



## Fuel management of fire-adapted species – one size does not fit all

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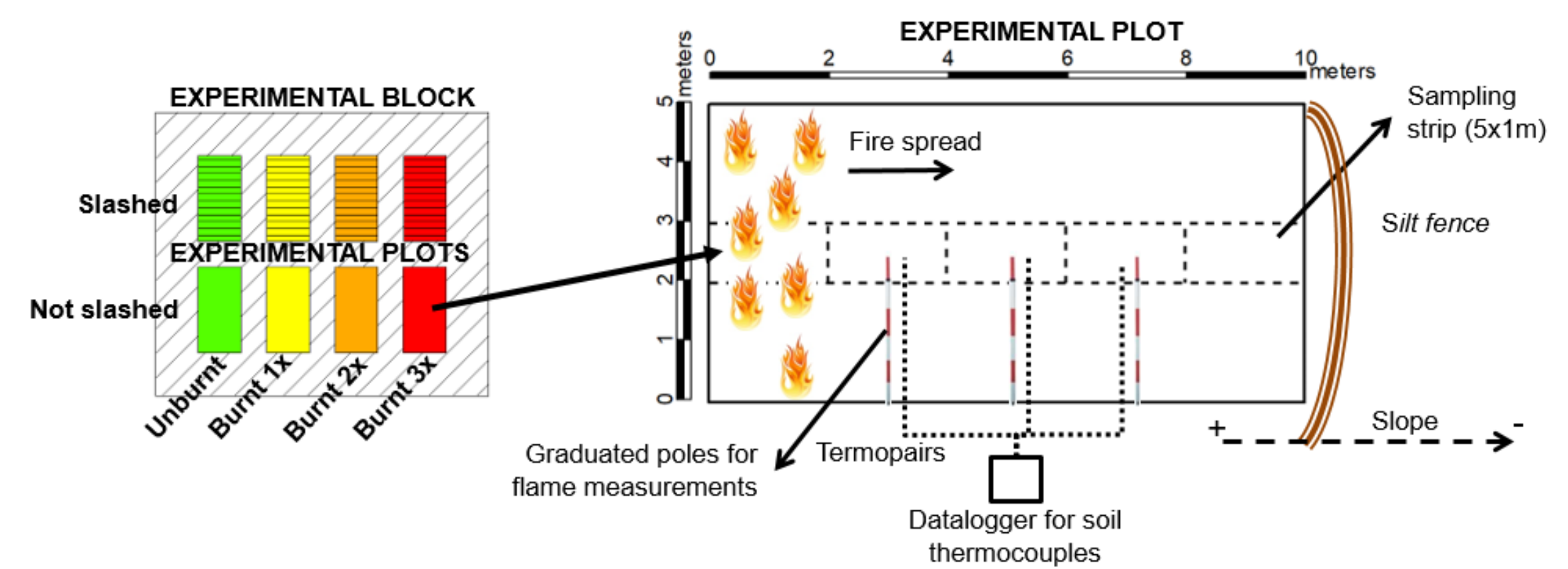
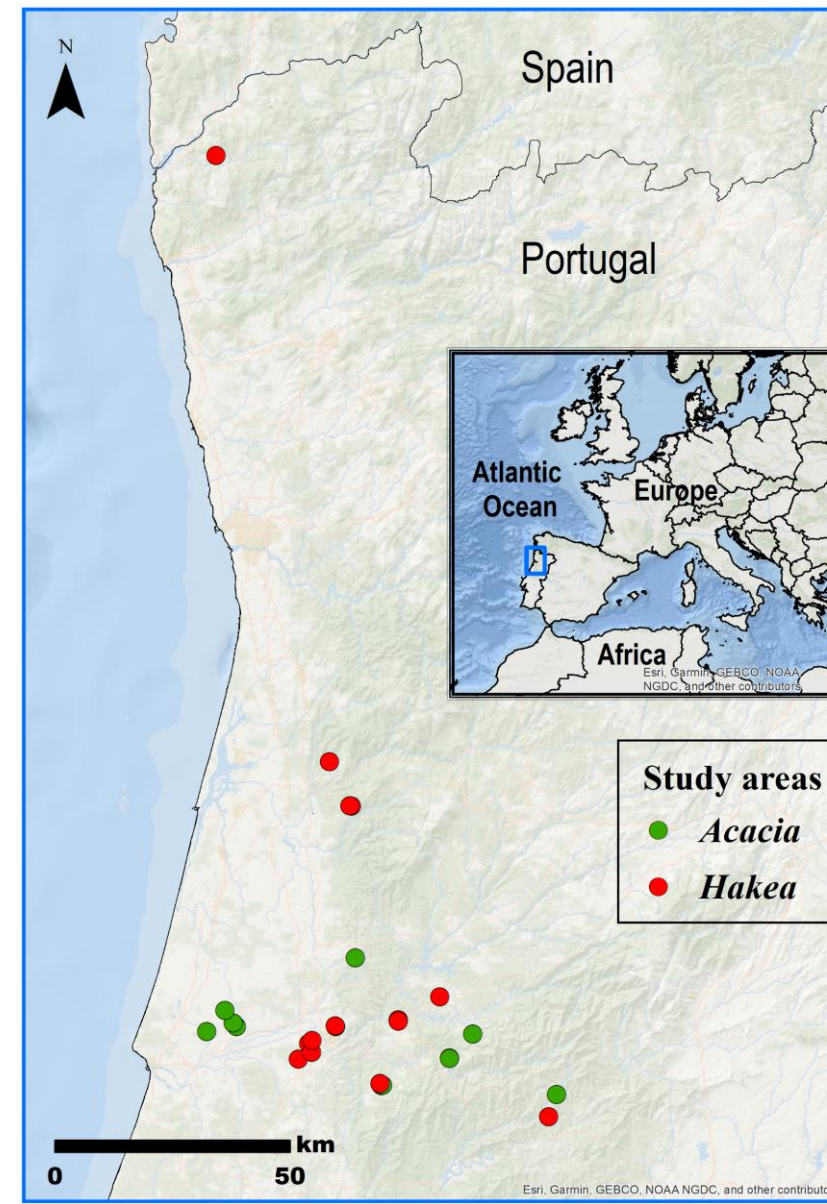
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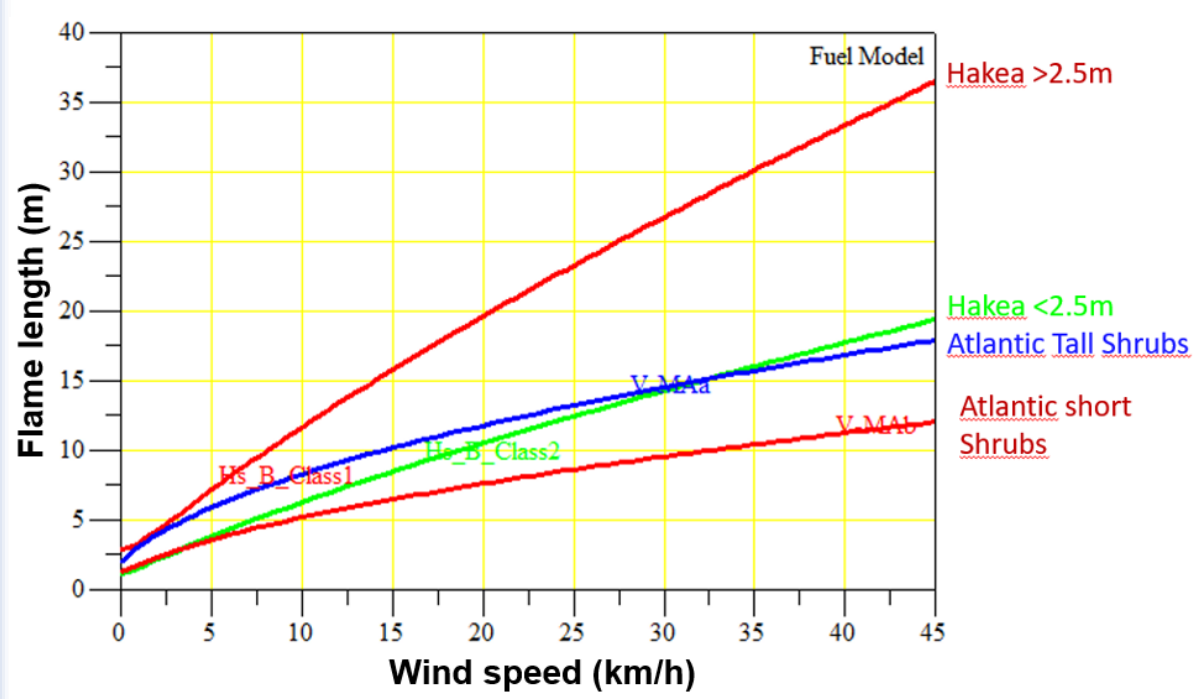
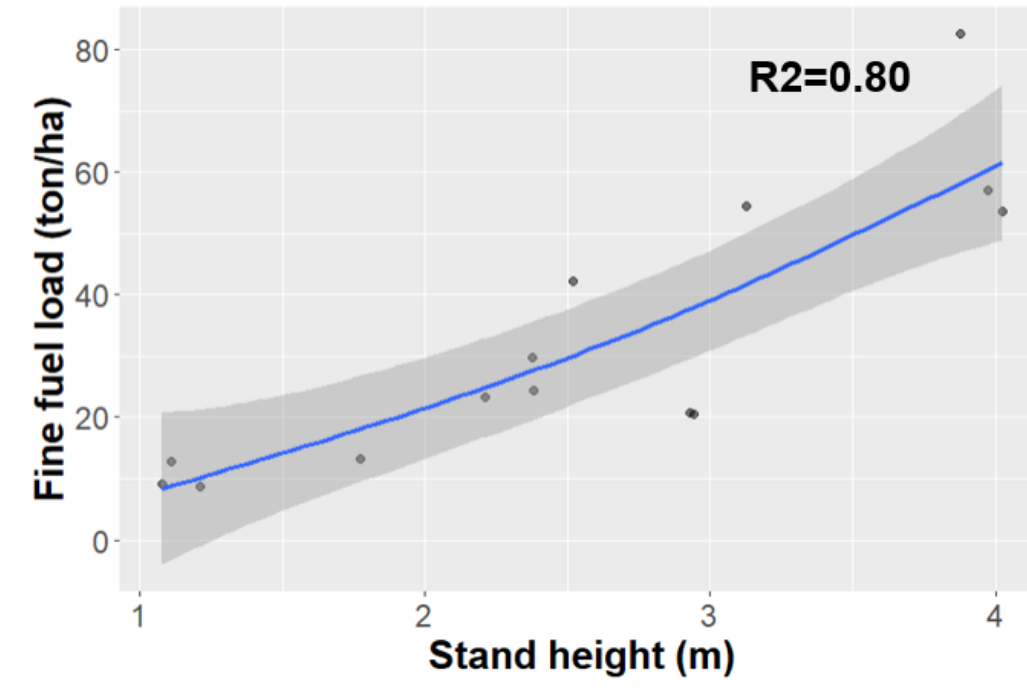
*Hakea sericea* and *Acacia dealbata* are fire-adapted, invasive woody species that benefit from a feedback loop between fire and invasion. This two-way relationship was investigated together and the use of prescribed fire treatments to control invasion was tested.

