Progress report: Post-fire architectural variations of resprouting species from northwestern Patagonia: implications for flammability and community management (ID: 45433-1).

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In this report, we summarise the activities carried out and the results obtained over the past few months with the support of the Rufford Foundation, since receiving the grant in February 2025. We also outline the planned future activities.

The species studied are four native resprouting species from Argentine Patagonia: ñire (*Nothofagus antarctica*), laura (*Schinus patagonicus*), maitén (*Maytenus boaria*), and chacay (*Ochetophila trinervis*).

- **Objective 1**

To characterise the basic architecture of the selected species at early developmental stages.

Performed activities

At the end of May 2025, we began analysing 20 greenhouse-grown individuals, aged between two and three years, from each of the four selected species in order to describe their architectural patterns (Figure 1). A retrospective analysis was conducted on the annual shoots forming the main axes, with particular focus on the most recent annual shoot produced by the primary axis.

For each individual, we recorded the following parameters: basal diameter, total length, number and length of internodes, phyllotaxis, presence of cataphylls, axillary production at each node, and the condition of the apical meristem. In branched individuals, we also analysed the position and size of the branches relative to the main axis in order to identify and classify the initial categories of axes (Figure 2).

Results obtained

Data are currently being processed and analysed.

Figure 1: Two-year-old seedlings of the selected species grown under greenhouse conditions. A: ñire, B: laura, C: chacay, D: maitén.

Figure 2: Architectural measurements conducted on two-year-old seedlings grown under greenhouse conditions.

- **Objective 2**

Architectural variation associated with post-fire responses under experimental conditions.

Performed activities

Between late February and early March 2025, we assessed post-treatment responses related to architecture and flammability in approximately 60 individuals per species of the four selected species. These individuals had previously (in March 2024) been subjected to two experimental treatments: biomass removal by fire (through burning) and biomass removal without fire (through pruning). A subset of individuals was left untreated as a control.

For each plant, we recorded: total height, number of axes and reiterations for the whole individual; basal diameter, total length, and basal deviation of the most dominant axis; and, for the annual shoot of the main axis, we measured length, basal diameter, number of nodes and branches, and the condition of the apical meristem (Figure 3). We also recorded the resprouting ability (i.e. the presence of resprouting at any point during the year, even if the shoot later died) and survival of each species over a one-year post-treatment period.

Results obtained

For all species, resprouting ability was lower in individuals exposed to fire compared to those pruned without fire. The species with the highest post-fire resprouting ability were maitén (71%) and chacay (50%), followed by ñire (44%) and laura (20%). However, post-fire survival was highest in ñire (44%) and maitén (43%), and lower in laura (20%) and chacay (10%).

Survival and the number of resprouts following both treatments were positively associated with initial plant size (basal diameter and height), except in the case of ñire, for which treatment was the only significant factor. In this species, individuals exposed to fire exhibited lower survival and fewer resprouts than those pruned without fire.

Data processing and analysis are ongoing (Figures 4 and 5).

Figure 3: Post-treatment architectural measurements.

Figure 4: Individuals of maitén (top) and laura (bottom) following one growing season after treatment application. Control and treatment conditions are indicated (biomass removal without fire: pruning; and with fire: burning).

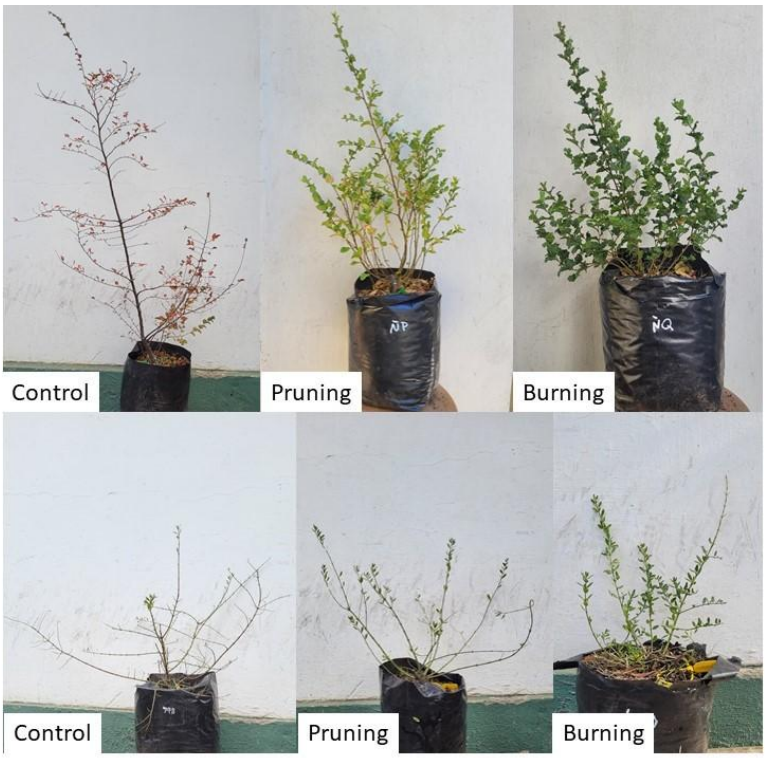

Figure 5: Individuals of ñire (top) and chacay (bottom) following one growing season after treatment application. Control and treatment conditions are indicated (biomass removal without fire: pruning; and with fire: burning).

