SUMMARY

1. Usara-to Chopta-Tungnath a mountain transect, which is located between area at 79°-79° 30' E and 30° 30'-30° 42' N. encompassing an altitudinal range of 1500-3500 m. Usara region in the mixed banj oak forest constitutes its lower extremity and Chopta-Tungnath constitutes its upper extremity. Being in the central part of east to west transect the elevational transect of present study shows an intermediate situation with respect to climate moisture and vegetational characters. This transect (lower to higher elevation) supports three major forest types, viz., Mixed banj oak forests (1500-2200m), Mixed moru oak forest (2250-2650) and mixed kharsu oak forest (2700-3500m).

2. Present study was conducted in the moist temperate forest of Garhwal Himalaya during-March-2005 to October 2007.

3. In order to understand the structural and functional of oak forests ecosystem 35 stands in three oak forests (mixed banj, mixed moru oak, and kharsu oak forests) were taken.

4. The climate of the study area is chiefly influenced by summer monsoon, which generally starts in mid June and continue till mid September. The mean monthly minimum temperature (0°C) was recorded in winter (December-January) and maximum temperature (26-28°C) reaches in month of May-June.

5. The annual rainfall ranged from 600 to 1200mm. The snowfall occurs in Mid December to February.

6. Soil colour varied from yellowish brown to dark brown, mostly sandy and clayey in texture. Soil texture across the studied slopes (concave, convex and uniform slopes) did not vary significantly. The soil moisture in the concave slope at all depths (0-10, 10-20 and 20-30cm) was markedly higher in concave slopes compared to the convex and uniform slopes. Comparison between the convex and uniform slope sites indicates that the convex slopes are the driest.

7. The pH value varied from 5.4 to 7.1 in concave, convex and uniform slopes. The total nitrogen concentration (%) varied 0.120 to 0.280 for growing season. The available phosphorus concentration (%) varied form 0.012 to 0.028 and potassium contents (%) varied between 0.280 to 0.680 in concave, convex and uniform slopes respectively.
8. For recording the flora of the study area, extensive field survey was conducted from March 2005 to October 2007 (for two consecutive years). The total plant richness was of 132 species, there were 37 tree species, 15 shrubs, 40 herbs, 5 ferns, 10 grasses, 5 climbers, 7 medicinal species, 4 aromatic plants and 9 lichens.

9. The life form pattern of study area showed that hemi cryptophytes (He) was the largest life form classes. The cryptophytes (Cr) and therophytes (Th) displayed the lowest percentage.

10. The maximum plant species richness occurred in concave slope in compare to convex slope and uniform slope (two major contrasting aspect N and south).

11. The common species of shrub Daphne cannabina and Daphne papyracea, Rubus ellipticus and Rubus lasiocarpus were commonly found only in the three forest types. Berberis asiatica was found in mixed banj oak forest and Berberis petiolaris and Cotoneaster microphyllus were found in mixed moru oak forest and Berberis petiolaris, cotoneaster microphyllus, Rosa webbiana were found in mixed kharasu oak forest respectively. Sikkimia laurecla one of species was found with less density in some forest stands on mixed kharasu oak forest which was used as aromatic dhoop in Garhwal Himalaya.

12. Polgopogon monspelunis and Dilpazium bellum were common herb species among these three forest types.

13. Evernestrum spp, Unsea spp, Promotrema spp. lichen species were also commonly found among these three forest types respectively.

14. The species of Quercus leucotrichophora, Rhododendron arboreum, Lyonia ovalifolia, Betula alnoides, Symlocos chinensis, Pyrus pashia Cotoneaster bacillaris, Boehmeria platyphylla in mixed banj oak and Quercus floribunda, Rhododendron arboreum, Lyonia ovalifolia, Ilex dipyrina, Abeis pindrow in mixed moru and Rhododendron arboreum, Lyonia ovalifolia, Quercus
semecarpifolia, Abies pindrow and Rhododendron companulatum were commonly found in these three forest type respectively.

15. The species of Prunus cornuta, Taxus baccata and Buxus wallichiana had less density while Picea smithiana was found only in two stands in mixed kharu oak forest. These species were totally absent in seedling stage duration in site investigation period.

16. The overall structural pattern in mixed banj oak forest of the present forest stands revealed that the stand 1st and 3rd were dominated by Litsea umbrosa and 2nd and 4th were dominated by Rhododendron arboreum in concave slope; 5th & 7th were dominated by Quercus leucotrichophora, stand 6th dominated by Rhododendron arboreum in convex slope, stand 8 dominated by Lyonia ovalifolia and 9th by Quercus leucotrichophora in uniform slope on northern aspect while stand 10th by Quercus leucotrichophora and 11th dominated by Rhododendron arboreum in uniform slope; stand 12th by R. arboreum and 13th were dominated by Q. leucotrichophora in convex slope on southern aspect

17. The overall structural pattern in mixed moru oak forest of the present forest stands revealed that the stand 14th & 15th were dominated by Eurya acuminata, Stand 16th Machilus duthiei and stand 17th were dominated by Quercus floribunda in concave slopes and stand 19th was dominated by Q. semecarpifolia and stand 19th dominated by Abeis pindrow in convex slope and stand 20th was dominated by Quercus floribunda on northern aspect while stand 21st was dominated by Quercus leucotrichophora in convex slope, stand 22nd by Rhododendron arboreum in uniform slope and stand 23rd was dominated by Quercus floribunda in concave slope on southern aspect respectively.