Experimental blocks were established in several invaded areas across Central Portugal. Each block featured several experimental plots subject to different treatments: slash, burn, slash and burn, and a control plot. Plots were monitored along three years to record survival, resprouting, seed dispersal and germination. Some preliminary results from this investigation are shown.



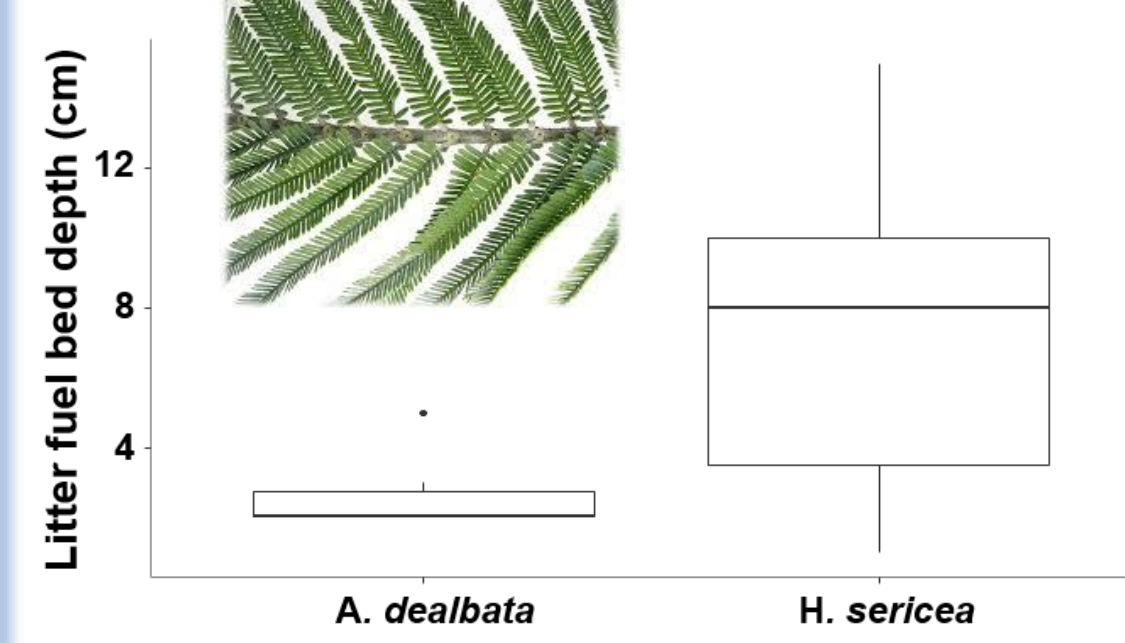
### Effect of *Hakea sericea* on fire

The height of hakea stands is a good predictor of the dead fine fuel load that will feed wildfires. Also, “time since disturbance” (e.g. wildfires) can help us estimate fuel load dynamics with relatively good accuracy (not shown).



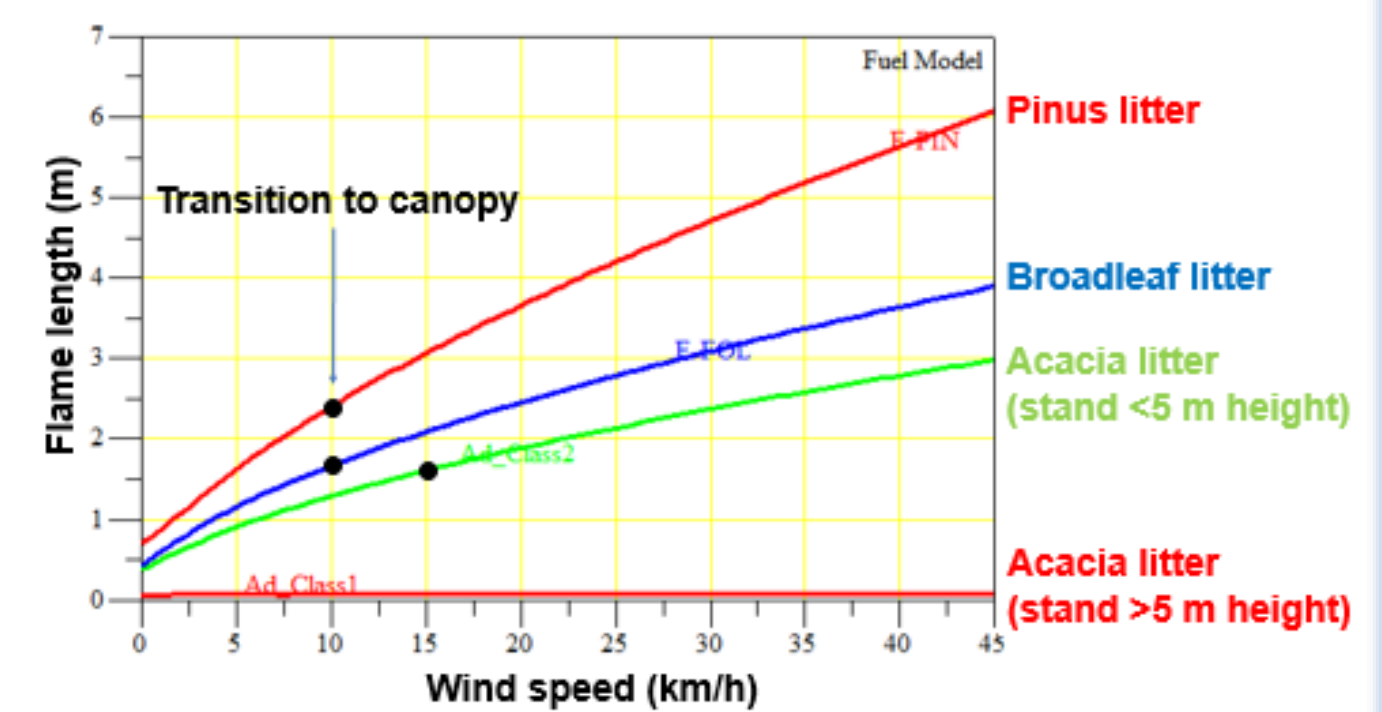
Fire behaviour simulations show that hakea stands will originate more intense fires than the native shrublands with the highest fuel loads, increasing fire hazard in invaded areas.

### Effect of *Acacia dealbata* on fire



The litter layer in acacia stands has lower depth because the double-compound leaves become extremely compacted. Also, acacia stands have few understorey and overall less fuel loads.

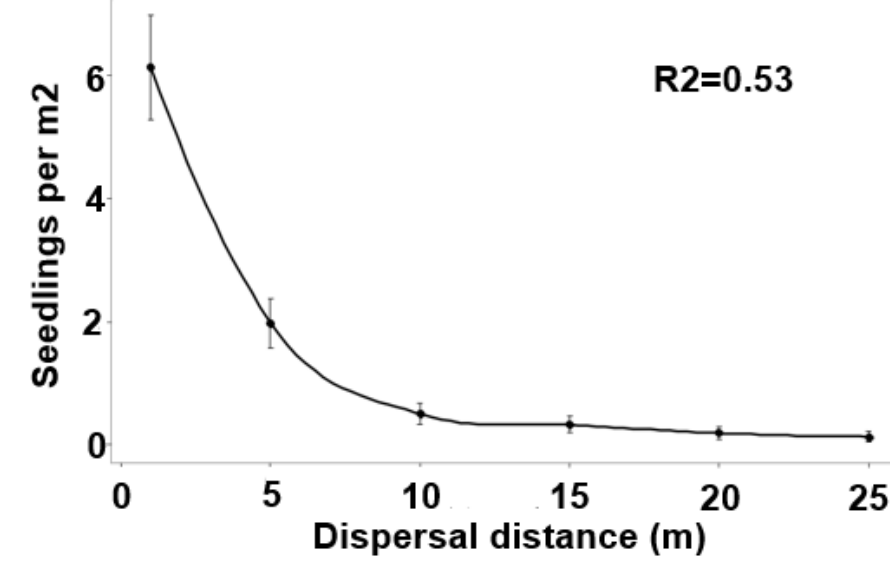
Due to fuel structure characteristics in acacia stands, fire is less intense and sometimes prescribed fire is hardly applied under mild atmospheric conditions.



