

Aliens & Flames – a new research initiative joining fire behaviour and invasion ecology

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Introduction

Wildfires are perhaps the most concerning environmental threat in Portugal, actually being the European country most affected by wildfires and one of the most affected worldwide. Over the last decades, wildfires have been aggravating, ravaging the Centre of Portugal in 2017 (ICNF 2017). Alien invasive plants are another major environmental concern in Portugal. These invasions originate direct and indirect costs and, unlike other degradation processes, their effects are in many cases nearly irreversible (Moreira et al. 2010). Some of the most problematic invasive plants are adapted to fire, frequently, fire facilitates plant invasions which, in turn, may facilitate fire spread, leading to a fire-invasion cycle (Brooks et al. 2004). In Portugal, *Acacia dealbata* Link. and *Hakea sericea* Schrader (fig. 1) have expanded (ICNF 2013) as a result of the current fire regime (Marchante et al. 2014). Fire acts directly on the *A. dealbata* soil seed bank, stimulating germination, and the plant resprouts vigorously after canopy damage (Lorenzo et al. 2010). There's also evidence of relationship between *H. sericea* and fire in which this serotinous plant benefits from wind dispersed seeds after fires (Esler et al. 2009). In this work we present a new project started in the year 2018 that tries a new approach to address both problems – wildfires and invasive plants - by the use of fire to control fire-dependant alien invasive plants.

Aims

In this project – Aliens & Flames – we aim to increase the knowledge on the relation with fire of *Acacia dealbata* Link. and *Hakea sericea* Schrader, namely how fire ecology and invasion ecology processes interact.

We will explore the use of prescribed fire to control and eradicate invasions of *A. dealbata* and *H. sericea*. The main objectives are:

- to provide tools that allow reducing the risk of invasion in areas where prescribed fire is applied to the management of vegetation to prevent wildfires;
- to improve an alternative technique to control plant invasions;
- to improve the forecasting of plant invasion in burnt areas;
- to elaborate accurate fuel models for areas invaded by the study species;
- to educate forest owners about the problematic of alien plant invasions and the effects of wildfires on plant invasions.



Fig. 1: Study species *Acacia dealbata* (left) and *Hakea sericea* (right).

Methods

In this five-year project, a set of experimental burns will be conducted in invaded areas in central Portugal (fig. 2) featuring different treatments:

- number of consecutive burns;
- type of vegetation treatments prior to fire;
- burning period;
- fire behaviour parameters.

Several data will be collected before, during and after the burns, including:

- floristic composition and structure;
- seed bank properties;
- plant demography;
- fire behaviour parameters;
- soil characterisation;
- post-fire erosion.

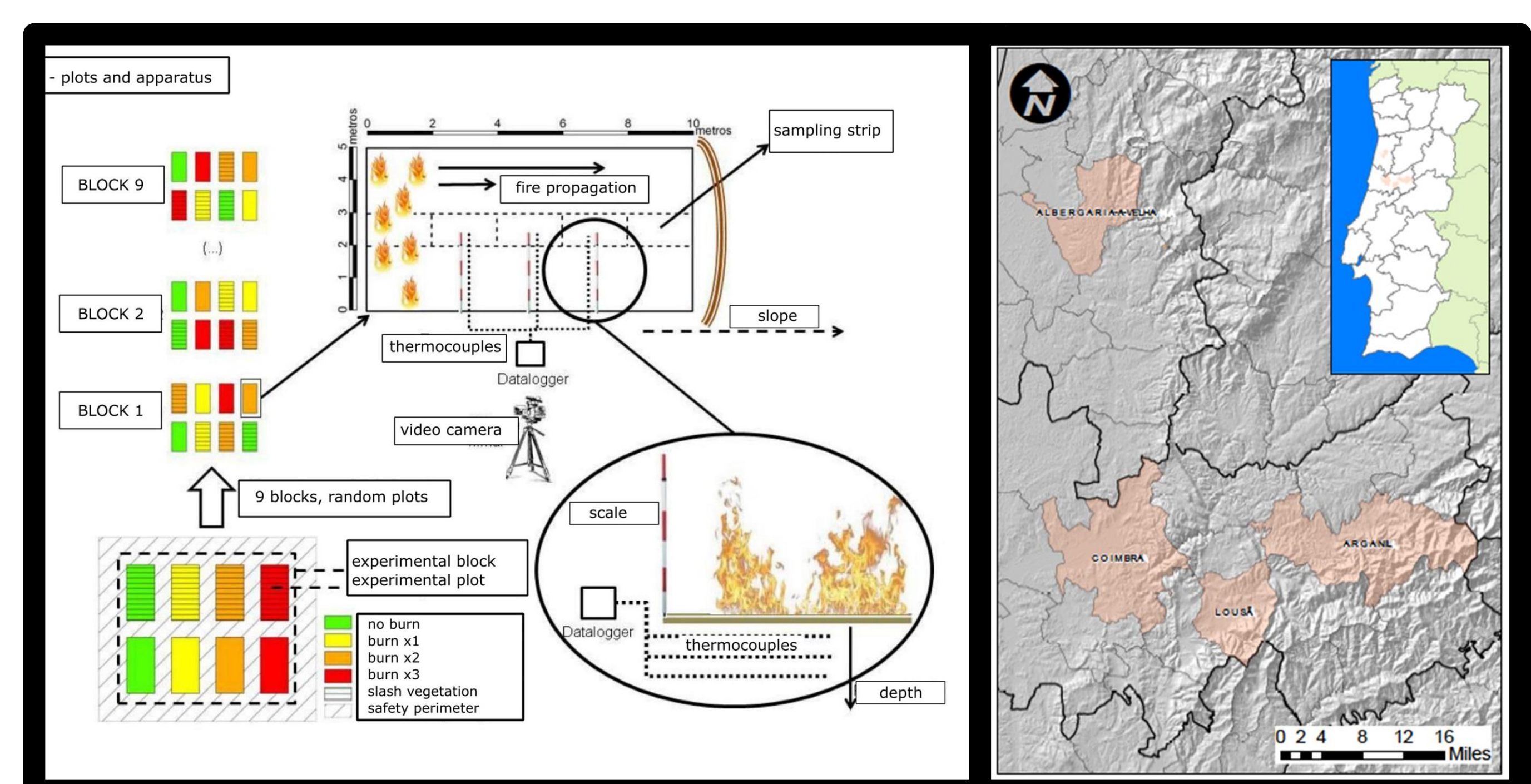


Fig. 2: Experimental design

Expected results

The expected results of this project are the best knowledge of the behavior of fire in areas invaded by this species, as well as the great conditions for the use of this technique as controlling the *A. dealbata* and *H. sericea*.

This knowledge will allow producing a guide for prescribed burning in areas occupied by *A. dealbata* and *H. sericea*, aiming to control the invasion.

Conclusion

Aliens & Flames is an innovative research initiative that gathers two branches of science that have been travelling separate paths and have never been explored together in fire-adapted, non-native trees in Europe: fire behaviour and invasion ecology.

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