

Forest Pests and Pathogens

problems in different forest types of Nepal



Natural Forest Section
Department of Forest Research and Survey
Ministry of Forests and Environment

Babarmahal, Kathmandu

June, 2018

Published by:

Department of Forest Research and Survey

Babarmahal, Kathmandu, Nepal

Phone: +977 14220482, +977 4233510

Fax: +977 14220159

Email: info@dfrs.gov.np

Web: www.dfrs.gov.np

Citation:

R. Malla and K. K. Pokharel, 2018. Forest pests and pathogens problem in different forest types of Nepal. Department of Forest Research and Survey, Kathmandu, Nepal

Prepared by

Rajesh Malla, Research Officer

Kiran Kumar Pokharel, Assistant Research Officer

Department of Forest Research and Survey

Edited by

Meghnath Kafle, Deputy Director General

Department of Forest Research and Survey

Printed at:

Classic Printing Services

Anamnagar, Kathmandu

01-4224810, classicpress2061@gmail.com

Cover photo:

Dieback of *Eucalyptus* in Banke district, Nepal by Rajesh Malla

Background

Forest resource provides both goods and services to the billions of people around the world. Globally, the efforts are being made to protect these resources by maintaining or increasing the area. According to the recent forest resource assessment, Nepal has 44.74% of the land under forest cover including other wooded land (DFRS, 2015). Due to high variation in altitude which is contiguous, Nepal is endowed with various types of forests. There are 35 forest types in Nepal (Stainton, 1972) which are further broadly categorized into 10 major types based on altitudinal ranges. Forests have become an integral component of the livelihood of majority of people particularly living in rural area. Moreover, forest serves as a carbon sink which help mitigate climate change impact. Considering vital role of forest, Government of Nepal has focused on the effective management of forest resources under its various programs with an objective of maximizing benefits from the forest.

Despite the efforts of Government, deforestation and degradation continues unabated. A study conducted by REDD Cell identified nine major drivers of deforestation and forest degradation in different physiographic regions of Nepal. Invasive Alien Species is considered as one of the drivers of deforestation and forest degradation (REDD, 2013). However, forest pests and pathogens also pose serious threats to forest conservation and management. This aspect has not been adequately addressed in Nepal so far. Huge economic loss due to a disease problem in *Dalbergia sissoo* has been recorded decades ago in Nepal. Likewise, pest infestation in *Shorea robusta* has resulted in loss of quality of the timber in the Terai region.

Forest pests and diseases are causing substantial losses in plantation and natural forests (FAO, 2010). Also, area under tree cover is declining at regional level due to the factors such as drought, new pathogens and pests. Interactions between these factors, can have negative impact on biodiversity (Fischer *et al.* 2010; Parks and Bernier 2010; Carnicer *et al.* 2011).

Control of forest pests and diseases have received serious consideration ever since the problems have been identified. Integrated pest management including silvicultural and biological control methods are widely used for forest pest management. Mixing of tree species has been reported as a solution to reduce pest incidence and spread (McGrady-Steed *et al.*, 1997; GoN, 2009) compared to monocultures. However, management of forest pests and diseases has received very low consideration in Nepal till date. This preliminary study, therefore, is an attempt to assess pests and diseases problems in different forest types of Nepal.

Objectives

- To identify prevailing forest pests and diseases problems in different forest types.

Limitation

Sample collections were taken from the field to diagnose particular pest and pathogen infestations. However, due to lack of laboratory facilities, identification of pests/pathogens was conducted based on visual inspections of symptoms.

Methodology

Site selection

Different localities of Sindupalchok, Banke, Bardia, Kailai and Kanchanpur districts covering various forest species such as *Shorea robusta*, *Eucalyptus* sps, *Pterocarpus marsupium*, *Tectona grandis* and *Cassia fistula* were selected based on the requests made by the clients to DFRS and also coordination with District forest office (DFO) staffs and community forest user groups (CFUGs).

Data Collection

Field observation

Ground inspection was conducted to detect the pest infestations. Photographs of the affected parts of the plant were taken and samples were collected for field expert by expert consultation.

Stakeholder survey

Apart from field observation, information on disease/pest outbreak was collected from the forest official, community forest user group and other concerned stakeholders.

Results

Pest/pathogen detections were recorded on different tree species. As indicated, the diagnosis was made from symptoms due to lack of laboratory facilities. Leaf of Sal (*Shorea robusta*) was affected by pests and pathogens. A leaf blight of Sal as shown in (Fig 1)



Fig 1: Insect attack in *Shorea robusta* (Left) and Pathogen infection (Right)

Similarly in Sindhupalchowk district, a big patch of Sal forest was totally defoliated by white moth (Fig 2). According to local people, the damage was seen couple of years ago. Literature shows that this kind of damage is mainly due to *Lymantria mathura*. It is a moderate-sized moth found all along the Indian Sub Himalayas from western Uttar Pradesh to Assam, and also extends farther east to Southeast Asia (Roonwal, 1979).