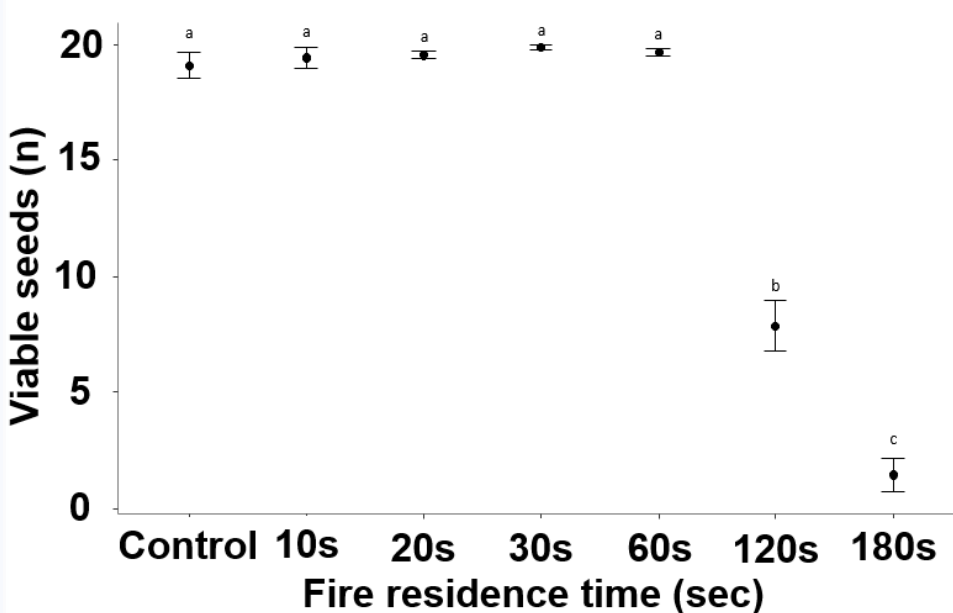
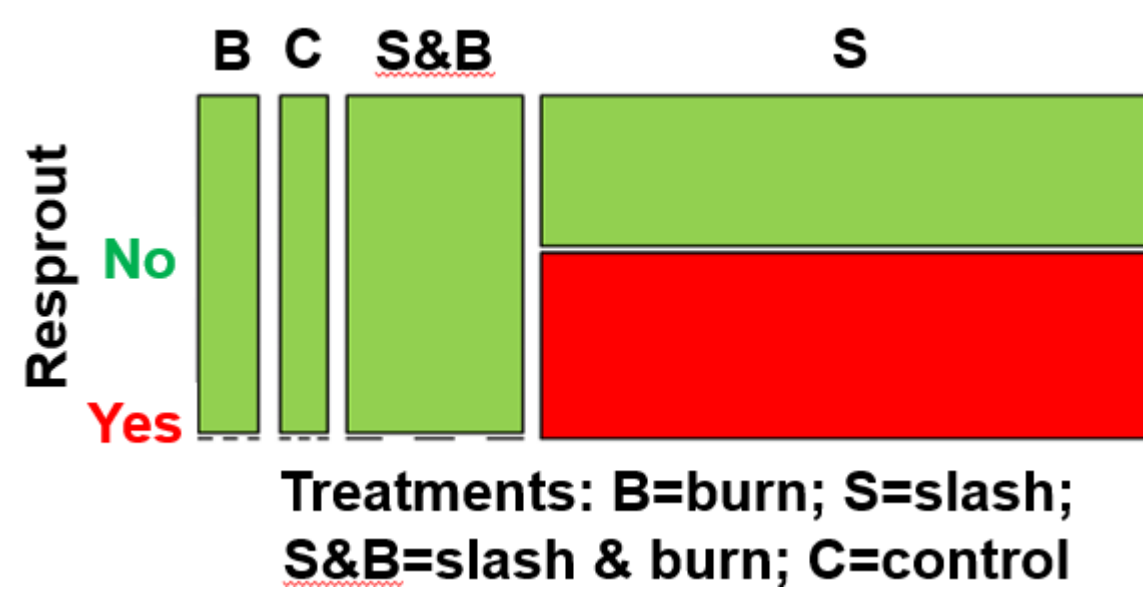
### Effect of (prescribed) fire on *Hakea sericea*



After fire there is a massive recruitment nearby mother-plants but seeds can be dispersed a few dozens of meters.



The slash treatment triggered resprouting of c. 60% of hakeas. Other treatments avoided resprouting.



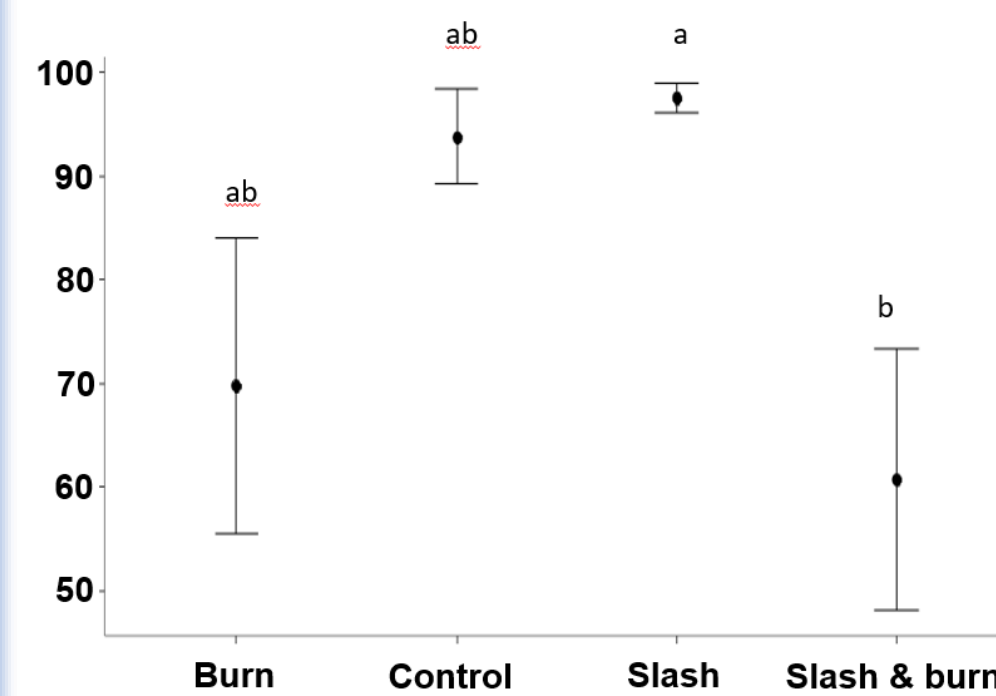
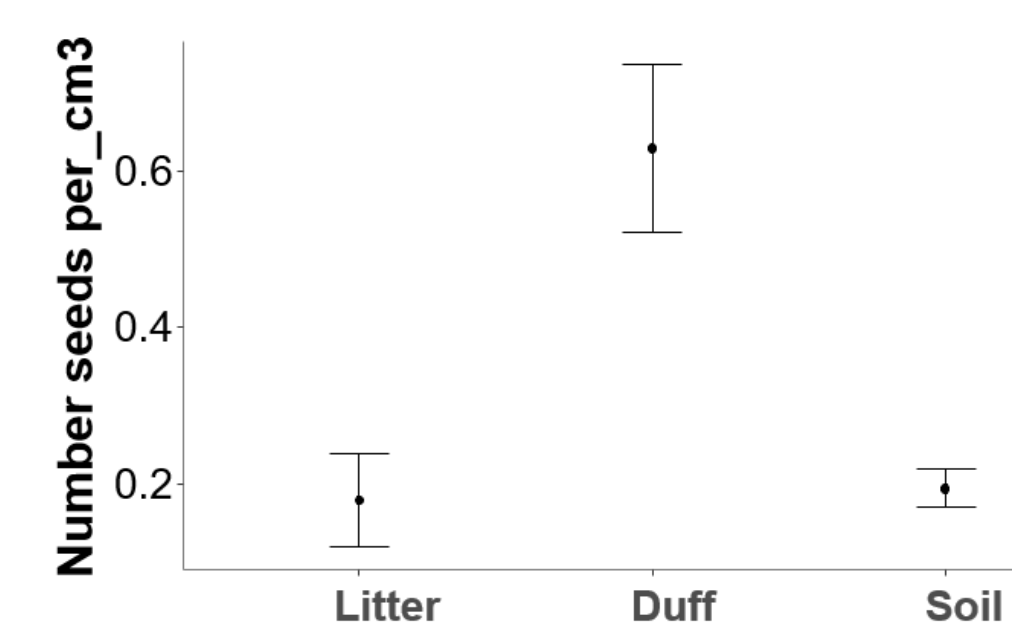
Higher fire residence time, especially after 180 seconds, prevented the opening of fruits (woody follicles; not shown) and killed most of the seeds within.

**Conclusion:** slash and burn, with high fire residence time (spread against slope and wind) is efficient to eliminate fuel load and eliminate *H. sericea*. Prescribed fire may be useful to control hakeas under the correct prescription.



