachal Pradesh. About 165 MAPs are traded every year, of which 24 MAPs are amongst the most traded 100 plants in the country. The total harvest of medicinal plants is more than 2,500 tonnes annually and the state earns about INR 40 lakhs. On an average the trade contributes to about INR 14,000 annually to the household economy of the collector (Kapta, 2006). Most of the MAPs collected from the wild and farm lands in the state have well established market at Majitha Mandi in Amritsar and Khari-Bawli in New Delhi, India. Some of the other markets of the MAPs are Calcutta, Saharanpur and Mumbai (Shilpa et al., 2015).

In addition to the sequential trade of MAPs, the state of Himachal Pradesh nurtures different tribal groups, including gaddis, kinnaura, lahaul, bhotia, swangla and gujjars, who are well acquainted with the biodiversity-based traditional knowledge and practices (Chaudhuri, 1992). The folks by means of the traditional knowledge have been practicing herbal treatments to cure many diseases (Uniyal et al., 2006). The indigenous wisdom and formulations have been the basis of subsistence for the mountain folks (Gupta et al., 2014). They have sufficient knowledge about identifying, utilising, harvesting and preserving of MAPs in natural habitats. The local conservation and sustainable harvesting practicing of MAPs is evaluated with reference to both the cultural and biological themes. The use of traditional knowledge by these indigenous communities, reflects not only the evidences for the establishment of Indian medicinal systems, but plays a crucial role in transmitting of knowledge to the generations (Mehta, 1995).

1.5 Problem Statement with respect to MAPs in Himachal Pradesh

Besides, the sustainable utilisation of MAPs by the rural communities,
the diverse medicinal flora and its traditions are declining with time in the state (Kala, 2003; Uniyal et al., 2011). The traditional knowledge is being commercialised with the development of herbal sector (Sahai, 2004) and the left out traditional knowledge is on the verge to diminish due to the fact that the local inhabitants have modulated themselves with the changing socio-economic conditions (Negi and Dutt, 2007). The generations on wheel are showing least interest in the traditional practices due to establishment of other employment opportunities, thus resulting in the weakening of the centuries old knowledge (Acharya and Acharya, 2009). To retrieve the traditional knowledge and adopt the practices, there is a need to enumerate the ethnobotanical knowledge about the MAPs intensively among the above-mentioned native folks of the state.

At the same time, with the development of the herbal sector and establishment of small-scale herbal factories in the area, the demand of a group of MAPs fetching high amount of price has cropped up enormously and has made their availability in the national as well as the international markets (Kala, 2005b; Olsen, 2005a). According to FRLHT report, a total of 960 medicinal plants are in active trade, of which 178 species are consumed in high volumes i.e. more than 100 MT per year and about 70% are found exclusively in Himachal Pradesh (Ved and Goraya, 2008a). The local people have been the suitable essence for these pharmaceutical companies as they have an easy access to these forest produce (Albert, 2007). Thus, the native people come under the influence of the rising market demand and for the maximum profit they tend to harvest the MAPs at the utmost. Concurrently, the MAPs trade is considered complex due to involvement of different individuals at different levels in the region (Nandi, 1999). Thereby, from the collection of the MAPs by the villagers to the local level consolidation by networking of local traders to the regional wholesale market, the process involves number of individuals. Thus, the value chain of MAPs had become a mosaic of uncertainty in the prices at every level (Karki et al., 2003). Therefore, a clear understanding of the market price values of the MAPs is essential for the regulation of trade.
The increase in trade of MAPs from the last decade has resulted in the over exploitation of plant species (Rasul et al., 2008). The illegal market supply of the raw materials in the area has listed the MAPs to threaten. The unscientifically harvested raw material has also been one of the major drawbacks in the loss of the high value MAPs in the area (Butola and Vashishtha, 2013). Therefore, it is required to examine various harvesting practices employed by locals, so that a suitable approach for the sustainability of the MAPs is recommended. In addition, the baseline information on the floristic distribution of MAPs in their natural habitats is important to assess the concerned status of the species for various threat categories as recommended by IUCN. As per the topography of the study site, the area is rugged and the inaccessibility of the mountainous slope has prevented the ecological surveys, including the status of MAPs in the area. Thus, elucidating the variations in the floristic pattern, especially of MAPs, along the environmental gradient is one of the important parts in the study.

Hence, to comprehend the above mentioned obtrusive issues about MAPs in Himachal Pradesh, there is a need to follow a line of investigation to explore the ecological as well as ethno botanical knowledge with relation to MAPs utilisation. Therefore, with a view of the problem statement, following objectives were set for the research purpose:

(i) To study the population structure of medicinal and aromatic plants and their distribution pattern along the altitudinal gradient.
(ii) To document the ethnobotanical knowledge of medicinal and aromatic plants used by local people.
(iii) To study the collection practices of medicinal and aromatic plants.
(iv) To study the conservation and management issues related to medicinal and aromatic plants and to set priorities for their long-term conservation.