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VULNERABILITY OF NORTH QUEENSLAND RAINFOREST
PLANTS TO PREDISPERSAL SEED PREDATION BY INSECTS

Thesis submitted by
Peter Alexander JUNIPER BSc(Hons) Macquarie University
in March 2000

for the degree of Doctor of Philosophy
in the Department of Zoology and Tropical Ecology,
James Cook University of North Queensland
STATEMENT OF ACCESS

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10/3/2000

Peter Alexander Juniper
ABSTRACT

Seed predation by animals is one of the major causes of death for seeds in tropical rainforests. By reducing seed availability in tropical rainforests seed predation may affect the recruitment of new plants, as has been shown in other types of ecosystems. Seed predation may therefore be one of the factors that determines the species composition of tropical rainforests. The purpose of this thesis was to determine what factors were associated with the vulnerability of rainforest plants to seed predation, what types of species were most vulnerable to seed predation and hence what types of species were most likely to be limited in abundance by seed predation. This study focussed on predispersal seed predation by insects in the tropical rainforests of north Queensland, on the Atherton Tablelands.

The presence and intensity of insect predispersal seed predation (IPSP) on the seed crops of rainforest plants was assessed and associations between the presence and intensity of IPSP, and species and site characteristics were tested.

Five factors were found to be associated with variations in IPSP:

1) Plants that produced fruit with a hard, thick pericarp layer (fruit wall) were less likely to be attacked by IPSPs than those with a thin hard pericarp or no hard pericarp at all.

2) The total fruit pericarp thickness was also inversely related to the likelihood that any seeds within were attacked. This relationship was caused by the confounding effects of hard pericarp thickness, which is positively correlated with total pericarp thickness.
3) Differences in the intensity of IPSP found among plants of different families suggest that the vulnerability of plants to IPSP was also associated with phylogeny. Plants belonging to the Lauraceae had particularly low intensities of IPSP while plants belonging to the Euphorbiaceae and the Sapindaceae had particularly high intensities of IPSP.

4) Native species of plant were more likely to be attacked by IPSP than exotic species. This was not due to any confounding phylogenetic differences.

5) There were indications that shade dwelling species of plant were less likely to be attacked by IPSPs than species that grew in well lit conditions. However, this association may be due to confounding differences in growth form.

Native species that grew in high light conditions and had soft and/or thin fruit pericarp layers were considered to be more vulnerable to IPSP than species that were exotic, grew in low light conditions and that had thick hard seed pericarp layers. Hence seed availability and in turn possibly seedling recruitment, was more likely to be limited by IPSP in the former species, particularly species in the Euphorbiaceae and the Sapindaceae.

The recruitment of plants is also affected by many other factors, hence the varying effect of IPSP on the recruitment of different species will be modified. The possible effects of IPSP on seed availability, and in turn recruitment, are discussed within the context of these other modifying factors, in particular - seed longevity and post-dispersal seed predation.
TABLE OF CONTENTS

STATEMENT OF ACCESS 1
ABSTRACT 2
TABLE OF CONTENTS 4
STATEMENT OF SOURCES DECLARATION 10
ACKNOWLEDGMENTS 11

CHAPTER 1: INTRODUCTION 13
1.1 Seed predation and the composition of tropical rainforest plant communities 14
1.2 General aim of thesis 18
1.3 Structure of thesis 18

CHAPTER 2: LITERATURE REVIEW FOR THE FACTORS THAT AFFECT PREDISPERSAL SEED PREDATION BY INSECTS 20
Abstract 21
2.1 Introduction
  2.1.1 What is seed predation? 21
  2.1.2 What are seed predators? 22
  2.1.3 The effects of seed predation on seed performance
    Seed-level effects
      Seed mortality 27
      Seed germination 29
    Crop-level effects
      Seed mortality 30
      Seed dispersal 31
      Seed survival 32
      Seed germination 32
<table>
<thead>
<tr>
<th>Section</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>2.1.4 What is predispersal seed predation?</td>
<td>33</td>
</tr>
<tr>
<td>2.2 Factors affecting predispersal seed predation by insects</td>
<td></td>
</tr>
<tr>
<td>2.2.1 Defining factors which affect insect predispersal seed predation</td>
<td></td>
</tr>
<tr>
<td>2.2.2 The factors that affect insect predispersal seed predation</td>
<td></td>
</tr>
<tr>
<td>Proximal factors</td>
<td>38</td>
</tr>
<tr>
<td>Lower level factors</td>
<td>39</td>
</tr>
<tr>
<td>Temporally related factors</td>
<td>42</td>
</tr>
<tr>
<td>Spatially related factors</td>
<td>47</td>
</tr>
<tr>
<td>Static plant attributes</td>
<td>53</td>
</tr>
<tr>
<td>2.3 Discussion and conclusions</td>
<td></td>
</tr>
<tr>
<td>2.3.1 The current state of knowledge on the factors that affect</td>
<td>57</td>
</tr>
<tr>
<td>predispersal seed predation by insects</td>
<td></td>
</tr>
<tr>
<td>The actual significance of factors to predispersal seed predation by</td>
<td></td>
</tr>
<tr>
<td>insects</td>
<td>59</td>
</tr>
<tr>
<td>The comparative effects of different factors to predispersal seed</td>
<td></td>
</tr>
<tr>
<td>predation by insects</td>
<td>66</td>
</tr>
<tr>
<td>The comparative effect of factors on predispersal seed predation by</td>
<td></td>
</tr>
<tr>
<td>insects across species</td>
<td></td>
</tr>
<tr>
<td>2.3.2 Further study necessary for the factors that may affect</td>
<td>67</td>
</tr>
<tr>
<td>predispersal seed predation by insects</td>
<td></td>
</tr>
<tr>
<td>CHAPTER 3: A DESCRIPTION OF THE STUDY REGION AND ITS</td>
<td></td>
</tr>
<tr>
<td>RAINFORESTS</td>
<td></td>
</tr>
<tr>
<td>Abstract</td>
<td>69</td>
</tr>
<tr>
<td>3.1 Physical geography and vegetation of the Atherton Tableland</td>
<td>70</td>
</tr>
<tr>
<td>3.1.1 Climate</td>
<td>72</td>
</tr>
<tr>
<td>3.1.2 Geology and soils</td>
<td>72</td>
</tr>
<tr>
<td>3.2 The rainforest of the Atherton Tableland</td>
<td>73</td>
</tr>
<tr>
<td>3.2.1 Rainforest Structure and Floristics - The Influence of</td>
<td></td>
</tr>
<tr>
<td>Climatic and Edaphic Factors</td>
<td>75</td>
</tr>
</tbody>
</table>
CHAPTER 4: A SURVEY OF INSECT PREDISPERSAL SEED PREDATION IN NORTH QUEENSLAND TROPICAL RAINFOREST: RELATIONSHIPS BETWEEN VULNERABILITY TO SEED PREDATION, AND PLANT AND HABITAT CHARACTERISTICS