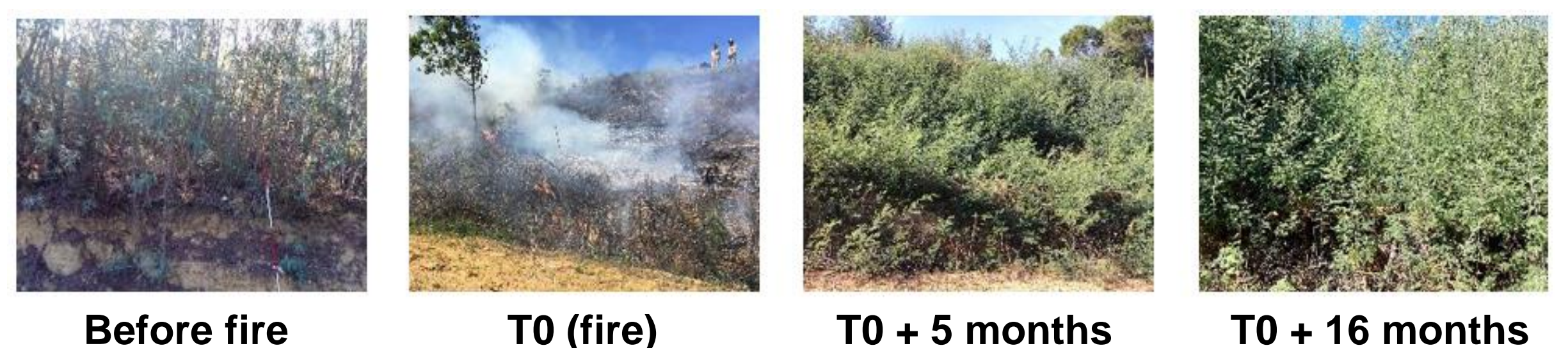
### Effect of (prescribed) fire on *Acacia dealbata*

Acacia accumulates a large soil seed bank that readily germinates after fire. Most seeds were found in the duff layer. In all layers seed viability was over 90% (not shown)



All treatments applied were unsuccessful at depleting the soil seed bank, even though burn treatments had greater effect by triggering germination. Moreover, most acacia individuals survived the treatments by resprouting and abundant germination was recorded.

**Conclusion:** Unlike *H. sericea*, prescribed fire with or without slash is not adequate to control *A. dealbata* since it enables resprouting, do not depletes the soil seed bank and triggers germination, possibly aggravating invasion. Other treatments are recommended such as debarking, herbicide or goat browsing.



