

Contents

Page

B. W. Geils I. Vázquez Collazo	Chapter 1. Loranthaceae and Viscaceae in North America	1
	Mistletoes of Canada, Mexico, and the United States	1
	Key to Genera of Mistletoes in North America	4
	Economic and Ecological Importance	4
	Management Strategies	5
I. Vázquez Collazo B. W. Geils	Chapter 2. <i>Psittacanthus</i> in Mexico	9
	General Life Cycle	10
	Description of Genus	12
	Description of Species	13
	1. <i>Psittacanthus americanus</i>	13
	2. <i>Psittacanthus angustifolius</i>	13
	3. <i>Psittacanthus calyculatus</i>	14
	4. <i>Psittacanthus macrantherus</i>	14
	5. <i>Psittacanthus pinicola</i>	14
	6. <i>Psittacanthus schiedeanus</i>	15
	Damage and Effects on Host	15
	Economic and Ecological Importance	15
	Management Strategies	16
	Biological Control	16
	Chemical Control	16
	Silviculture	16
B. W. Geils D. Wiens F. G. Hawksworth	Chapter 3. <i>Phoradendron</i> in Mexico and the United States	19
	Life History and Biology	20
	Life Cycle	20
	Host–Parasite Physiology	20
	Host–Parasite Ecology	20
	Description of Genus	21
	Description of Species	22
	1. <i>Phoradendron bolleanum</i>	22
	2. <i>Phoradendron capitellatum</i>	23
	3. <i>Phoradendron densus</i>	23
	4. <i>Phoradendron juniperinum</i>	25
	5. <i>Phoradendron libocedri</i>	25
	6. <i>Phoradendron longifolium</i>	26
	7. <i>Phoradendron minutifolium</i>	26
	8. <i>Phoradendron pauciflorum</i>	26
	9. <i>Phoradendron rhipsalinum</i>	27
	10. <i>Phoradendron saltilense</i>	27
	Importance	27
	Management Strategies	28
F. G. Hawksworth D. Wiens B. W. Geils	Chapter 4. <i>Arceuthobium</i> in North America	29
	General Life Cycle	29
	Life History	30
	Dispersal	30
	Establishment	31
	Incubation	31
	Reproduction	31
	Spread and Intensification	32
	Rating systems	32
	Description of Genus	33
	Key to North American Species of <i>Arceuthobium</i>	35

Description of Species	38
1. <i>Arceuthobium abietinum</i>	38
1a. White Fir Dwarf Mistletoe	38
1b. Red Fir Dwarf Mistletoe	40
2. <i>Arceuthobium abietis-religiosae</i>	40
3. <i>Arceuthobium americanum</i>	40
4. <i>Arceuthobium apachecum</i>	41
5. <i>Arceuthobium aureum</i> subsp. <i>p Petersonii</i>	41
6. <i>Arceuthobium blumeri</i>	41
7. <i>Arceuthobium californicum</i>	42
8. <i>Arceuthobium campylopodium</i>	42
9. <i>Arceuthobium cyanocarpum</i>	43
10. <i>Arceuthobium divaricatum</i>	43
11. <i>Arceuthobium douglasii</i>	44
12. <i>Arceuthobium durangense</i>	45
13. <i>Arceuthobium gillii</i>	45
14. <i>Arceuthobium globosum</i>	46
14a. <i>Arceuthobium globosum</i> subsp. <i>globosum</i>	46
14b. <i>Arceuthobium globosum</i> subsp. <i>grandicaule</i>	46
15. <i>Arceuthobium guatemalense</i>	47
16. <i>Arceuthobium hondurensense</i>	47
17. <i>Arceuthobium laricis</i>	47
18. <i>Arceuthobium littorum</i>	48
19. <i>Arceuthobium microcarpum</i>	48
20. <i>Arceuthobium monticola</i>	49
21. <i>Arceuthobium nigrum</i>	49
22. <i>Arceuthobium oaxacanum</i>	50
23. <i>Arceuthobium occidentale</i>	50
24. <i>Arceuthobium pendens</i>	50
25. <i>Arceuthobium pusillum</i>	51
26. <i>Arceuthobium rubrum</i>	51
27. <i>Arceuthobium siskiyouense</i>	52
28. <i>Arceuthobium strictum</i>	52
29. <i>Arceuthobium tsugense</i>	52
29a. <i>Arceuthobium tsugense</i> subsp. <i>tsugense</i>	53
29b. <i>Arceuthobium tsugense</i> subsp. <i>mertensianae</i>	54
30. <i>Arceuthobium vaginatum</i>	54
30a. <i>A. vaginatum</i> subsp. <i>vaginatum</i>	54
30b. <i>Arceuthobium vaginatum</i> subsp. <i>cryptopodium</i>	55
31. <i>Arceuthobium verticilliflorum</i>	56
32. <i>Arceuthobium yecorensense</i>	56
 B. W. Geils F. G. Hawksworth	
Chapter 5. Damage, Effects, and Importance of Dwarf Mistletoes	57
Physiology of Dwarf Mistletoe Parasitism	58
Direct Effects to Host Trees	58
Reproduction	58
Cones and seeds	58
Seedlings	59
Growth	59
Longevity	60
Wood Quality, Decay, and Breakage	61
Witches' Brooms	61
Ecological and Evolutionary Effects	62
Interactions	62
Fungi	62