- **Objective 3**

To characterise the basic architecture of the selected species at advanced developmental stages and to assess architectural variation associated with post-fire responses under natural conditions.

Performed activities

Between January and April 2025, we selected 20 individuals per species for three of the selected species: ñire (*Nothofagus antarctica*), laura (*Schinus patagonicus*), and maitén (*Maytenus boaria*). For each species, 10 individuals were located at a fire affected site, and 10 at a nearby unburned site with similar environmental conditions (Figure 6).

For each individual, we recorded general measurements including: height, basal diameter of main axes, number of axes (live and dead), axis categories, branching pattern, crown width, and height of the first branch from ground level. We then harvested one main axis from plants growing in post-fire conditions, and a comparable fragment containing the same number of growth units from the main axis of plants growing in unburned conditions, estimating the percentage of the total plant represented by the harvested portion.

For the harvested axis, we recorded general metrics such as the number of growth rings and characteristics of each growth unit (basal diameter, length, branching pattern,

number and diameter of branches). We also recorded specific measurements for the two-year-old shoot (number of branches, distance between branches), and the most recent annual shoot (number of nodes, leaf area) (Figure 7).

Additionally, the harvested axes from five individuals per species were separated into fine and coarse fuel fractions, which are currently being dried and weighed.

Results obtained

Data processing and analysis are currently underway.

Figure 6: Individuals of maitén, laura, and ñire growing at an unburned site (top) and at a post-fire site (bottom).

Figure 7: Architectural and flammability measurements of the harvested axis.

- **Objective 4**

Architectural variation in response to pruning in individuals growing at early post-fire regeneration stages.

Performed activities

In mid-April 2025, we began the analysis of 45 resprouting individuals of ñire (*Nothofagus antarctica*) growing at a site affected by fire between December 2021 and April 2022. In autumn 2024, these individuals were subjected to different resprout pruning treatments: 15 individuals received a severe pruning, another 15 a moderate pruning, and 15 were left unpruned as controls (Figure 8). In all pruned individuals, two resprouts were left intactone was marked as a reference, and the other was retained as a backup in case replacement was needed.

Measurements were taken at different scales for each individual: for the whole plant (crown width and average clump height), for the marked resprout (length, height, and basal diameter), and for the annual shoot (length, basal diameter, number of nodes and branches).

Results obtained

Data processing and analysis are currently ongoing.

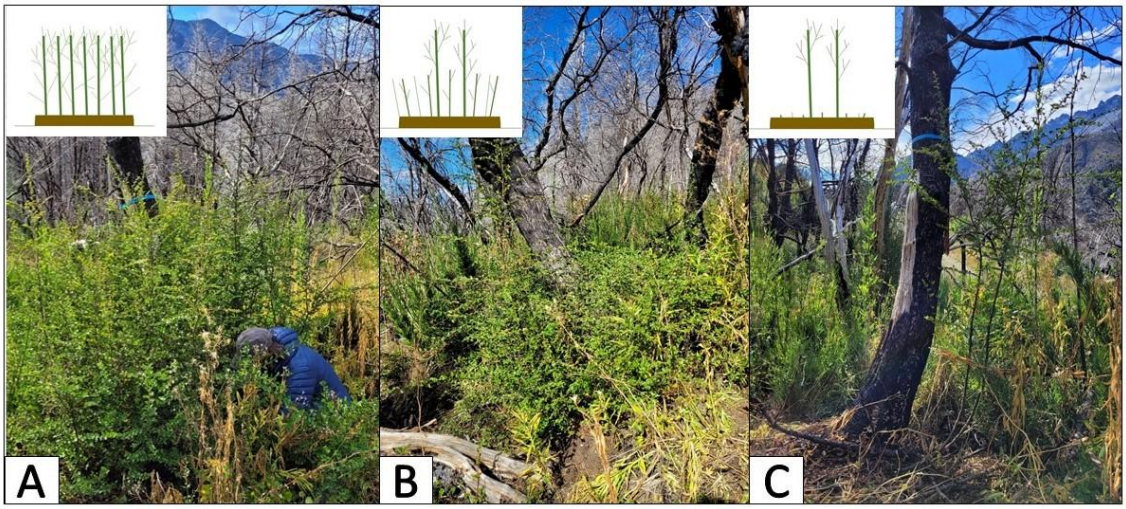

Figure 8: Pruning treatments in ñire individuals. A: control, B: moderate pruning, C: severe pruning.

- **Courses**
  - "START WITH R: Introductory course on data analysis and visualisation". April 2025. Duration 40 teaching hours. Universidad Nacional del Comahue, Centro Regional Universitario Bariloche, Postgraduate Department, PhD in Biology, Bariloche, Río Negro Province.

- **Future activities**

With regard to Objective 1, we plan to complete the measurements and begin data processing over the coming month. For Objective 2, data are currently being processed for presentation at the First Trinational Ecology Meeting (RAE), to be held in Mendoza City, Argentina, in October 2025. Concerning Objective 3, during the next field season (Austral spring 2025–summer 2026), we will complete the sampling and analysis of individuals, as well as the corresponding data processing. For Objective 4, we aim to finalise the measurements during May, and proceed with data processing in the following months.

This month, I will be attending a course offered by the Postgraduate Department of the National University of Comahue on ecological project development.

Another planned activity for October this year is participation in "INIBIOMA Abierto", an interactive science fair that allows the public to engage with ongoing research at the institute through hands-on activities and workshops.