

CONTENTS

ABSTRACT	i
DECLARATION	v
CERTIFICATE OF SUPERVISOR	vii
ACKNOWLEDGEMENT	ix
LIST OF TABLES	xv
LIST OF FIGURES	xvii
LIST OF PLATES	xxi
LIST OF ABBREVIATIONS	xxiii

CHAPTER 1 GENERAL INTRODUCTION	
--------------------------------	--

1.1 Introduction	1
1.2 Objectives	
1.2.1 The aim of the study	4
1.2.2 Specific objectives	4
1.3 Hypotheses	4
1.4 Significance of the study	5
1.5 References	6

CHAPTER 2 REVIEW OF LITERATURE	
--------------------------------	--

2.1 Vegetation of Himalayan region	
2.1.1 Origin	11
2.1.2 Types of vegetation in the Indian Himalayan Region	12
2.2 Phenology	

2.2.1 History	16
2.2.2 Phenology and Climate	17
2.3 Himalayan soil	
2.3.1 Soil formation and nutrient dynamics	23
2.4 Phenological models	
2.4.1 Development of phenological models	24
2.4.2 Types of phenological models	24
2.5 References	26

CHAPTER 3 VEGETATION DIVERSITY

3.1 Introduction	39
3.2 Methodology	
3.2.1 Study site	40
3.2.2 Vegetation sampling and analysis	42
3.3 Results	45
3.4 Discussion	63
3.5 Conclusion	65
3.6 References	66

CHAPTER 4 PHENOLOGY

4.1 Introduction	75
4.2 Methodology	
4.2.1 Phenological data	76
4.2.2 Meteorological data	81
4.2.3 Data analysis	81

4.3 Results	
4.3.1 Meteorological data	81
4.3.2 Variation in monthly phenophases	83
4.3.3 Correlation of phenophases with climatic variables	90
4.3.4 Seasonality of phenophases	95
4.4 Discussion	
4.4.1 Vegetative phenophases and climatic variables	100
4.4.2 Reproductive phenophases and climatic variables	101
4.5 Conclusion	102
4.6 References	103

CHAPTER 5 SOIL NUTRIENT DYNAMICS

5.1 Introduction	109
5.2 Methodology	
5.2.1 Study site	110
5.2.2 Sampling method	110
5.2.3 Physicochemical analysis	110
5.2.4 Data analysis	111
5.3 Results	
5.3.1 Soil parameters of tropical semi-evergreen forest	111
5.3.2 Soil parameters of scrub patches	112
5.4 Discussion	119
5.5 Conclusion	120
5.6 References	121

CHAPTER 6 PHENOLOGICAL MODELING

6.1 Introduction	127
6.2 Methodology	128
6.3 Results	129
6.4 Discussion	139
6.5 Conclusion	140
6.6 References	142

CHAPTER 7 CONCLUSION

7.1 Conclusion	145
7.2 Further research potential	147

LIST OF PUBLICATIONS

Journal papers/Articles	149
Book chapters	149
Seminars and Conferences	149