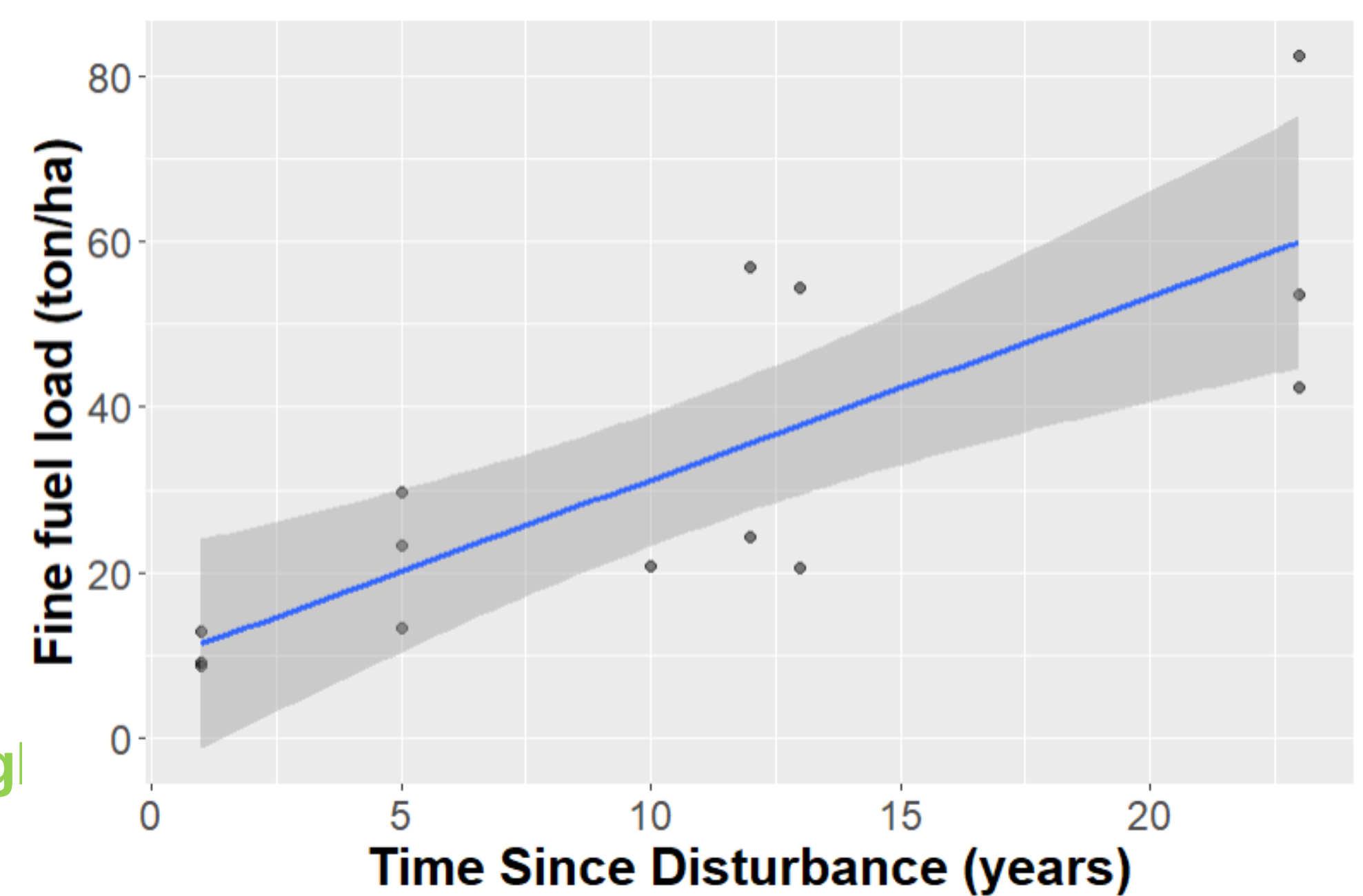
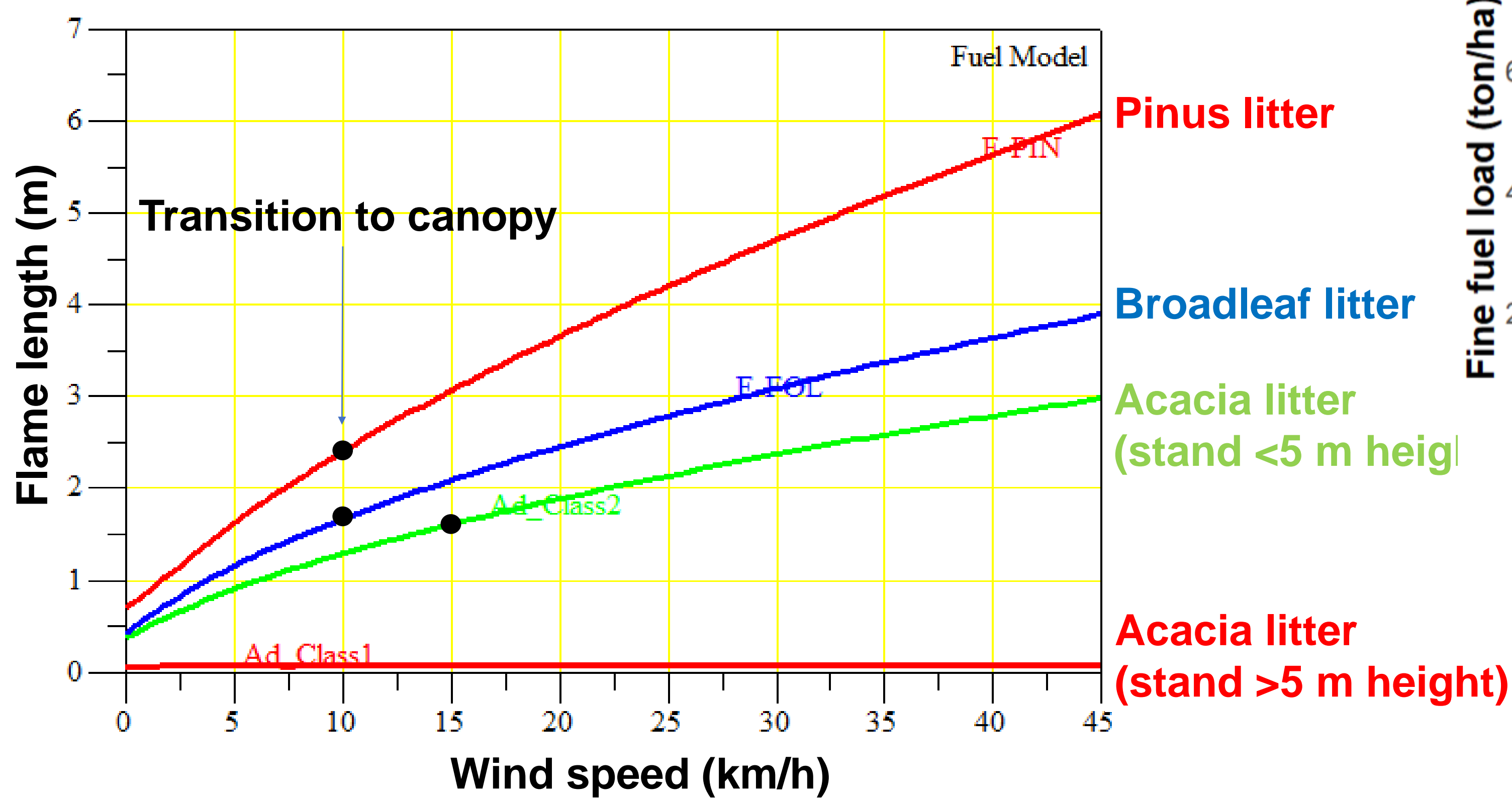
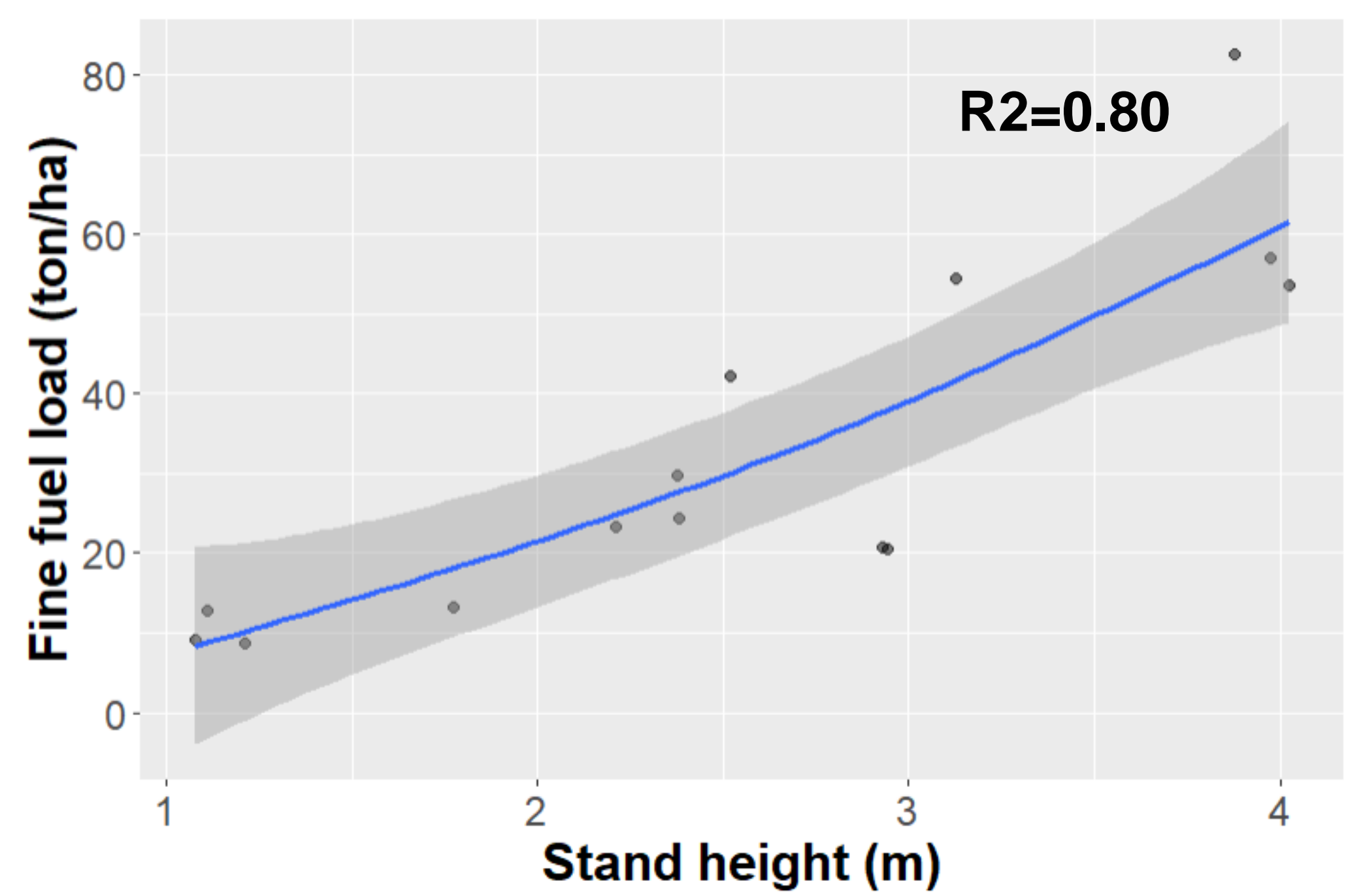
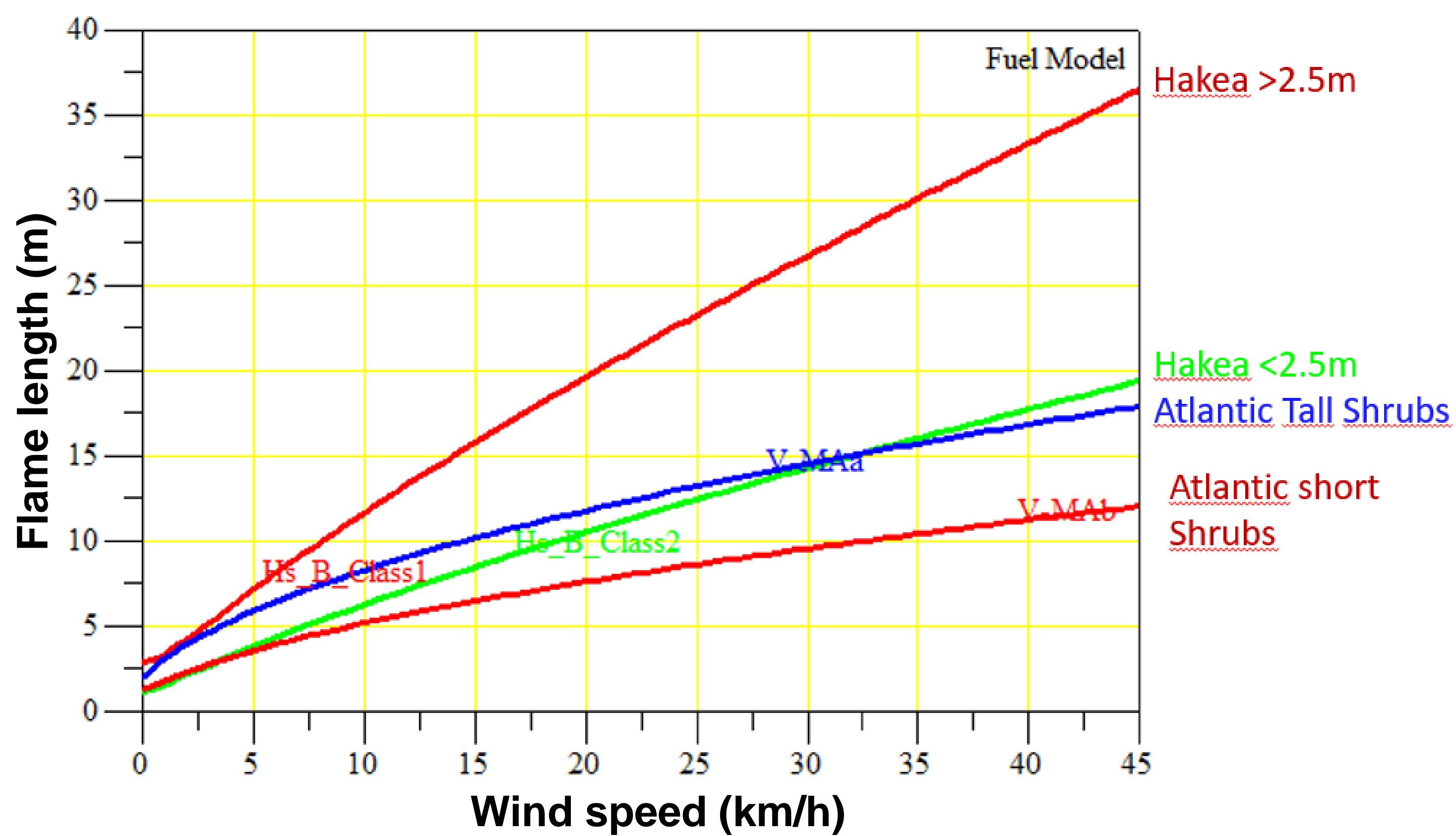
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# Graphical contents