18. The overall structural pattern in mixed kharu oak forest of the present forest stands revealed that the stand 24th & 25th in uniform slope; stand 26th in concave slope and stand 31st convex slopes were dominated by Quercus semecarpifolia and 28th concave slope was dominated by Picea smithiana and 29th & 30th convex slopes were dominated by Rhododendron arboreum on northern aspect while stand 32nd convex slope, stand 33rd concave slope and stand 34th and 35th uniform slopes were dominated by Quercus semecarpifolia on southern aspect respectively.

19. The total tree density was highest in stand 7th (1247ind.ha$^{-1}$) in convex slope on northern aspect and lowest (579ind.ha$^{-1}$) in uniform slope on southern aspect in mixed banj oak forest and highest density (1032ind.ha$^{-1}$) in concave slope on southern aspect respectively.
northern aspect and lowest (213 ind. ha$^{-1}$) in convex slope on southern aspect in mixed moru oak forests while highest density (934 ind. ha$^{-1}$) in uniform slope on southern aspect and lowest (386 ind. ha$^{-1}$) in uniform slopes on northern aspect respectively.

20. The total sapling density was highest (1246 ind. ha$^{-1}$) at stand 9th in uniform slope on northern aspect and lowest (181 individuals/ha) at stand 12th in convex stand on southern aspect in mixed banj oak forest and highest density (873 ind. ha$^{-1}$) at stand 17th in concave slope and lowest (46 ind. ha$^{-1}$) at stand 19th in convex slope on northern aspect in mixed moru oak forest while the highest density (660 ind. ha$^{-1}$) at stand 31st in convex slope on northern aspect and lowest (27 ind. ha$^{-1}$) at stand 28th in concave slope on northern aspect and at stand 33rd in concave slope on southern aspect in mixed kharsu oak forests respectively.

21. The total highest seedling density (2040 ind. ha$^{-1}$) at stand 1st in concave slope on northern aspect and lowest (413 ind. ha$^{-1}$) at stand 11th in concave slope on southern aspect in mixed banj oak forest and the total highest density (2392 ind. ha$^{-1}$) at stand 1st in concave slope on northern aspect and lowest (280 ind. ha$^{-1}$) at stand 31st in convex slope in mixed moru oak forest while highest (600 ind. ha$^{-1}$) at stand 28th in concave slope on northern aspect and lowest (147 ind. ha$^{-1}$) at stand 34th in uniform slopes on southern aspect in mixed kharsu oak forest respectively.

22. The abundance to frequency (A/F) ratio revealed that majority of species was randomly distributed whereas the remaining species exhibit contagious distribution while some of the regular distribution.

23. The value for tree diversity and dominance are well within the range as reported for various temperate zones.

24. Higher the value of H greater is the species diversity in the community. The highest 2.802 at stand 1st in concave slope on northern aspect and lowest 1.519 at stand 10th in convex slope on southern aspect in mixed banj oak forest and highest 1871 at stand 14th in concave slope and minimum 0.562 at stand 18th in convex slope on northern aspect while highest 1.09 at stand 26th in concave slope on northern aspect and minimum 0.286 at stand 34th in uniform slope on southern aspect in mixed kharsu oak forest.

25. The major traditionally used species were reported on the ranking basis with community participation through PRA exercises in oak and pine zone respectively.
26. A total 41 tree species, 10 shrubs, 4 ringal, 17 herbs, 8 grasses, 2 climbers in oak zone while 37 trees, 6 shrub, 4 herbs, 10 grasses and 2 climbers (including domestic species) were major traditionally used with different type uses like, fodder, firewood, timber wood, agricultural implements, leaf litter for cowshed, edible fruit species, folk medicinal plants, religious plant etc.

27. Villagers were well aware about the different traditionally uses of different species. They knew about plant identification, distribution (altitude); Phenology like leaf formation time, leaf fall time, flowering time, seed maturation time; folk taxonomical features like- bark nature and colour; leaf size, structures and colour; flower size, structures and colour; fruit size, colour and structures and seed type, size, structures and colour and the traditional uses and part uses of different species in oak and pine zone respectively. These results came out through PRA exercises with community member duration field investigation respectively.

28. Erosion of knowledge between young (20-30years) and older (above 45years) generation regarding plant identification and uses in oak and pine zone. Thus the results had shows the erosion of knowledge in younger group 21.64% in oak and 34.06% in pine zone in compare to the older group (male and female).