Timothy D. Paine • François Lieutier Editors

Insects and Diseases of Mediterranean Forest Systems



Contents

1	Introduction Timothy D. Paine and François Lieutier	1
2	Introduction to Mediterranean Forest Systems: Mediterranean Basin François Lefèvre and Bruno Fady	7
3	Defoliators in Native Insect Systems of the Mediterranean Basin Andrea Battisti, Manuela Branco, and Zvi Mendel	29
4	Native Fruit, Cone and Seed Insects in the Mediterranean Basin Thomas Boivin and Marie-Anne Auger-Rozenberg	47
5	Native Sap-Sucker Insects in the Mediterranean Basin Aurélien Sallé and Andrea Battisti	89
6	Bark Beetles of Mediterranean Conifers François Lieutier, Zvi Mendel, and Massimo Faccoli	105
7	Native Buprestid and Longhorn Beetles in the Mediterranean Basin Aurélien Sallé	199
8	Foliage Feeding Invasive Insects: Defoliators and Gall Makers Manuela Branco, Andrea Battisti, and Zvi Mendel	211
9	Invasive Fruit, Cone and Seed Insects in the Mediterranean Basin Marie-Anne Auger-Rozenberg and Thomas Boivin	239
10	Invasive Sap-Sucker Insects in the Mediterranean Basin Zvi Mendel, Manuela Branco, and Andrea Battisti	261

11	Alien Wood-Boring Beetles in Mediterranean Regions Davide Rassati, François Lieutier, and Massimo Faccoli	293
12	The Pine Wood Nematode and Its Local Vectors in the Mediterranean Basin Pedro Naves, Luis Bonifácio, and Edmundo de Sousa	329
13	Invasive Insects in the Mediterranean Forests of Chile Sergio A. Estay	379
14	Insects and Diseases of Mediterranean Forests: A South African Perspective Jeff Garnas, Brett Hurley, Bernard Slippers, Michael J. Wingfield, and Jolanda Roux	397
15	Native Defoliators of Australian Mediterranean Forest Trees Martin J. Steinbauer and Helen F. Nahrung	431
16	Native Phloem and Wood Borers in Australian Mediterranean Forest Trees Simon A. Lawson and Valerie J. Debuse	455
17	Invasive Insects in Mediterranean Forest Systems: Australia Helen F. Nahrung, Andrew D. Loch, and Mamoru Matsuki	475
18	Native Bark Beetles and Wood Borers	
	in Mediterranean Forests of California Christopher J. Fettig	499
19	in Mediterranean Forests of California	499 529
19 20	in Mediterranean Forests of California Christopher J. Fettig Native Diseases of California Mediterranean Forest Angiosperms	529
	in Mediterranean Forests of California Christopher J. Fettig Native Diseases of California Mediterranean Forest Angiosperms A. James Downer Diseases of Conifers in California	529
20	 in Mediterranean Forests of California Christopher J. Fettig Native Diseases of California Mediterranean Forest Angiosperms A. James Downer Diseases of Conifers in California Philip G. Cannon, Pete Angwin, and Martin MacKenzie Invasive Bark and Ambrosia Beetles in California Mediterranean Forest Ecosystems 	529 549
20 21	 in Mediterranean Forests of California Christopher J. Fettig Native Diseases of California Mediterranean Forest Angiosperms. A. James Downer Diseases of Conifers in California. Philip G. Cannon, Pete Angwin, and Martin MacKenzie Invasive Bark and Ambrosia Beetles in California Mediterranean Forest Ecosystems. Steven J. Seybold, Richard L. Penrose, and Andrew D. Graves Goldspotted Oak Borer in California: Invasion History, Biology, Impact, Management, and Implications for Mediterranean Forests Worldwide 	529 549 583

Contents

25	Sudden Oak Death in California Tedmund J. Swiecki and Elizabeth A. Bernhardt	731
26	Polyphagous Shot Hole Borer and Fusarium Dieback in California Colin Umeda, Akif Eskalen, and Timothy D. Paine	757
27	Air Pollution Michele Eatough Jones and Delbert J. Eatough	769
28	Responses of Mediterranean Forest Phytophagous Insects to Climate Change François Lieutier and Timothy D. Paine	801
29	Follow the Water: Extreme Drought and the Conifer Forest Pandemic of 2002–2003 Along the California Borderland. Richard A. Minnich, Brett R. Goforth, and Timothy D. Paine	859
30	General Conclusions François Lieutier and Timothy D. Paine	891