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## Distribution Characteristics of the Tree Species in Central Himalaya, India

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**Abstract:** A total of 257 tree species were recorded and studied for their pattern and altitudinal distribution in Central Himalaya. Relatively higher percentage (65%) of deciduous species was recorded. Distribution of tree species in this region is between <200-4200 m asl. However, maximum (60%) species were found either below or at around 1500 m asl altitudes may be due to overlapping of species. Lauraceae and Anacardiaceae are the dominant families in both forms. Species richness declines gradually towards the higher altitudes, it was sharper in evergreen species. Study concludes, the distribution of trees in central Himalaya, depends upon climate, soil, temperature and altitude.

**Key words:** Tree species, nature, status, altitude, forest types, richness

### INTRODUCTION

Distribution of forest types, structure, composition and nature are strongly correlated with environmental factors (Bongers *et al.*, 1999; Kherkwal *et al.*, 2005). A new species when introduced into an apple in environment, usually takes some time to adapt to the new habitat. The factors, which affect the distribution of individual organism, have consequences for the range of the species and are, therefore, of importance in biogeography. They conclude abiotic influence of environment, such as climate, soil type, drainage, geologic features and topography. Biotic factors characteristics such as the mobility of the animals and seed or spore dispersal in plants. The different forest types of central Himalaya are composed mostly of evergreen broad leaf species and conifer species. The tree line is the most prominent ecological boundary in the Himalaya where the sub-alpine forests terminate (Champion and Seth, 1968). A number of tree species found in the Himalaya showed varying patterns of distribution. Distributional ranges of several species were segregated along the widened altitudinal ranges. The upper limit of tree species ranged between 4000-4600 m asl (*Rhododendron campanulatum* and *Betula utilis*). In many sectors the high altitude oak (*Quercus semecarpifolia*), maple (*Acer caesium*) and few other broad leaf species reach upto tree line (Singh and Singh, 1992). The present study attempts to provide a general account of distribution of hitherto least studied vegetation composition i.e., trees, in Indian central Himalaya.

### MATERIALS AND METHODS

The study area is located in Central Himalaya (28° 43' 45"-30° 20' 12"N and 78° 44' 30"-80° 18' 45" E) in an elevational belt of <200-4200 m asl. Present study is based on data recording, field checks and past records (Osmaston, 1927; Pangtey *et al.*, 1991; Kherkwal *et al.*, 2005) in 2002 at Nainital in Kumaun Central Himalaya. However, this study was accomplished into two phases i.e., (i) species richness in relation to altitude at 200 m asl altitudinal differences, (ii) nature of plant forms. The Himalayas are well outside the tropics, therefore, climatic conditions and different vegetation types are very close to those of more northerly latitude. The seasons are mainly divisible as: cold and dry winter (Dec-Feb), warm and dry summer (April-mid June) and warm and humid rainy season (mid June-Sept.). The transition between winter and summer season and between rainy and winter season are referred to as spring and autumn, respectively. The climate is monsoon temperate, snowfall being frequent during winter months (Dec-Feb).

### RESULTS

A total of 257 species of tree were recorded from Central Himalaya (Kumaun including Garhwal) (Fig. 1). The Evergreen tree species were belonging to 35 families and 81 genera. The dominant families of Angiosperms in evergreen tree were Lauraceae (5 genera, 13 species), Euphorbiaceae (10 genera, 12 species), Cornaceae (4 genera, 8 species), Bixaceae (6 genera, 7 species),

