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**THE ECOLOGY AND INTEGRATED
MANAGEMENT OF BROOM (*Cytisus scoparius*) IN
NEW ZEALAND PLANTATION FORESTS**

A thesis presented in partial fulfilment of the
requirements for the degree of

Doctor of Philosophy

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Abstract

Broom (*Cytisus scoparius*) is a major weed of radiata pine (*Pinus radiata*) plantations in New Zealand. The objective of this work was to determine how best to discourage broom establishing successfully within newly planted pine forests. Measurements of seed banks under pine forests showed that broom seeds can accumulate in the soil prior to the trees being harvested, with over 3500 seeds m⁻² of high viability being found in some forest soils. Seeds germinate immediately once scarified, but unscarified seeds break dormancy over time, and temperature fluctuations within bare soil are thought to help break seed coats. A field trial in which several different grass species were sown at different rates showed that grasses establishing at the same time as broom seedlings have little detrimental effect on broom establishment, regardless of whether planted in spring or autumn. However, if grasses had been established for six months prior to broom seeds germinating, no broom survived. A range of herbicides were tested for their ability to control broom from three months to 12 months in age. Most herbicides tested gave good control of broom seedlings, including hexazinone, terbuthylazine, and several combinations of clopyralid, triclopyr and picloram, though some herbicides were better than others on older plants. Herbicides were also assessed to determine how persistent they are within soil for controlling broom seedlings that begin establishing several months after a herbicide was applied. Three of the most persistent treatments were hexazinone, clopyralid and a triclopyr/picloram mixture. A range of herbicide and ground cover treatments were assessed in a newly planted pine forest in Hawkes Bay for their effect on broom establishment. The most effective strategy for discouraging broom problems in pine forests is thought to involve planting grass ground covers then using a herbicide mixture based on clopyralid with some picloram and triclopyr added to selectively remove broom from among young pines and the grass sward within the first 12 months. Following this herbicide application, subsequent establishment of further broom seedlings should be prevented initially by residues from the herbicide then later by the grass sward.

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Table of Contents

Abstract	ii
Table of Contents	v
CHAPTER 1 GENERAL INTRODUCTION.....	1
1.1 Introduction	1
1.2 Literature reviews.....	3
1.2.1 Taxonomy	3
1.2.2 Invasion history of broom in New Zealand	4
1.2.3 Description	4
1.2.4 Distribution and uses of broom.....	4
1.2.5 Habitat.....	6
1.2.6 Growth and development.....	9
1.2.7 Reproduction and growth.....	10
1.2.8 Modelling the invasive weeds with respect to management and control.....	21
1.2.9 Management and control of broom.....	27
1.3 Research objectives	30
1.4 Thesis outline	31
CHAPTER 2 ASPECTS OF BROOM (<i>Cytisus scoparius</i>) SEED BANK, SEED GERMINATION AND SEEDLING ECOLOGY	33
2.1 Introduction.....	33
2.2 Materials and methods	35
2.2.1 Broom seed bank variability and seed viability under <i>Pinus radiata</i> stands ..	35
2.2.2 Effects of scarification and burial depth on broom seedling emergence	38
2.2.3 Effects of disturbance and herbivory on broom seedling emergence and survival.....	45
2.2.4 Statistical analysis	48
2.3 Results.....	51
2.3.1 Broom seed bank variability and seed viability under <i>Pinus radiata</i> stands ..	51
2.3.2 Effects of scarification and burial depth on broom seedling emergence	53
2.3.3 Effects of disturbance and herbivory on broom seedling emergence and survival.....	57
2.4 Discussion	60
2.4.1 Broom seed bank and seed germination under <i>Pinus radiata</i> stands.....	60
2.4.2 Effects of scarification and burial depth on broom seedling emergence	62
2.4.3 Effects of disturbance and herbivory on broom seedling emergence and survival.....	63

CHAPTER 3 COMPETITIVE EFFECT OF SOWN GRASSES ON SUPPRESSION OF BROOM (<i>Cytisus scoparius</i>) SEEDLINGS	66
3.1 Introduction	66
3.2 Materials and methods	69
3.2.1 Study site	69
3.2.2 Seed collection and preparation	70
3.2.3 Broom field experiments	72
3.2.4 Data collection and harvesting	76
3.2.5 Data analysis	77
3.3 Results	79
3.3.1 Broom seedling emergence, survival and growth	79
3.3.2 Botanical composition	85
3.3.3 Dry matter production	89
3.4 Discussion	92
3.5 Implications for management and future research	95
CHAPTER 4 PERSISTENCE OF RESIDUAL HERBICIDES FOR PREVENTING THE ESTABLISHMENT OF BROOM (<i>Cytisus scoparius</i>) SEEDLINGS	96
4.1 Introduction	96
4.2 Materials and methods	101
4.2.1 Study site	101
4.2.2 Field treatments	102
4.2.3 Soil sampling and bioassay assessment	104
4.2.4 Data collection and measurements	107
4.2.5 Data analysis	108
4.3 Results	109
4.4 Discussion	118
4.4.1 Metsulfuron-methyl	119
4.4.2 Triclopyr	120
4.4.3 Terbutylazine	121
4.4.4 Clopyralid	121
4.4.5 Hexazinone	122
4.4.6 Triclopyr/picloram	123
4.5 Implications for management and future research	124
CHAPTER 5 ASSESSMENT OF HERBICIDES FOR SELECTIVELY CONTROLLING BROOM (<i>Cytisus scoparius</i>) GROWING WITH RADIATA PINE (<i>Pinus radiata</i>)	126
5.1 Introduction	126
5.2 Materials and methods	128

5.2.1 General cultivation methods for broom and <i>Pinus radiata</i>	128
5.2.2 Experimental design.....	130
5.2.3 Assessment of herbicide effects.....	133
5.2.4 Data analysis.....	133
5.3 Results.....	135
5.3.1 Effects of herbicides on broom plants.....	135
5.3.2 Effects of herbicides on <i>Pinus radiata</i>	139
5.4 Discussion.....	142
5.5 Implications for management and future research.....	146
CHAPTER 6 POPULATION DYNAMICS OF BROOM (<i>Cytisus scoparius</i>) UNDER VARIOUS MANAGEMENT SCHEMES IN A RADIATA PINE (<i>Pinus radiata</i>) PLANTATION.....	147
6.1 Introduction.....	147
6.2 A conceptual model for broom in New Zealand.....	149
6.3 Objectives.....	149
6.4 Research questions and hypotheses.....	149
6.5 Materials and methods.....	151
6.5.1 Study site.....	151
6.5.2 Broom seed bank sampling.....	153
6.5.3 Experimental design.....	153
6.5.4 Data collection and measurements.....	156
6.5.5. Data analysis.....	160
6.6. Results.....	163
6.6.1 Seed bank, seedling and sapling emergence and survival.....	164
6.6.2 Changes in cover percentages of botanical composition and debris.....	167
6.6.3 Relationship between broom survival and cover percentage.....	173
6.6.4 Matrix models for broom under various zones.....	174
6.7 Discussion.....	183
6.8 Implications for forest managements and future research.....	188
CHAPTER 7 SYNTHESIS.....	189
7.1 Introduction.....	189
7.2 Thesis findings.....	189
7.3 Recommendations for future research.....	193