

**Community Structure and Regeneration of Sub-alpine *Abies spectabilis*
(D.Don) Mirb. Forest in Langtang National Park,
Central Nepal**

**A Dissertation submitted for the partial fulfillment of the
Requirements for the M.Sc. in Botany**

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CERTIFICATE

This is to certify that the dissertation work entitled, “Community Structure and Regeneration of Sub-alpine *Abies spectabilis* (D.Don) Mirb. Forest in Langtang National Park, Central Nepal” submitted by Mr. Ravi Mohan Tiwari for the partial fulfillment of M.Sc. degree in Botany, has been carried out under my supervision. To the best of my knowledge, this dissertation work has not been submitted for any other degree. I recommend this dissertation to be accepted for the partial fulfillment of Master Degrees in Botany from Tribhuvan University, Nepal.

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The dissertation paper submitted by Mr. Ravi Mohan Tiwari entitled "Community Structure and Regeneration of Sub-alpine *Abies spectabilis* (D.Don) Mirb. Forest in Langtang National Park, Central Nepal" has been accepted for a partial fulfillment of M.Sc. in Botany.

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Abstract

Community structure and regeneration of *Abies spectabilis* (D.Don) Mirb was studied in *Abies spectabilis* forest located between Chandanbari and Lauribina area (3100-4000m) of Langtang National Park, Central Nepal. Vegetation sampling was done by quadrat method, and the sample quadrats were located by systematic random sampling method. Nine vertical transects running parallel to each other were defined within the study area and the quadrats were located along the transects. Altogether 80 quadrats were sampled. Canopy cover, litter and grazing/trampling damage in each quadrat were determined by visual estimation. Soil samples were collected from each quadrat from its four corners and their physicochemical characteristics were analyzed. Number of woody plant species, number of individuals of each tree species, diameter at breast height (DBH) of each individual tree, number of seedlings and saplings of tree species were recorded in each quadrat. Various community attributes (e.g. importance percentage, species diversity) and population characteristics (e.g. life table, density- diameter curve) were analyzed.

Soil was slightly acidic with soil pH value 6.35. Soil carbon and soil nitrogen were 7.24% and 0.44% respectively. Twenty five woody species were recorded from the forest. *Abies spectabilis* was the dominant tree species with the highest importance percentage (84%) and *Rhododendron campanulatum* was the co-dominant species (5%). Simpson's Index of Dominance (0.75) was more than Shannon Wiener's Index (0.63). Species diversity of the forest was relatively low, which might be due to anthropogenic factors such as cattle grazing, fire wood collection and logging. Total tree density declined with increasing elevation between 3100 m and 3550 m but it increased from 3550 m towards treeline (4000 m). Density-diameter curve for all tree species combined was nearly reverse J-shaped, indicating sustainable regeneration. But the curve for *Abies spectabilis* alone deviated slightly from the typical reverse J-shape with lower density of the smallest size class than of the next size class. Mortality of seedlings was 98% and only 2% of seedlings developed into saplings. Very high mortality of seedlings might be due to high disturbance (grazing/trampling) by livestock. Therefore, regeneration of *Abies spectabilis* was not sustainable.

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ABBREVIATIONS AND ACRONYMS

a.s.l.	Above Sea Level
BC	Basal Cover
Cm	Centimeter
°C	Degree Centigrade
CV	Coefficient of Variation
D	Density
DBH	Diameter at breast height
DHM	Department of Hydrology and Meteorology
DNPWC	Department of National Parks and Wildlife Conservation
F	Frequency
Ha	Hectare
IVI	Important Value Index
IP	Important Percentage
m	Meter
mg	Milligram
ml	Milliliter
mm	Millimeter
OC	Organic Carbon
RBC	Relative Basal Cover
RF	Relative Frequency
RD	Relative Density
RRI	Relative Radiation Index
SPSS	Statistical Package for Social Science
USA	United States of America.