

Special feature: alien pests threatening biodiversity of forest ecosystems

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Throughout the world, biological invasions have become one of the most important factors threatening biodiversity. Many species are introduced into “a new world” accidentally or intentionally. Most fail to become established, but some become established, colonize, and start to increase and expand their ranges. Some invasive pathogens damage and kill host species. Some invasive herbivores destroy vegetation by feeding and killing host plants. Some invasive carnivores extinguish their prey by depressing their density below the minimum viable population. Some domestic species are replaced by or hybridize with invasive species in a similar niche. The effects of invasive species are more than these direct effects. They cause cascading changes in the ecology, function, and value of diverse ecosystems.

In forest ecosystems, there are four major forest diseases that are not epidemic in their original places but are epidemic in “new worlds”: chestnut blight and pine rust disease both in North America, Dutch elm disease in North America and Europe, and pine wilt diseases caused by pinewood nematode in Asia and Europe. Regarding insect pests, the gypsy moth, the Asian long-horned beetle, and the emerald ash borer were all introduced to North America, established a population, and now cause serious damage to forest ecosystems there.

Problems of invasive species to forest ecosystems will probably be more serious in the future. Probability of new invasions by alien species will increase greatly because of globalization. Future global warming will also accelerate the invasive species problems through pathways as follows: warm temperature will increase the number of combinations of invasive species and their hosts and host trees will be stressed by higher temperature than their original suitable temperature and increased droughts.

During the 22nd World Congress of IUFRO, Brisbane, Australia, 8–13 August 2005, we organized a session titled “Alien pests threatening biodiversity of forest ecosystems”. The aim of the session was to cover the state of the art on invasive pest impacts to biodiversity of forest ecosystems. The session thus started with two general review presentations about forest pest invasions and biodiversity of forest ecosystems. Andrew Liebhold (USDA Forest Service, USA) summarized the influence of alien pest species in forest succession. Nod Kay (NZFRI, New Zealand) discussed the role of biodiversity in explaining patterns of establishment and host range expansion. Three presentations then followed, covering invasive pests of different taxa. Fumio Yamada (FFPRI, Japan) described the impacts of invasive mongoose on native animals in Amami-Island, Japan and provided a good example of an island ecosystem vulnerable to invasive species. Anna Schoettle (USDA Forest Service, USA) discussed the long term consequences of the alien disease, white pine blister rust, on ecosystem biodiversity and sustainability in North America. Glenn Stewart (Lincoln University, New Zealand) described vertebrate invasions and their effects on biodiversity of New Zealand forests. He demonstrated that native vegetation had been severely impacted by introduced mammals, but the degree, to which natural processes are being impaired was highly variable. Seventeen poster

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papers were presented during a postersession. There are four poster papers on pine wilt disease caused by pinewood nematode *Bursaphelenchus xylophilus* in Taiwan, Portugal and Japan. Two other papers described recent work on risk assessment and management of an Asian long-horned beetle (*Anoplophora glabripennis*) in the USA and Canada. Several other papers reported on the current status of invasive pests on eucalypts. Additional topics of poster papers were as follows: an invasive seed chalcid *Megastigmus rafni* on firs stands in Europe, the Japanese oak wilt caused by an ascomycetous fungus *Raffaelea quercivora* carried by an ambrosia beetle *Platypus quercivorus*, genetic structure of a *Ips duplicatus* populations from Europe and Asia, *Phytophthora cinnamomi* as a threat to north temperate pine forests, western gall rust (*Peridermium harknessii* syn. *Endocronartium harknessii*) as a serious threat to exotic *Pinus radiata* forests in New Zealand, and a phytoplasma disease causing degeneration of *Toona ciliata* in India.

This special issue includes four articles based on these papers: one invited paper and three voluntary papers. Schoettle and Sniezko (2007) evaluate proactive management options to mitigate the development of impacts caused by white pine blister rust in threatened remote high-elevation

five-needle pine ecosystems of western North America. Santana and Burckhardt (2007) review introduced *Eucalyptus* psyllids in Brazil. Lakatos et al. (2007) compare the double spined spruce engraver beetle *Ips duplicatus* populations from Europe and Asia by genetic means using the analysis of the mitochondrial DNA. Taniguchi et al. (2007) show effects of an exotic nitrogen-fixing locust *Robinia pseudoacacia* on the regeneration of a native pine species, *Pinus thunbergii*.

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