DIVERSITY AND DISTRIBUTION OF INVASIVE ALIEN PLANT SPECIES ALONG ROAD NETWORK IN CENTRAL NEPAL

A Dissertation Submitted to the

Central Department of Botany, Tribhuvan University, for the Partial Fulfillment of the Requirements of Masters of

Science in Botany

Submitted by

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RECOMMENDATION

This is to certify that the dissertation work entitled **"Diversity and Distribution of Invasive Alien Plant Species along Road Network in Central Nepal"** submitted by Nirmala Paudel has been carried out under my supervision. The entire work was based on the results of her primary fieldwork and has not been submitted for any other academic degree. I therefore, recommend this dissertation to be accepted for the partial fulfillment of Masters of Science in Botany from Tribhuvan University, Kathmandu, Nepal.

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LETTER OF APPROVAL

This dissertation paper entitled **"Diversity and Distribution of Invasive Alien Plant Species along Road Network in Central Nepal"** submitted to the Central Department of Botany, Tribhuvan University by Nirmala Paudel has been accepted for the partial fulfillment of requirements of Masters of Science in Botany.

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Nirmala Paudel

CONTENTS

ABSTRACT

Invasive alien plant species are spreading rapidly in Nepal and can have irreversible environmental and economic problem if not managed in time. For the proper management of IAPS detail information regarding their diversity and distribution is needed. In this study a detail survey of IAPS distribution was carried out during June- July in 2013 along road networks in Central Nepal. The study also dealt with the variation in species richness pattern across land use types and along elevation gradient. IAPS distribution was assessed through systematic location of sample plots at an interval of 10km in plain areas and 5km in hilly areas. At every specified distance, a 10 × 10 m^2 plot was defined along the sides of the road. At each plot, IAPS encountered within the plot, their phenophases, presence of biocontrol agents and three most dominant IAPS in terms of cover were recorded. The cover was estimated visually and the frequency of individual IAPS was calculated. The geographical distribution map of each IAPS and overall species richness distribution pattern map was prepared using Arc GIS. A total of 340 plots were sampled covering 2075km of road network. Among the 18 species of invasive alien plants recorded from roadside vegetation, *Bidens pilosa* had the highest frequency whereas *Eichhornia crassipes* had the lowest. And *Ageratina adenophora* was the first dominant species in 30% of the sample plots. IAPS richness showed unimodal pattern of distribution along the elevation gradient. There was significant difference in species richness across land use types. Grazing and fallow land was more vulnerable to invasion, as reflected by the highest species richness in comparison to other land use types (Agricultural land>Shrubland>Forest>Wetland). A negative linear relationship was obtained between frequency (%) and year of record of the IAPS. There was no significant relationship between elevational limit and minimum residence time of IAPS. Most of the IAPS were concentrated to the tropical and sub-tropical region. Middle mountains had greater IAPS richness in comparison to other physiographic regions.This study concludes that IAPS have been spreading rapidly along road networks in Central Nepal. The road networks are acting as dispersal corridors and source areas for plant invasion. Therefore, comprehensive study of IAPS distribution and their impacts has to be carried out at national level which may be useful to develop management strategies for controlling biological invasion.

Keywords: Biological invasion, Invasive alien plant species, Species richness, Elevation gradient, Disturbance, Road network, Frequency, Residence time, Distribution maps.

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A. FIGURES

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LIST OF ABBREVIATION AND ACRONYMS

IAPS	Invasive Alien Plant Species
IAS	Invasive Alien species
m	meter
asl	above sea level
ANOVA	Analysis of variance
GIS	Geographic Information System
SPSS	Statistical Package for Social Science
d.f.	Degree of freedom
p	Level of Significance
R^2	Coefficient of Determination
mm	Millimeters
km	Kilometers
m^2	meter square
GPS	Global Positioning System
Vs.	Versus
Yr	Year
IUCN	The World Conservation Union
GISD	Global Invasive Species Database
MFSC	Ministry of Forest and Soil Conservation