Fig 2: White Moth (left) and its excreta (Right) seen massively in *Shorea robusta* forest

Pterocarpus marsupium is found naturally, especially in the western lowland of Nepal. Having high commercial value, it was planted in *Banka* of Kanchanpur district a decade ago. Damage in leaf was seen in this species (Fig 3).



Fig 3: Damaged seen in the leaf of *Pterocarpus marsupium*

Teak (*Tectona grandis*) is a commercial tree species and mostly planted in the lower altitude regions of Nepal. Leaves of teak were found affected during the survey. There are several pathogens which can cause leaf spots and blights in *Tectona grandis*. The Figure 4 (leaf on the right side)



Fig 4: Infection seen in the leaf of *Tectona grandis*

Similarly, leaves of *Cassia fistula* was apparently affected by sooty mold (Fig 5).



Fig 5: Infection seen in the leaf of *Cassia fistula*

During the field study, visit was made in the *Eucalyptus* plantation area of (approx 6 ha) in Banke district of Nepal. The plantation was disease-free during the first few years. Later, infections on the different parts of the trees were noticed especially on stem bark. The disease was tentatively identified as pink disease caused by the fungus *Corticium salmonicolor* (Fig 6).



Fig 6: Flowing green fluid over the stem

Similarly, die-back in *Eucalyptus* caused by *Cylindrocladium* sp., leaf gall caused by the insect *Leptocybe invasa* - an invasive species (Fig 7) and stem canker caused by *Cryphonectria* sps were also identified (Fig 8).



Fig 7: Unusual growth seen below the leaf



Fig 8: Stem canker at the base of the stem

Conclusion

The forests in Nepal are under threat due to pests and pathogens. All the types of forests are infested but the level of infestation varies between forests. Lack of proper care at the outbreak stage resulted in the problems to assume serious impact such as forest degradation and biodiversity loss. So, the pest and pathogen problem observed in the forests of Nepal has to be dealt with high priority. The reasons for infestation by forest pests/pathogen could be of several reasons including site conditions, seed quality, anthropogenic disturbances, over grazing, climate change etc.

Way forward

Almost all types of forests in Nepal are infested by pests and pathogens which result in serious consequences. Controlling spread of pests and pathogens in the forests,

early detection of infestation and rapid response are the best methods to apply. Periodic monitoring of forest for new pest outbreaks and management of the existing problems seem mandatory. To institutionalize periodic monitoring of forest pest and pathogens, forest inventory programs at local level to national level should incorporate new variables related to forest pests and pathogen. Furthermore, networking among the stakeholders on the new disease outbreaks and methods of management is equally important to deal with this issue.

Acknowledgement

DFRS would like to thank Dr. Shiroma Sathyapala, Forestry Officer, FAO, Dr. K.V. Sankaran Former Director, Kerala Forest Research Institute and Dr. T.V. Sajeev, Co-ordinator, APFISN for their generous support in diagnosing pests and pathogens causing problems in different forests of Nepal based on visual interpretation. Similarly, DFRS highly appreciates support from DFOs offices, National Parks Offices and NTNC during the field study.

Literature cited:

Carnicer, J., Coll, M., Ninyerola, M., Pons, X., Sánchez, G., &Peñuelas, J. 2011. Widespread crown condition decline, food web disruption, and amplified tree mortality with increased climate change-type drought. *Proceedings of the National Academy of Sciences USA*, 108, 1474–1478. doi:10.1073/pnas.1010070108.

DFRS, 2015. State of Nepal's Forests. Forest Resource Assessment (FRA) Nepal, Department of Forest Research and Survey (DFRS). Kathmandu, Nepal.

Fischer, J., Zenger, A., Gibbons, P., Stott, J., & Law, B. S. 2010. Tree decline and the future of Australian farmland biodiversity. *Proceedings of the National Academy of Sciences USA*, 107, 19597–19602. doi:10.1073/pnas.1008476107.

GoN, 2009. Fourth National Report to the Convention on Biological Diversity. Government of Nepal, Ministry of Forests and Soil Conservation, Kathmandu, Nepal.

Jackson, J.K. 1994. Manual of Afforestation in Nepal (Vol 2). Forest Research and Survey Centre. Kathmandu, Nepal.

McGrady-Steed J., Harris, P.M. & Morin, P.J. 1997. Biodiversity regulates ecosystem predictability. *Nature*, **390**: 162-165.

MFSC, 2013. Invasion and colonization of alien species: A threat or benefits in Nepal. *Policy Brief*. Kathmandu, Nepal.

Parks, C. G., & Bernier, P. 2010. Adaptation of forests and forest management to changing climate with emphasis on forest health: a review of science, policies and practices. *Forest Ecology and Management*, **259**: 657–659. doi:10.1016/S0378-1127(09)00903-7.

Roonwal, M. L., 1979. Field ecological studies on mass eruption, seasonal life history, nocturnal feeding and activity rhythm, and protective behavior and coloration in the Sal defoliator, *Lymantria mathura* in sub-himalayan forests. *Rec. zool. surv. India*, **75**: 209-236