HAL
open science

Climate change and silvicultural practices promoted the emergence of a novel pest of poplar stands

Sophie Pointeau, Christelle Robinet, Stéphanie Bankhead-Dronnet, Aurelien Salle, François Lieutier

To cite this version:

Sophie Pointeau, Christelle Robinet, Stéphanie Bankhead-Dronnet, Aurelien Salle, François Lieutier. Climate change and silvicultural practices promoted the emergence of a novel pest of poplar stands. 24. IUFRO World Congress-The International Forestry Review. Sustaining Forests, Sustaining people: The role of research, International Union of Forest Research Organisations (IUFRO). AUT., Oct 2014, Salt Lake City, United States. 588 p. hal-02738620

HAL Id: hal-02738620

https://hal.inrae.fr/hal-02738620v1

Submitted on 2 Jun 2020

HAL is a multi-disciplinary open access archive for the deposit and dissemination of scientific research documents, whether they are published or not. The documents may come from teaching and research institutions in France or abroad, or from public or private research centers.

L'archive ouverte pluridisciplinaire **HAL**, est destinée au dépôt et à la diffusion de documents scientifiques de niveau recherche, publiés ou non, émanant des établissements d'enseignement et de recherche français ou étrangers, des laboratoires publics ou privés.

Climate change and silvicultural practices promoted the emergence of a novel pest of poplar stands. Pointeau, S., Robinet, C., Bankhead-Dronnet, S., Sallé, A., Lieutier, F. (*University of Orléans, France; sophie.pointeau@avignon.inra.fr; christelle.robinet@orleans.inra.fr; stephanie.bankhead@univ-orleans.fr; aurelien.salle@univ-orleans.fr; francois.lieutier@univ-orleans.fr*).

Climate change in recent decades has been directly or indirectly involved in changing the life-history and population levels of many endemic forest insect species, leading to unexpected and unprecedented outbreaks. In spite of difficulties in assessing the complex impact of climate on insect communities, evaluating the effect of climate warming on insect population dynamics remains fundamental to understanding and predicting global warming-induced insect outbreaks in forest ecosystems. To test the hypothesis that climate warming affects the emergence and spread of endemic insects, the authors assessed whether recent climate warming could explain the outbreaks of the woolly poplar aphid (*Phloeomyzus passerinii*), an emerging pest in French poplar stands since 1996. A model of population dynamics was developed to simulate the annual growth potential of *P. passerinii* populations under optimal conditions using a theoretical index based on temperature-dependent biological traits. When host tree data were taken into account, this model successfully indicated the history and current outbreak range of the insect, confirming the effect of climate warming on this emerging aphid pest.

Conserving plant diversity of Central European oligotrophic forest habitats requires goal-oriented management of nutrient cycles. Pyttel, P. (*Albert-Ludwigs-University Freiburg, Germany; patrick.pyttel@waldbau.uni-freiburg.de*), Ewald, J. (*University of Applied Science Weihenstephan-Triesdorf, Germany; joerg.ewald@hwst.de*).

Nitrogen eutrophication poses a major threat to biodiversity. In Central Europe's cultural landscape eutrophication is due to the additive effects of ecosystem recovery from preindustrial land use and of modern deposition from combustion and agriculture. Looking at the intersection of Red List and Ellenberg indicator values for nutrients for forest species reveals that 69% of Germany's threatened vascular forest plants depend on oligotrophic habitats. While forests present a reserve of oligotrophic habitats, their filtering capacity makes them particularly prone to N deposition. A review of management options to counteract eutrophication shows that, under current environmental conditions, the maintenance of oligotrophic forest habitats requires selective removal of nutrients through intensive harvesting of crown biomass or removal of soil organic matter. The arising conflict with other ecosystem functions calls for a careful, site-specific prioritization of goals and optimization of measures.

Invasiveness of *Uromycladium tepperianum* on *Falcataria moluccana* affected by pyroclastic cloud from Merapi Volcano, Yogyakarta, Indonesia. Rahayu, S. (*University of Gadjah Mada, Indonesia; tatarahayu@yahoo.com*).

