PLANT SPECIES COMPOSITION AND SOIL SEEDBANK IN *PARTHENIUM HYSTEROPHORUS* L. INVADED GRASSLAND OF HETAUNDA, CENTRAL NEPAL

A Dissertation Submitted to the

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Partial Fulfillment of the Requirements for the
Master of Science in Botany

Submitted by

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RECOMMENDATION

This is to certify that the dissertation work entitled "**Plant Species Composition and Soil Seedbank in *Parthenium hysterophorus* L. Invaded Grassland of Hetaunda, Central Nepal**" submitted by Jyoti K.C. 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 "**Plant Species Composition and Soil Seedbank in *Parthenium hysterophorus* L. Invaded Grassland of Hetaunda, Central Nepal**" submitted at the Central Department of Botany, Tribhuvan University by Jyoti K.C., has been accepted for the partial fulfillment of requirements for Masters of Science in Botany.

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Date: Nov 09, 2012 Jyoti K.C.

CONTENTS

ABSTRACT

Impact of *Parthenium hysterophorus L.* invasion on the herbaceous plant species richness and composition of a grassland and its abundance in the total germinable soil seedbank were monitored for two years in Hetaunda Municipality of Makawanpur district, Central Nepal. The study also dealt with the impacts of defoliation caused by the leaf feeding beetle *Zygogramma bicolorata* on the germinable soil seedbank density of *Parthenium.* Field samplings were done in two steps; vegetation sampling and soil sampling. The vegetation samplings were done in September and the soil samplings in October for the two successive years 2009 and 2010 representing 1st and 2nd year of defoliation by *Zygogramma,* respectively. A total of 30 transects, 10 on each of the three study sites, selected subjectively were sampled. On each transect, 3 quadrats of 1m × 1m were sampled in such a way that they represented >90%, >40≤60% and 0-10% *Parthenium* coverage, indicating High, Medium and Low levels of *Parthenium* infestation, respectively. Altogether 90 quadrats (3 on each of the 30 transect) were sampled. In each quadrat, vascular plant species richness, *Parthenium* density, its coverage, maximum height and the coverage of other species were recorded. For the estimation of germinable soil seedbank density, soil samples were collected from the plots having high *Parthenium* infestations at two different depths (0-5 cm and 5-10 cm) by using soil core sampler, and thus collected soil samples were kept for germination in the greenhouse for eight months and soil seedbank was analyzed by counting germinating seedlings. There were no significant differences in the herbaceous plant species richness at different levels of *Parthenium* infestation but we found change in the species composition. *Parthenium* had the highest abundance on the germinable soil seedbank measured up to 10 cm soil depth and comprised about 4/5th of the total soil seedbank. We did not find significant change in the germinable soil seedbank density measured for 2009 and 2010. The study suggests that *Parthenium* invasion is affecting the species composition of grassland Defoliation caused by the *Zygogramma* has not been so effective in reducing the soil seedbank density owing to the recent event and persistent nature of its germinable soil seedbank. Thus, for effective control of *Parthenium,* defoliation has to be continued for some more years associated with other long-term management programs.

Keywords: Biocontrol, germinable soil seedbank, *S*pecies richness, *Zygogramma bicolorata*.

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A. FIGURES

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LIST OF ABBREVIATION AND ACRONYMS

IAS	Invasive Alien Species
masl	meter above sea level
UEIP	Urban & Environmental Improvement Project
GoN	Government of Nepal
°C	Degree Centrigrade
TUCH	Tribhuvan University Central Herbarium
KATH	National Herbarium, Godawari, Kathmandu
ANOVA	Analysis of variance
SPSS	Statistical Package for Social Science
P	Level of Significance
d.f	Degree of freedom
sqrt	Square root
Max.	Maximum
Sp.	Species
SD	Standard Deviation
HIP	High Infested Plot
MIP	Medium Infested Plot
LIP	Low Infested Plot