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Shifting pattern of *Rhododendron campanulatum* in response to Climate change in Western Garhwal Himalaya

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The evidence of global temperature rise is now widely accepted. The Himalayan Mountains have emerged among the most sensitive ecosystems under the global climate change (CC) scenario. Impacts of climate change are realized all across the physical, biological and socio-economic components of the ecosystems. Impact of climate change to alpine treeline ecotone and upward shifting pattern of plants due to warming have been reported from many parts of the globe. The present study examines the trend of expansion of Rhododendron campanulatum krummholz in the form of seedling population and growth characteristics along an altitudinal gradient shifting from the upper forest zones to timberline ecotone and beyond it in Tungnath alpine meadow (i.e., 3242 m asl), Uttarakhand. In the studied transect (altitudinal gradient of 3511–3665 m asl) in the year 2021, a total of 17 trees and 36 seedlings of *R. campanulatum* were found growing. Almost half of the trees were devoid of any seedlings around their canopies. Height and circumference at collar height of both the adults and seedlings were positively correlated ($P < 0.05$). The rate of expansion of *R. campanulatum* population was computed about 1.4 m yr–1. Occurrence of mature individuals at the mountain top without any seedlings indicates that as no space left for upward movement of plants. The upward advance of *Rhododendron campanulatum* (a krummholz species) may deplete alpine meadows with climatic warming. This may leave little grazing grounds for the migratory livestock and change ecosystem properties. It may be further pointed out that due to rise in atmospheric temperature (@ 0.11 °C yr–1 in the past two decades) and continued biotic pressure of grazing and tree lopping, *R. campanulatum*, a non-palatable species of wider niche width might preponderate at the expense of herbs and other timberline species in future and may resulted compositional changes in timberline vegetation and carbon storage.

Key words: Climate change, Rhododendron campanulatum, seedling population, timberline ecotone, Western Garhwal Himalaya.

Biography

Dr. Sarvesh Suyal presently is working as an Assistant Professor in Department of Botany in DBS (PG) College, Dehradun Uttarakhand, India. He has completed his Doctor of Pholosophy in Botany with specialization Plant ecology and biodiversity conservation in the year of 2011 from HNB Garhwal Central University, Srinagar Garhwal, Uttarakhand, India. He has 13 years of teaching experience of undergraduate and Master level students in various universities and higher education institutions. He has a vast experience of research in Himalayan Mountains especially in the field of plant ecology and natural resources management. More than twenty students their dissertation work and one student his Ph.D. have been completed under his supervision. He has completed two major research projects funded of DST and MOEFCc. Moreover, he has been published more than thirty research papers and book chapters in various reputed international and national research journals. He has attended and presented research papers in more than twenty national and international conferences, seminars. He is the member of many well known national and international societies related to plant sciences and environment. He is also a member of editorial committee of many famous international research journals.