

# Chapter 30

## General Conclusions

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Knowledge and problems presented in chapters of the present volume clearly show that many similarities exist among the different Mediterranean forest systems regarding forest insect pests and diseases, and even ecosystem functioning. These similarities, however, correspond to two different situations. In some cases, the same species are present in different Mediterranean systems because they have been introduced and have found the same suitable conditions in separate locations for their establishment and invasion: same climate, same introduced host tree species, no competitors, and no natural enemies. A typical case is that of the *Eucalyptus* pests. In such situations, the system can be considered identical everywhere it has been introduced. One can also even suppose that this system may function by itself, with possibly very few interactions with the surrounding indigenous systems, especially when the introduced host tree and pest species largely differ from the indigenous ones. Thus, the scientific and practical approaches to addressing these situations can be relatively standardized. An interesting scientific subject in that context is precisely the relations between the functioning of the introduced system and that of the indigenous ones.

In other cases, the similarities among Mediterranean forest systems relate to species that are indigenous in their region, but have similar ecological counterparts in other Mediterranean systems, i.e., homologous guilds developing on homologous host trees. Such situations are very interesting because their comparative study can reveal general traits on the functioning of these guilds and, more generally, on the functioning of forest systems in the Mediterranean areas. Especially, as the basic

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components of ecosystem functioning are tritrophic interactions, a coordinated approach to research efforts on this aspect in homologous insect and disease guilds should be very fruitful. However, as a common characteristic of all Mediterranean forest systems is their heterogeneity, each of these systems inevitably has its own particularities. Above all, the five different Mediterranean regions have had very different human cultural and historical development so, consequently, the different type and extent of human impact may be significant. Comparative investigations on homologous guilds can, thus, also reveal the impact of these particularities on ecosystem functioning. Another scientifically and pragmatically interesting question in such homologous systems relates to the risks of invasion and damage resulting from introduction of insects and diseases from other Mediterranean systems: e.g., interspecific competition leading to elimination of one of the competitors or, alternatively, coexistence with possible changes in damage levels to the forests in both cases.

Because of their similarities and differences, the existence of various Mediterranean forest systems in different parts of the world, and even in different parts of a same region, represents an excellent opportunity for comparative approaches exploring generalizations and factors of variation in ecosystem functioning. Moreover, even if forest pests are presently the focus of similar approaches in the Mediterranean systems, the high species diversity of organisms living in these systems means that the basic biology of most species is still unknown. Comparative research on biodiversity, on identification of key species and their biology in forest Mediterranean systems is thus still heavily needed.

The Mediterranean forest systems should also be prioritized systems for the study of global change and prediction of its effects on forest guilds, with consequences on pest populations. For geographical and topographical reasons, the Mediterranean areas are indeed particularly exposed and susceptible to climate change. They have also been submitted to heavy human impacts for a long time, which are expected to greatly increase in the future, especially in forestry, as indirect consequences of climate change. Combined effect of climate and human action in the Mediterranean areas will certainly lead to dramatic change in the nature, level and extension of pest damage, as well as in the distribution of many species. These changes may result in considerable change in tritrophic interactions and, thus, in forest ecosystem structure and functioning.

The essential fields that deserve to be investigated with both scientific and applied objectives in the Mediterranean forest systems are highly diverse. However, all research fields should lean on two main general principles: (1) They all need to be thought in the context of global change; (2) The local peculiarities must be taken into account because of the heterogeneity and diversity of the Mediterranean systems. This will not be done without a real cooperation between different disciplines and between different countries and regions among the various Mediterranean areas. The present "MEDINSECT" 7-03-14 IUFRO group offers the structure for such cooperative research efforts.