The objectives of the research were to evaluate changes in the morphological characteristics, survival, and pathogenicity of *Uromycladium tepperianum* in sengon (*Falcataria moluccana*) trees affected by the volcanic cloud from the eruption of Mount Merapi, Indonesia. Inoculum samples were taken from trees that showed gall symptoms. Trees were located on the southern slope of Mount Merapi in the danger, alert, and warning areas, at distances of 3–7 km, >7–11 km, and >11–15 km, respectively, from the top of the volcano**.** Samples were taken at random distances within the sites: fire (directly affected by the pyroclastic cloud), border (indirectly affected), and green (completely uninfluenced). Based on the artificial inoculation test, pathogenicity of each sample including germination, penetration, and infection ability was observed. Severity of gall rust disease in *F. moluccana* planted around the mountain was also evaluated. Results showed that the spores of *U. tepperianum* from the border location, had higher pathogenicity and aggressiveness, indicated by a higher percentage of germination, faster penetration, and higher infection rate, as well as a greater ability to produce galls, compared to spores from the fire and green locations. The rust fungus also became very invasive and caused an epidemic in the recently planted *F. moluccana*.

Insect frugivores and their impact on the regeneration of mangrove species in the West Coast of India. Remadevi, O.K., Latheef, A., Chatterjee, D. (*Institute of Wood Science and Technology; okremadevi@gmail.com; lathifc@gmail.com; yuv.jyoti@gmail.com*).

The conservation and management of mangrove forests deserve great attention because of the well-known importance and utility of mangroves. Insect frugivores feeding on fruits, seeds, and also propagules, were found to have a sizable effect on regeneration of mangrove species. A study was undertaken to assess insect infestation of fruits, the intensity and nature of damage of the seeds and propagules, and the impact on regeneration of the mangrove species, *Rhizophora mucronata*, *Avicennia officinalis*, *Kandelia* sp., *Bruguiera gymnorrhiza*, and *Sonneratia* sp. in the West Coast of India. Considerable damage was found in the fruits of *Avicennia* (in 70% of samples), where three different types of larvae were found to inflict considerable damage to the fruit. Most of the damage was caused by two species of insects, *Calandra* sp. and *Callistomyia klugii*. A large percentage of the *Sonneratia* fruits (71%) were found to be infested by a noctuid moth and a curculionid beetle. *Coccotrypes* sp. was found attacking nursery-planted seedlings of *Bruguiera gymnorrhiza*. Sixty-four percent of all severely affected seedlings were not viable within 2 months. The impact of insect attack on the initial establishment and survival of mangrove plants is discussed in the paper.

A common foliar endophyte, *Hormonema* sp., suppresses seedling emergence of host species, *Pinus ponderosa*. Ridout, M., Newcombe, G. (*University of Idaho, USA; mridout@uidaho.edu; georgen@uidaho.edu*).

Numerous endophytic fungi inhabit needles of the genus *Pinus*. Both within their host and the greater environment, however, the biological and ecological functions of the greater portion of these organisms are largely unknown. Among the more common endophytes isolated from asymptomatic needles of *Pinus ponderosa* are *Hormonema* spp. In greenhouse germination trials, *H. dematioides* reduced emergence of ponderosa pine seedlings by as much as 66%. Seed from western U.S. provenances of two *Pinus. ponderosa* subspecies, var. *ponderosa* and var. *scopulorum*, subjected to identical conditions had significant reductions in seedling emergence, by 14 and 30%, respectively. The same *Hormonema* isolate, however, failed to reduce emergence of a co-occurring western U.S. conifer *Pseudotsuga menziesii* var. *glauca*. Seedling germination and emergence are critical points for survival and establishment of pines in naturally regenerating stands. Physical and chemical conditions in litter layers have long been implicated as factors in low recruitment of seedlings beneath parent species. The presence of endophytic fungi in senesced foliage presents another potential factor in poor conspecific seedling recruitment in naturally regenerating stands and supports the Janzen-Connell hypothesis of biological diversity in forest systems.