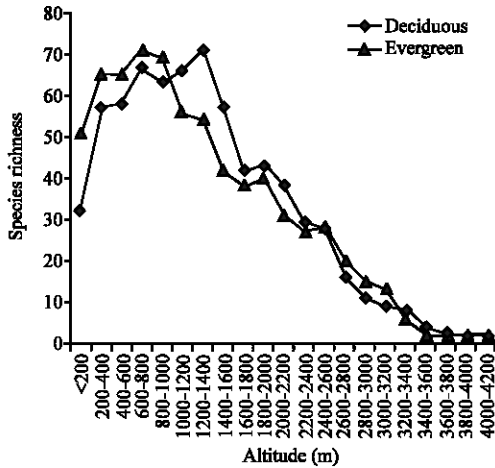


Fig. 1: Altitudinal distribution of tree species

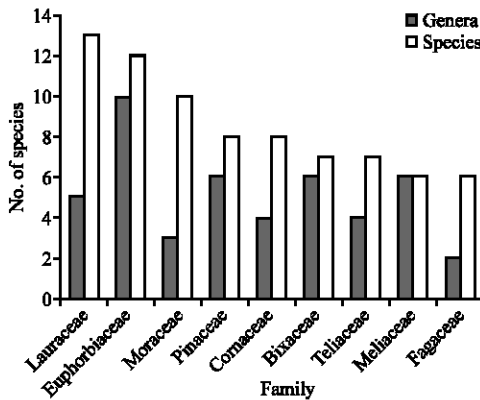


Fig. 2: Distribution of evergreen tree species

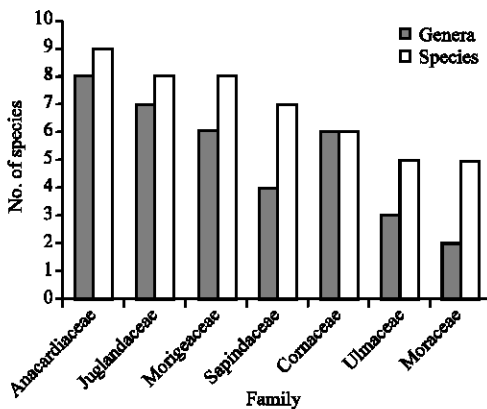


Fig. 3: Distribution of deciduous tree species

Teliaceae (4 genera, 7 species), Meliaceae (6 genera, 6 species) and Fagaceae (2 genera, 6 species). In Gymnosperms two families (Pinaceae and Taxaceae) were

recorded of which Pinaceae had 8 species while Taxaceae had only one species (Fig. 2). Deciduous tree belonging to 41 families and 78 genera out of which, the dominant families were Anacardiaceae (8 genera, 9 species), Juglandaceae (7 genera, 8 species), Morigeaceae (6 species, 8 genera), Sapindaceae (4 genera, 7 species) Cornaceae (6 species, 6 genera), Ulmaceae (3 genera, 5 species) and Moraceae (2 species, 5 genera). During present investigations including previous literature, we include the nature of species (i.e., deciduousness or evergreenness) and altitudinal distribution of various species (Fig. 2 and 3).

### DISCUSSION

The flora of Himalaya, Tibet and west China had a common origin and they radiated into distinct eco-floristic zones gradually level to become the highest region in the world (Kashyap, 1925). In the present study Lauraceae represented the highest number of plant species (13 species) followed by Euphorbiaceae (12 species) and Moraceae (10 species) in evergreen plant forms. With contrast to this, the maximum numbers of plant species in deciduous tree were Anacardiaceae (9 species) followed by Juglandaceae, Morigeaceae (8 species each) and Sapindaceae (6 species). The entire region exhibited relatively higher percentage (65%) of deciduous species. These deciduous species were present extremes at sub-tropical and sub-alpine forest. On the other hand, very few evergreen species reached in the sub-alpine zones. *Abies pindrow* and *Pinus excelesa* were the only evergreen species reaching the upper limit of temperate forests (i.e., approx. 2500 m asl). However, extreme rarity of *A. pindrow* and *P. excelesa* at this altitudes indicates that evergreen species fail to survive at high altitude zones whereas, the common occurrence of deciduous species like, *Alnus nepalensis* and *Betula utilis* etc above the altitudes of 2500 m asl suggested that the deciduous species are well adapted to overcome the harsh winter conditions of this zone. Beyond these elevations, in response to severity of cold windy conditions and physiological dryness, vegetation becomes simpler and shorter.

The relatively higher percentage of deciduous tree species (60%) followed by the percentage of climber species (54%) in Kumaun Himalaya and the percentage of deciduous tree species at timberline was recorded by Rawal *et al.* (1991). Therefore, it may be argued that spatial floatation in climatic condition favors to develop the higher percentage of deciduous species in this region which had also favored to the luxuriance growth of evergreen vegetation (Saxena *et al.*, 1982; Singh and Singh, 1987).

The trees are distributed throughout this region between altitudes of, 200-3000 m asl. However, more than 60% species were present either below or at 1500 m asl (subtropical/warm temperate forests). The decline in species richness with increasing altitude was sharper in evergreen component, where just two species touched the upper limits of temperate forests (i.e., 2500 m asl) or above. Similar observation that the species richness decreases towards higher altitudes has been made in Nepalese Himalaya (Grytnes, 2002). The highest altitudinal limit (4200 m asl) observed in present study corresponds the highest limit (4000-4500 m asl) of tree species recorded in Nepal, suggesting more or less equal range of altitudinal distribution for trees in central and eastern Himalayas.

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