J.A. Muir	Insects and spiders	62
B. Moody	Fire and fuels	63
	Forest Structure and Composition	63
	Old-growth forests	63
	Wildlife habitat	63
	Consequences to Resources and Other Values	64
	Importance	64
	Species affected	64
	Area affected	64
	Growth loss	64
	Amenity Values	65
	Coevolution	65
Chapter 6. Dwarf Mistletoe Surveys	67
S. F. Shamoun	General Requirements and Procedures	68
L .E. DeWald	Dwarf Mistletoe Surveys	69
	Aerial Surveys	70
	Aerial Photography	70
	Forest Inventory Plots	70
	Road and Plot Surveys	70
	Transects and Grids	71
	Permanent Plots	71
	Project Area Assessments	71
	Developing management prescriptions	71
	Assessments complex stands	72
	Evaluations Using Dwarf Mistletoe Survey Data	72
	Further Needs for Surveys and Evaluations	73
Chapter 7. Management Strategies for Dwarf Mistletoes: Biological, Chemical, and Genetic Approaches	75
J. A. Muir	Biological Control	76
B. W. Geils	Integrating Biological Control with Silviculture	76
	Insects	76
	Fungi	76
	Aerial shoot fungi	77
	Canker fungi associated with endophytic system	78
	Resin disease syndrome	79
	Summary	79
	Chemical Control	79
	Summary	80
	Management Through Selection for Genetic Resistance	80
	Summary	81
Chapter 8. Management Strategies for Dwarf Mistletoe: Silviculture	83
	Designing Silvicultural Treatments	84
	Management of Even-Aged Stands	87
	Prevention of Spread Into Cut Blocks	87
	Silvicultural Treatments of Young Stands	87
	Recently harvested and regenerated stands	88
	Sanitation thinning	88
	Thinning precommercial stands	89
	Commercial Thinning Treatments	89
	Uneven-Aged Silviculture and Selection Cutting	90
	Prescribed Burning	91
	Models to Assess Treatment Opportunities	91

Management for Recreation, Wildlife Habitat, and Other Ecosystem Values	93
Treatments in Developed Recreation Sites	93
Treatments for Wildlife Habitat and Other Ecosystem Values.....	94
Appendices	95
Appendix A: References	95
Appendix B: Scientific and Common Names of Trees	113
Appendix C: Acknowledgments	115
Appendix D: Glossary	116
Appendix E: Index	120