

Project Update: May 2019

Respect to the aims:

The present work seeks to generate knowledge of the mechanisms involved in the rapid adaptation of the exotic conifer *Pinus radiata* to fire, as well as the effects of this on the invaded ecosystem and the influence of these mechanisms on this species invasiveness.

1. Estimation of the aerial seed bank and post- fire invasion growth and density characteristics

The last spring and summer, we collected the samples of cones and seeds; also we measured different growth and stand characteristics. We finished this objective, and in this context, we also studied the role of cones as a fuel component. Evidence was found that fire acts as a selection factor on an adaptive character, such as serotiny, in *P. radiata*. The increase in the level of serotiny and in the size of the aerial seed bank, together with the high tree density in post-fire conditions, could be fostering a cycle of fire-invasion feedback.

2. Germination and seedling survival assays

Collected seed cones were dried and heated at 150° C for 10 minutes using a laboratory stove, to promote their opening and the release of the seeds. Percent seed viability was determined by the pressure method. Viable seeds were used in the germination assays that were carried out in a growth chamber under controlled light, temperature and irrigation conditions. To determine the post-fire germination response, seeds were subjected to two fire conditions: high temperature shock (120° C for 5 minutes) and using ash as substrate. After germination, seedlings were cultivated under a naturally lighted greenhouse. We have finished the germination experiment, and currently we are conducting the survival and early growth experiment in a greenhouse.

3. Genetic analyses

During last spring of the southern hemisphere (September to December 2018) fresh foliage from 30 randomly selected individuals was sampled at each site which were used to extract enzymatic homogenates that were analysed by electrophoresis using 12 enzymatic systems. The same samples were subjected to total genomic DNA extraction, and currently we are carrying out amplification and genotyping of microsatellite markers already developed for *P. radiata*.



A. *Pinus radiata* serotinous cones; B. Burned stand in summer 2019; C. Burned cones and open cones (top image) and seed released after fire (bottom image); D. post fire seedling recruitment.

Monitoring:

One of the purpose of this work is to generate useful information to understand the mechanisms involved in the fire-invasion-fire cycle and the success of this work will be monitored in two different ways:

- **The transmission of knowledge developed to different sectors of interest as the Forest Service, the Service of Prevention and Fight against Forest Fires (SPLIF) and National Parks.**

We participated in the organisation of a participative discussion workshop and in the preparation of a technical report about the current environmental problems in the Lake Epuyén Multiple Use Forest Reserve (Study Site) derived from the pine invasion. Results related to the aerial seed bank and its implication in the pine invasion of the area were included in the discussion. The workshop was attended by local residents, tourism providers, forest entrepreneurs, and members of the Chubut Forest and Fire Department. This instance allowed me to present the results to people directly involved with the area and receive feedback on various topics of interest to continue working.

- **The communication of results in scientific meetings and journals of local and international impact.**

The results of the aerial seed bank estimation are proximal to be sent to a scientific journal for publication. I have also presented results in two congresses: Reunion Argentina de Ecologia - RAE (Argentine meeting of ecology) and the conference "Adapting forest ecosystems and wood products to biotic and abiotic stress". In the RAE I presented results corresponding to the estimation of the aerial seed bank as well as those related to the cones as fuel; and in the adapting forest ecosystems conference, the preliminary results of the genetic studies corresponding to isoenzymes were presented.



Pictures of the participative discussion workshop about the current environmental problems in the Lake Epuyén Multiple Use Forest Reserve. Attended: local residents, tourism providers, forest entrepreneurs, and members of the Chubut Forest and Fire Department.