## Hakea effects on fire

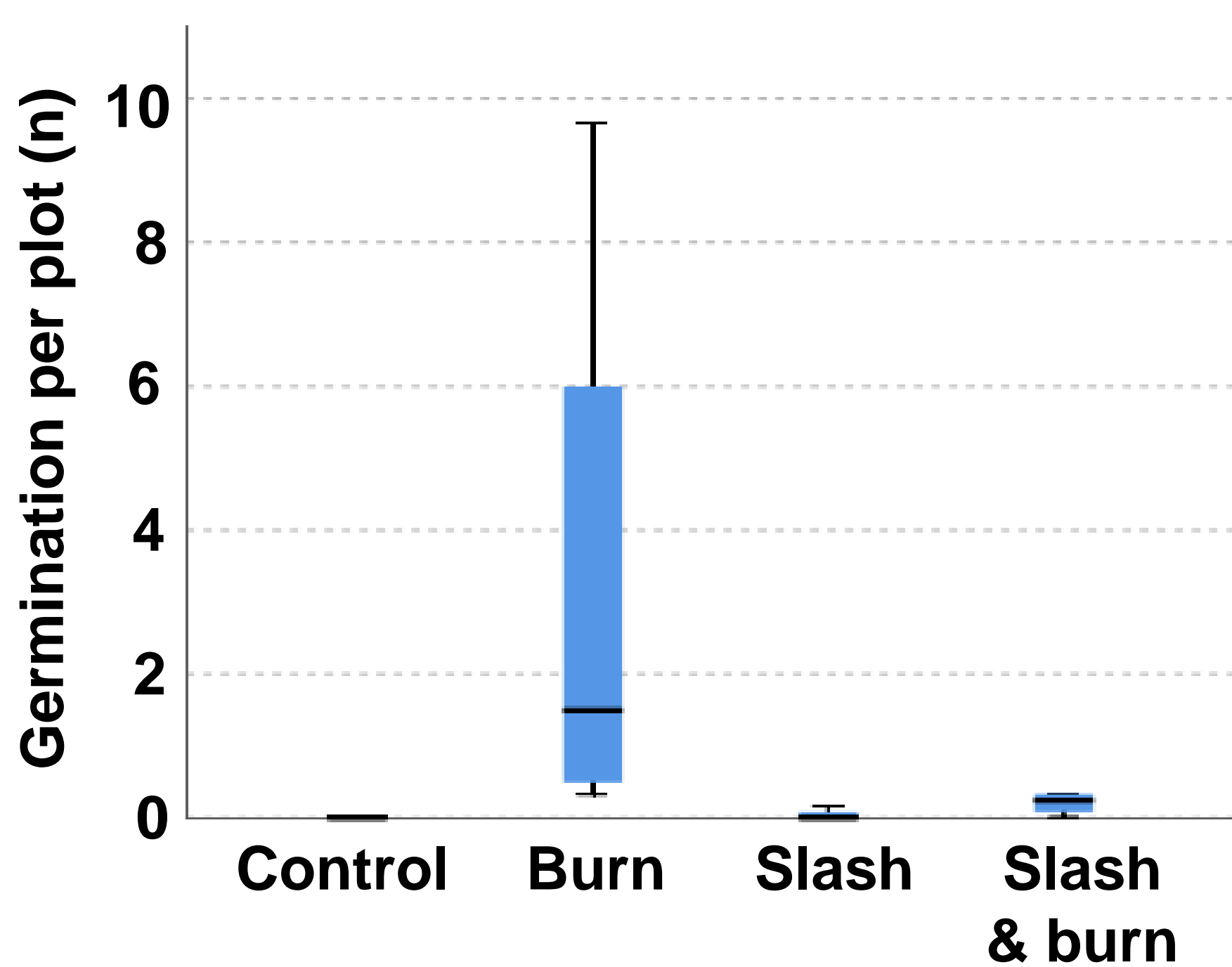
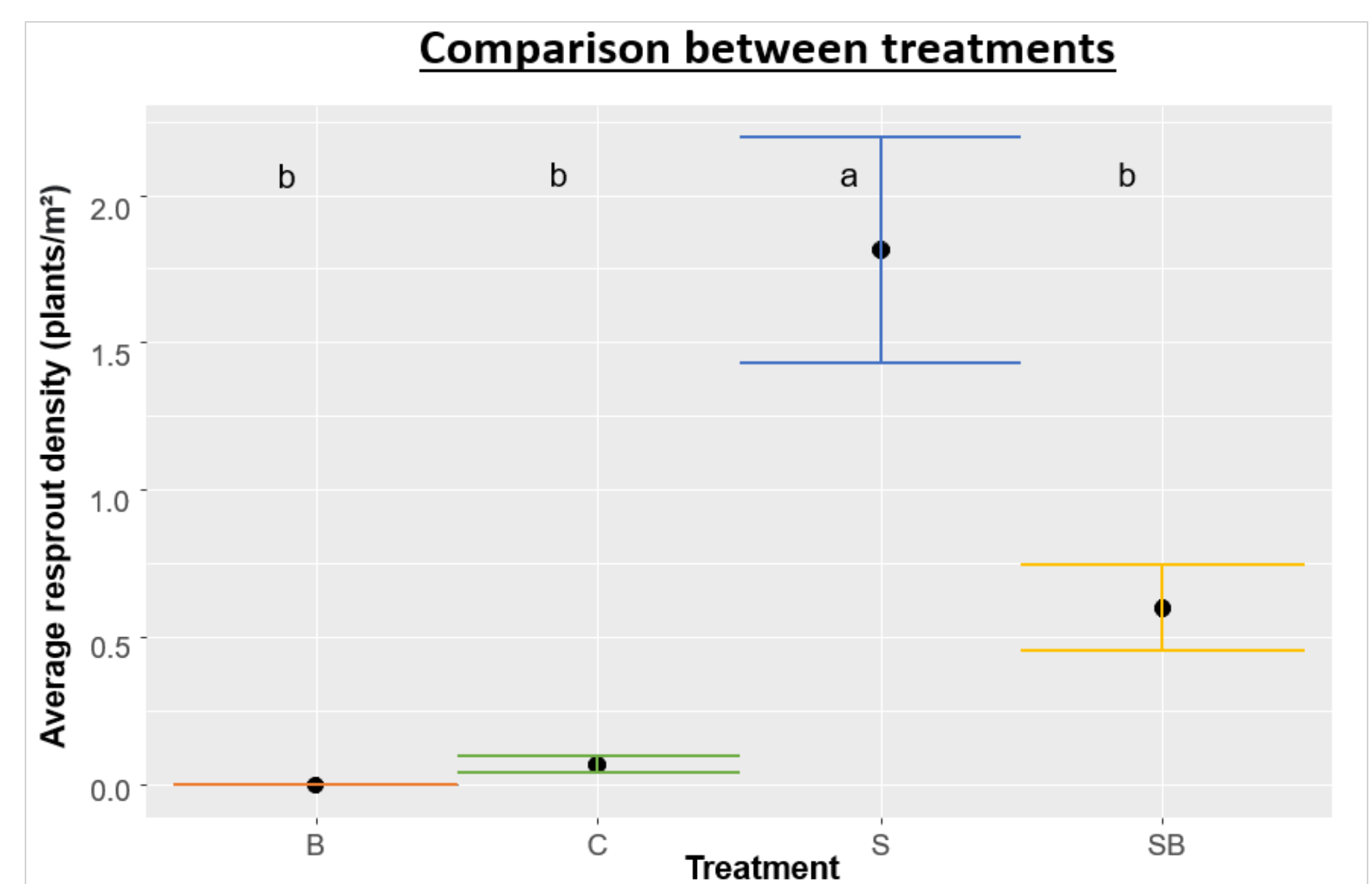
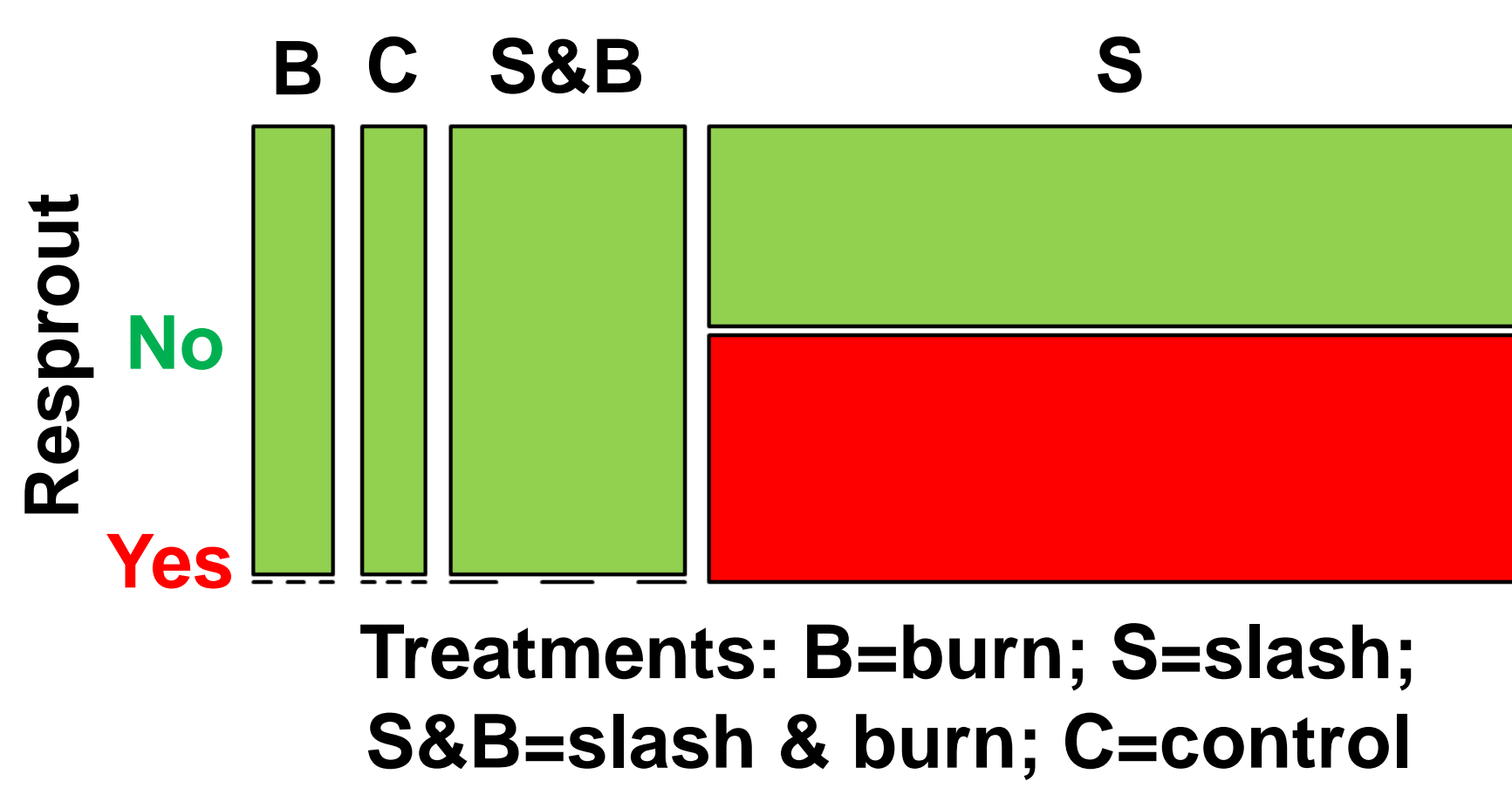
