

Tree Mortality: Assessment and Mitigation

J.D.S. Negi & P.S. Chauhan



TREE MORTALITY:

Assessment and Mitigation

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FOREWORD

Extending from the dry alpine vegetation of J&K in the north to the dense rain forests of Kerala in the south and from the desert thorn forest of Rajasthan in the west to the dense forests of north east India; the forest cover of India is about 70.17 million hectares (2015) which is 21.34 % of the total geographical area of the country. The tree cover is another 9.26 million hectares. Trees form the most dominant component of the forest cover in India.

Trees mortality is considered as one of the main reasons for forest degradation in India, though other factors also contribute to it. It is important to understand the causes and effects of mortality of trees in India.

This book covers various aspects of tree mortality of species like *Sal*, *Shisham* in detail and factors specific observation on broad leaf species such as *Aam*, *Arjun*, *Bakli*, *Banj-oak*, *Bargad*, *Churel*, *Dhak/Khankhra*, *Dhauri*, *Gutel*, *Jamun*, *Kharsu*, *kala Siris*, *Neem*, *Neem chemli*, *Sain*, *Saguan*, *Santra*, *Safeda* and *Safed Siris*. Narrow leaf species such as *Babool* and *Bamboo/Bans* and coniferous species such as *Bhutan pine/Kail*, *Deodar*, *Chirpine* and *Surai* are also dealt with in accordance with associated factors such as pollution, heat, prolonged water stagnation and stress and soil compaction etc.

The information contained in the book is concise and comprehensive. I firmly believe that the matter covered in the book will be useful to students, researchers, administrators and all others concerned alike in the fields of Botany and Forestry.

I compliment Dr. J.D.S. Negi, Former Head of Department, Forest Ecology and Environment Division, Forest Research Institute, Dehradun, Uttarakhand and Dr. P.S. Chauhan, Assistant Professor (Forestry), College of Horticulture and Forestry, Agriculture University, Kota, Campus Jhalawar, Rajasthan, for bringing out such a useful book. I wish this endeavour a grand success.


(S. S. Negi) 20/11/2016



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Preface

Forest is an assemblage of trees, shrubs, herbs and climbers living harmoniously, catering to a range of goods and services, to mankind on this Earth planet vis-à-vis fauna living and interacting together, exerting influence on the local climate. However in present day scenario, a catastrophic change is being witnessed in bio-composition of the Earth ecosphere. Forests are getting cleared off. Their rate of regeneration is abysmally low. Tree mortality and consequent depletion in biodiversity very often represent morbid site in forest ecology.

Of course, tree mortality is a normal process but when death interferes our financial or emotional expectation, it is considered abnormal. It is because persistent change in tree mortality rates can alter forest structure composition and ecosystem services such as carbon sequestration and microclimate.

To my knowledge I have continuously visited almost all the forests of my country since the year 1965. But in the year 1980 when I was working in Sal forest of Uttarakhand (then Uttar Pradesh) some sporadic mortality of Sal trees was seen but did not pay much attention. But during the year 1990 when I visited Sal forest in Barkot forest range, Dehradun forest division, I came across a patch mortality of Sal trees. It shocked me and I started thinking that how the best one can find out the primary causes of mortality and its mitigating measures. Further, Dr. P.S. Chauhan, second author, associated with me in the year 1997 and worked in Forest Research Institute (FRI) up to the year 2003.

Generally, when we talk about healthy forest, we refer to the forest that maintains its unique species and processes along with the ability to cater current and future need of people for value products and services. Truly speaking, the degeneration of forest began since World War I. Maximum devastation of Sal forest (Tarai forest) took place during World War II to cater the need, primarily of railway sleepers, building material and other defence purposes. The associate species of Sal, especially *Mallotus philippensis*, were extracted indiscriminately for charcoal manufacturing till the year 1960. The unscientific removal of Sal trees along with its associate species has finally exerted pressure on forest health and now we see unhealthy forest (*Bimar* forest). *Bimar* forest can be defined as scattered trees with top dying or some trees along with failure of regeneration with large gaps created by abiotic and biotic activities.

Keeping in view the poor health of the forest, an extensive monitoring and survey was carried out in Sal forests of Uttarakhand and Uttar Pradesh, temperate forest of Uttarakhand and Shisham forests of various States i.e., Himachal Pradesh, Uttarakhand, Uttar Pradesh, Punjab, Haryana, Bihar and Delhi. However, some observations of tree mortality were also taken into consideration and have also been incorporated in this book. Mortality is not restricted to a particular area, but also occurs in all types of forests.

The present book deals with the forest health in general and tree mortality in particular. It is a well-known fact that death of the trees is inevitable but when tree mortality interferes with poor health and productivity of the forest, then it certainly becomes a serious concern. Since the year 1990 each and every forest of the country was observed

thoroughly and examined very closely for its health in general and productive capacity to cope with the climate change and carbon mitigation in particular. This will help in the management of disturbed and degraded forests. In this book the questions related to tree mortality are examined with particular reference to Sal and Shisham mortality along with broad-leaved conifers and tree species in captivity. Primary and secondary causes have been established and then their mitigating measures have been suggested. It is expected that the book will be useful for researchers, foresters and field foresters vis-a-vis Botany and Forestry students alike in their intent to study tree mortality.

Dr. J.D.S. Negi

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Dr. J. D. S. Negi

Dr. P. S. Chauhan

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