

**INSECT POLLINATORS IN WHITE CLOVER (*Trifolium repens* L.) IN
GROUND OF BHAKTAPUR MULTIPLE CAMPUS, BHAKTAPUR**



BY

GYANU CHAGUTHI

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A THESIS SUBMITTED IN PARTIAL FULFILMENT OF THE REQUIREMENTS
FOR THE AWARD OF THE DEGREE OF MASTER OF SCIENCE IN ZOOLOGY
WITH SPECIAL PAPER ENTOMOLOGY

TO

CENTRAL DEPARTMENT OF ZOOLOGY
INSTITUTE OF SCIENCE AND TECHNOLOGY
TRIBHUVAN UNIVERSITY,
KIRTIPUR, KATHMANDU

NEPAL

2017

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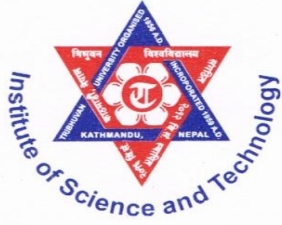
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DECLARATION

I hereby declare that the work presented in this thesis entitled “**INSECT POLLINATORS IN WHITE CLOVER (*Trifolium repens* L.) IN GROUND OF BHAKTAPUR MULTIPLE CAMPUS, BHAKTAPUR**” has been done myself and has not been submitted elsewhere for the award of any degree. All sources of information have been specifically acknowledged by references to the authors and institutions.

Date.....

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RECOMMENDATION

This is to recommend that the thesis entitled “**INSECT POLLINATORS IN WHITE CLOVER (*Trifolium repens* L.) IN GROUND OF BHAKTAPUR MULTIPLE CAMPUS, BHAKTAPUR**” has been carried out by Miss Gyanu Chaguthi for the partial fulfilment of Master’s Degree of Science in Zoology with special paper Entomology. This is her original work and has been carried out under my supervision. To the best of my knowledge, this thesis work has not been submitted for any other degree in any institutions.

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LETTER OF APPROVAL

On the recommendation of supervisor “**Lecturer Urmila Dyola**” this thesis submitted by Miss Gyanu Chaguthi entitled “**INSECT POLLINATORS IN WHITE CLOVER (*Trifolium repens* L.) IN GROUND OF BHAKTAPUR MULTIPLE CAMPUS, BHAKTAPUR**” is approved for examination and submitted to the Tribhuvan University for the partial fulfillment of the requirements for the Master’s Degree of Science in Zoology with special paper Entomology.

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CERTIFICATE OF ACCEPTANCE

This thesis work submitted by Miss Gyanu Chaguthi entitled “**INSECT POLLINATORS IN WHITE CLOVER (*Trifolium repens* L.) IN GROUND OF BHAKTAPUR MULTIPLE CAMPUS, BHAKTAPUR**” has been accepted for the partial fulfillment of the requirements for the requirements of Master’s Degree of Science in Zoology with special paper Entomology.

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LIST OF ABBREVIATIONS

Abbreviated form	Details of abbreviations
CCA	Canonical Correspondence Analysis
DDC	District Development Committee
NARC	National Agriculture Research Council
NHM	Natural History Museum
RECAST	Research Centre for Applied Science and Technology

ABSTRACT

Insect pollinators play key role in the pollination of both wild and cultivated plants and other vegetations. *Trifolium repens* L. is one of the wild plants which grow on the bare pasture lands, along lawns and heavily grazed areas. This plant entirely depends on insects (one of the biotic pollinators) for its pollination. Through this study various insect pollinators which come around the clover flowers for nectar and pollen include insects belonging to 3 major orders are *Apis cerana* (54.75%) belonging to order Hymenoptera and family Apidae. *Apis cerana* was followed by *Lampides boeticus* (11.89%) belonging to Lepidoptera, *Andrena sp.* (6.89%) of Hymenoptera order, *Polyommatus semiargus* (4.08%), *Colias fieldi* (2.90%) of Lepidoptera order and *Apis mellifera* (2.56%) of Hymenoptera order.

Similarly, the least found insect species pollinating clover flower were *Polistes sp.* (0.77%) Ichneumonid spp. (0.72%), *Nyctimera adversata* (0.63%), *Aglais caschmirensis* (0.36%), *Vespa spp.* (0.33%), *Pontia daplidice* (0.30%) and *Syntomoides spp.* (0.25%) respectively.

Correlation of various environmental variables with insect species was performed by multivariate analysis using Canoco 5 software. Permutation test result on first axis was pseudo-F=5.2, P=0.002 and on all axis was pseudo-F=2.4, P=0.002. Final model CCA forward selection was used to show the factor affecting pollinator visit in the *Trifolium repens* L.. All together six environmental variables were used but among them five variables showed significant result during forward selection: Light (F=3.5, P=0.002), Temperature (F=3.8, P=0.002), Day (F=2.5, P=0.002), Evening (F=1.8, P=0.046) and relative humidity (F=1.8, P=0.028). Light showed insignificant result during the forward selection test and removed for analysis. Two environmental variables (day and morning) showed co-linearity and only morning time.