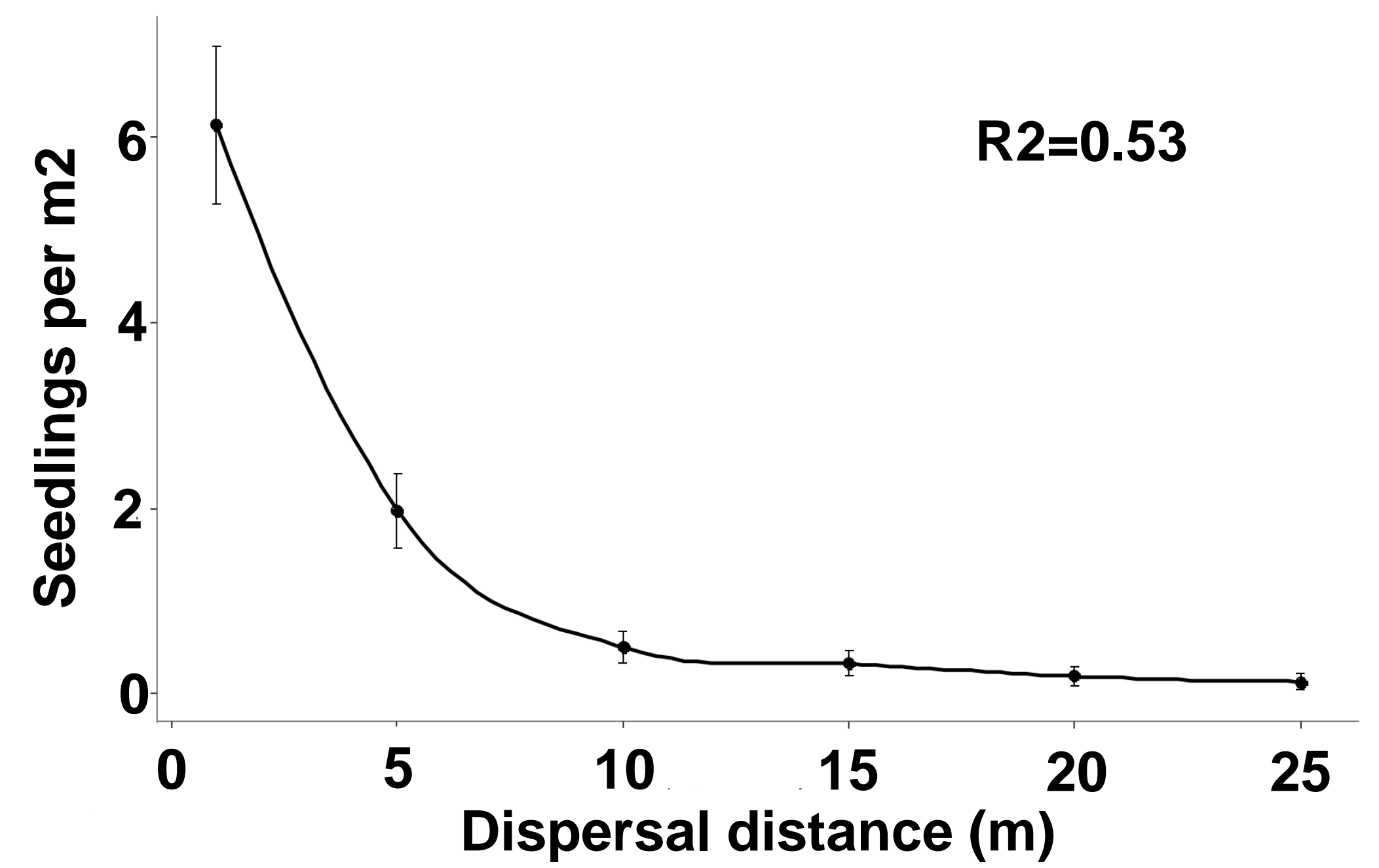
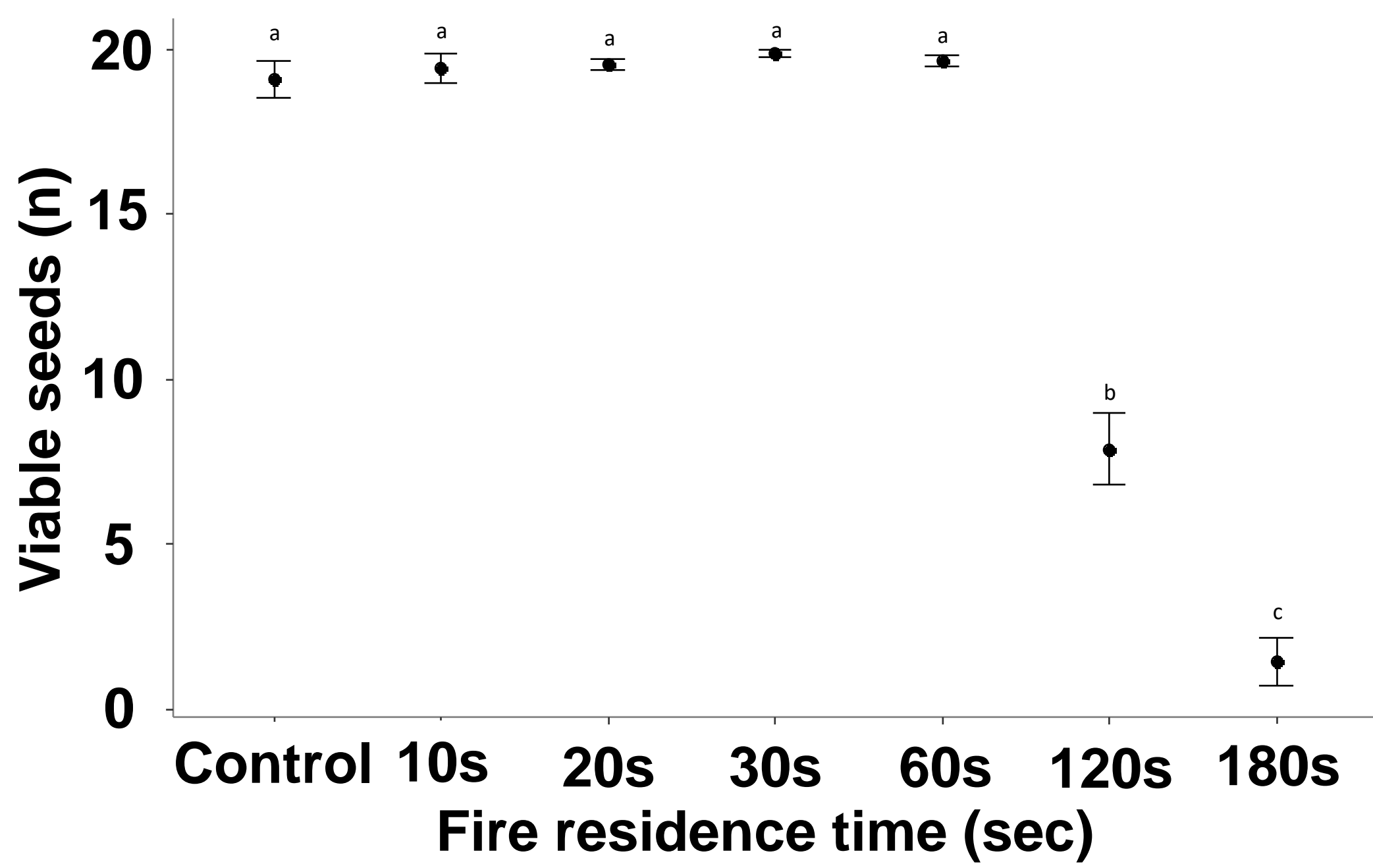
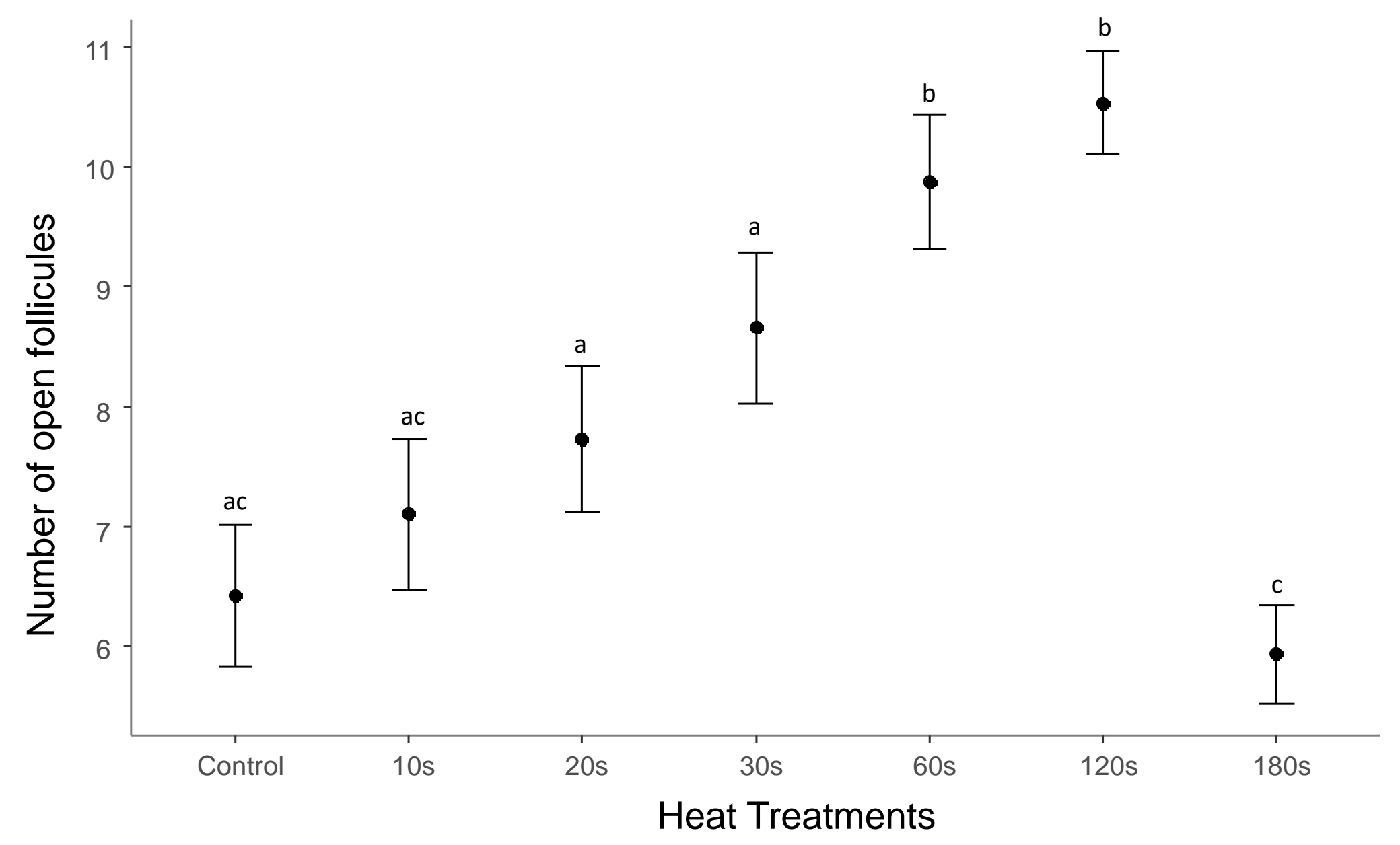
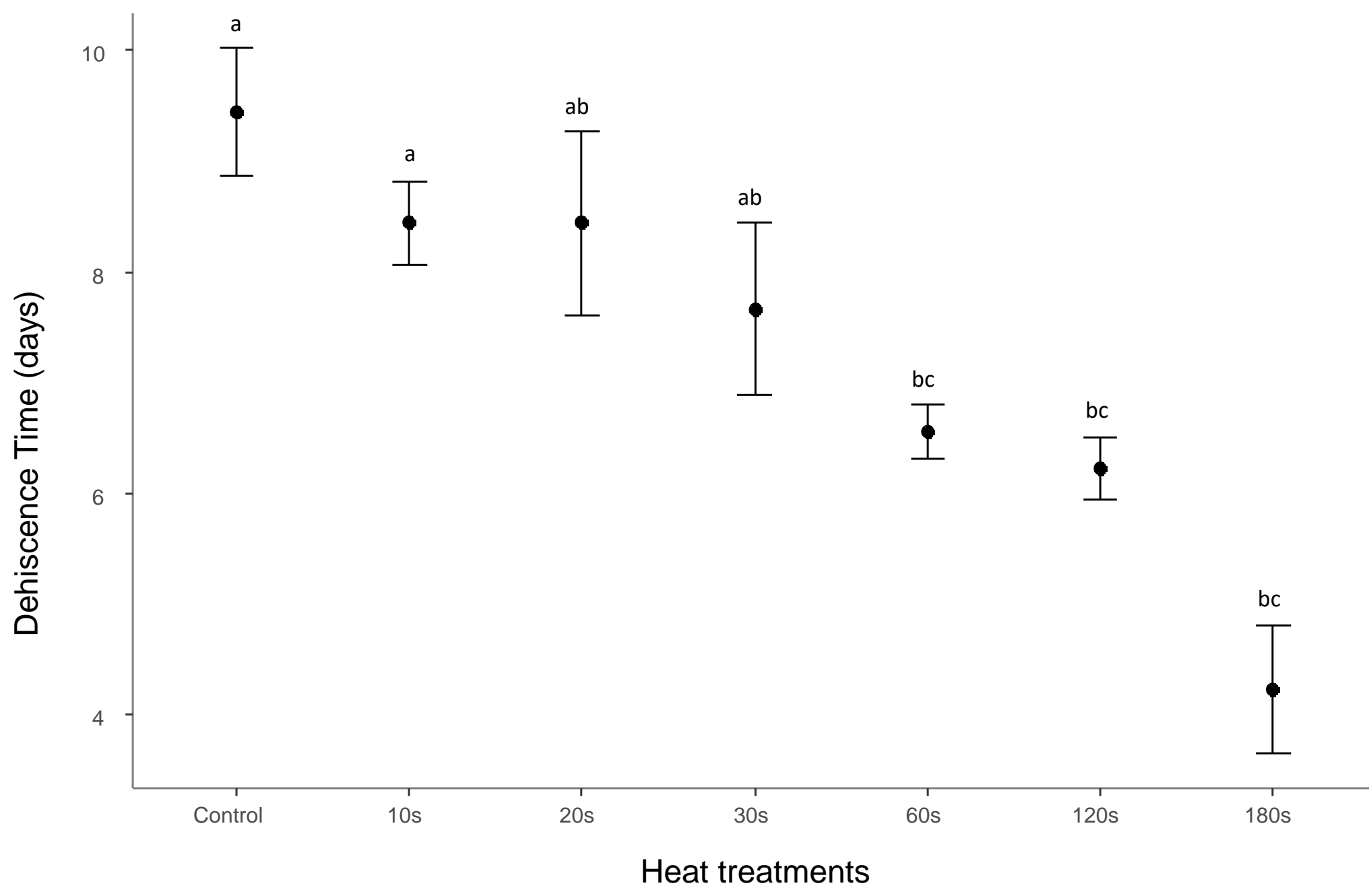