Abstract 79

4.1 Introduction 80

4.1.1 What factors can affect insect predispersal seed predation? 80

4.1.2 Scope of study 82

4.1.3 Summary of hypotheses 93

4.2 Methods 94

4.2.1 Study area and sampling 94

4.2.2 Rearing insect seed predators 95

4.2.3 Measuring seed predation 97

4.2.4 Recording fruit/seed morphological attributes 98

4.2.5 Defining parameters 98

4.2.6 Data analysis 101

4.3 Results 105

4.3.1 Seed predation and the seed predators 105

4.3.2 Univariate analysis 111

Correlations between parameters and the presence/absence of IPSP

*Hard pericarp thickness* 111

*Total pericarp thickness* 114

*Plant indigeneity* 119

4.3.3 Results summary 125
4.4 Discussion

4.4.1 Significant parameters
Hard pericarp thickness
Plant indigeneity
Plant taxonomic affiliation

4.4.2 Insignificant parameters
Seed size
Seed sphericity
Seed number per fruit and seed mass per fruit
Fruit pericarp texture
Plant growth form
Light and phosphorus availability
Fruiting season

4.5 Summary and conclusions

CHAPTER 5: HOST PLANT RESOURCE AVAILABILITY

Abstract

5.1 Introduction

5.1.1 Aim of study

5.2 Methods

5.2.1 Study Area

5.2.2 Assessing intensities of seed predation

5.2.3 Assessing defences against seed predators

5.2.4 Statistical Analysis

5.3 Results

5.3.1 Seed predation and resource availability

5.3.2 Seed predation and possible defences against seed predators

5.3.3 Anti-seed predator defences and resource availability

5.4 Discussion

5.4.1 Limitations of the data
5.4.2 Alternative interpretations of the results
Seed defences and seed predation
Light availability and seed predation

CHAPTER 6: HOST PLANT INDIGENEITY

Abstract
6.1 Introduction
6.2 Methods
  6.2.1 Study area, species selection and field sampling
  6.2.2 Assessing seed predation
  6.2.3 Assessing the phylogenetic similarity of exotic species to the local native rainforest species
  6.2.4 Rearing insect seed predators
6.3 Results
  6.3.1 Selection of species for comparing natives versus exotics
  6.3.2 Seed predation in the selected species
  6.3.3 Phylogenetic similarity of exotic species to local native rainforest species
6.4 Discussion and conclusions

CHAPTER 7: GENERAL DISCUSSION AND CONCLUSIONS

Abstract
7.1 The vulnerability of plants to IPSP
7.2 Possible effects of IPSP on species abundance
7.3 Factors that may modify the effects of IPSP on species abundance
  7.3.1 Postdispersal seed predation
  7.3.2 Seed longevity
7.4 Conclusions
7.5 Further research
  7.5.1 The vulnerability of rainforest plant species to IPSP
  Host plant phylogeny
  Light availability
7.5.2 The effects of IPSP on the population dynamics of rainforest plants

REFERENCES 217
APPENDIX 1 251
APPENDIX 2 254
APPENDIX 3 256
STATEMENT OF SOURCES DECLARATION

I declare that this thesis is my own and has not been submitted in any form for another degree or diploma at any university or other institution of tertiary education. Information derived from the published or unpublished work of others has been acknowledged in the text and a list of references is given.

10/3/2000

Peter Alexander Juniper
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