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## Fire effects on Hakea

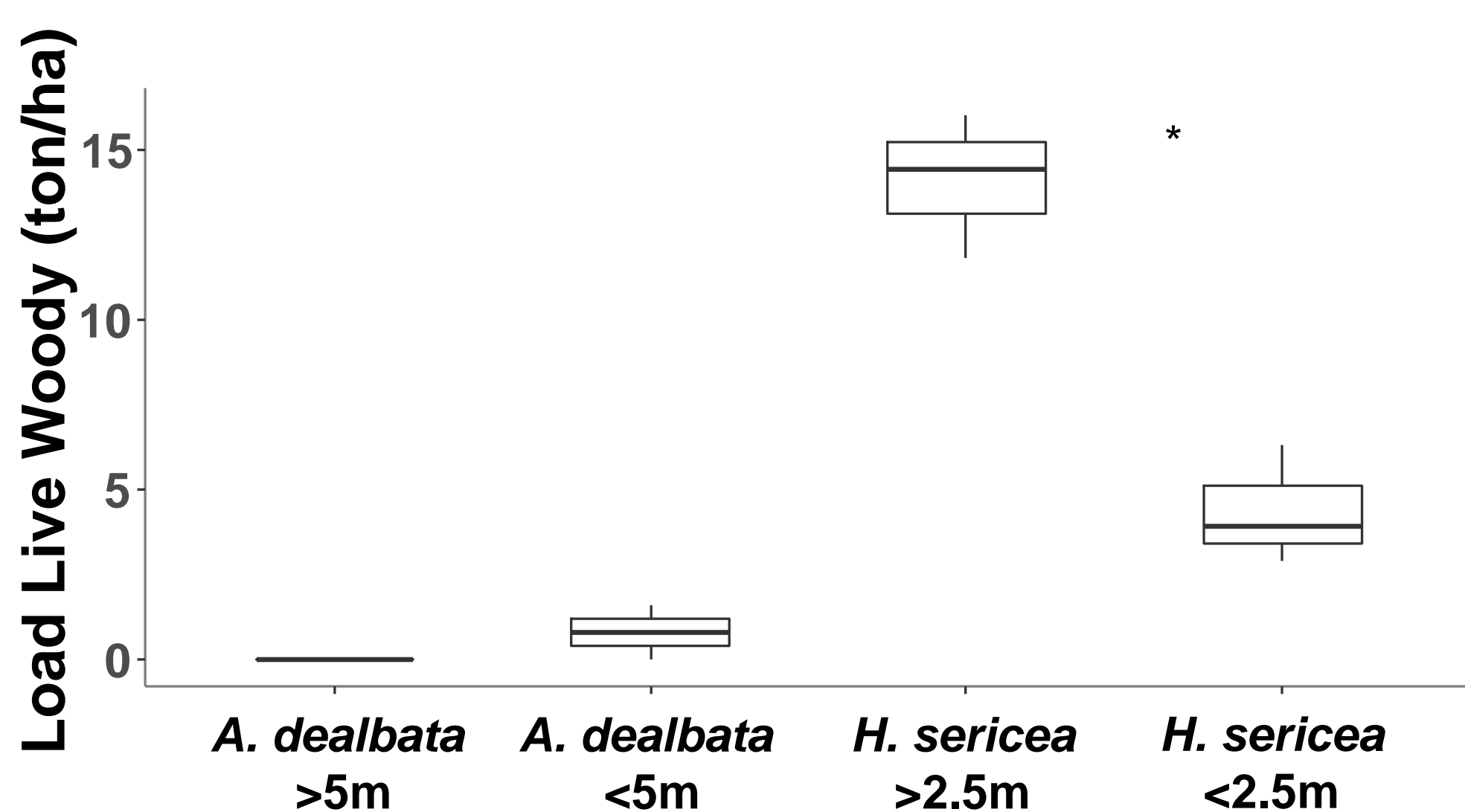
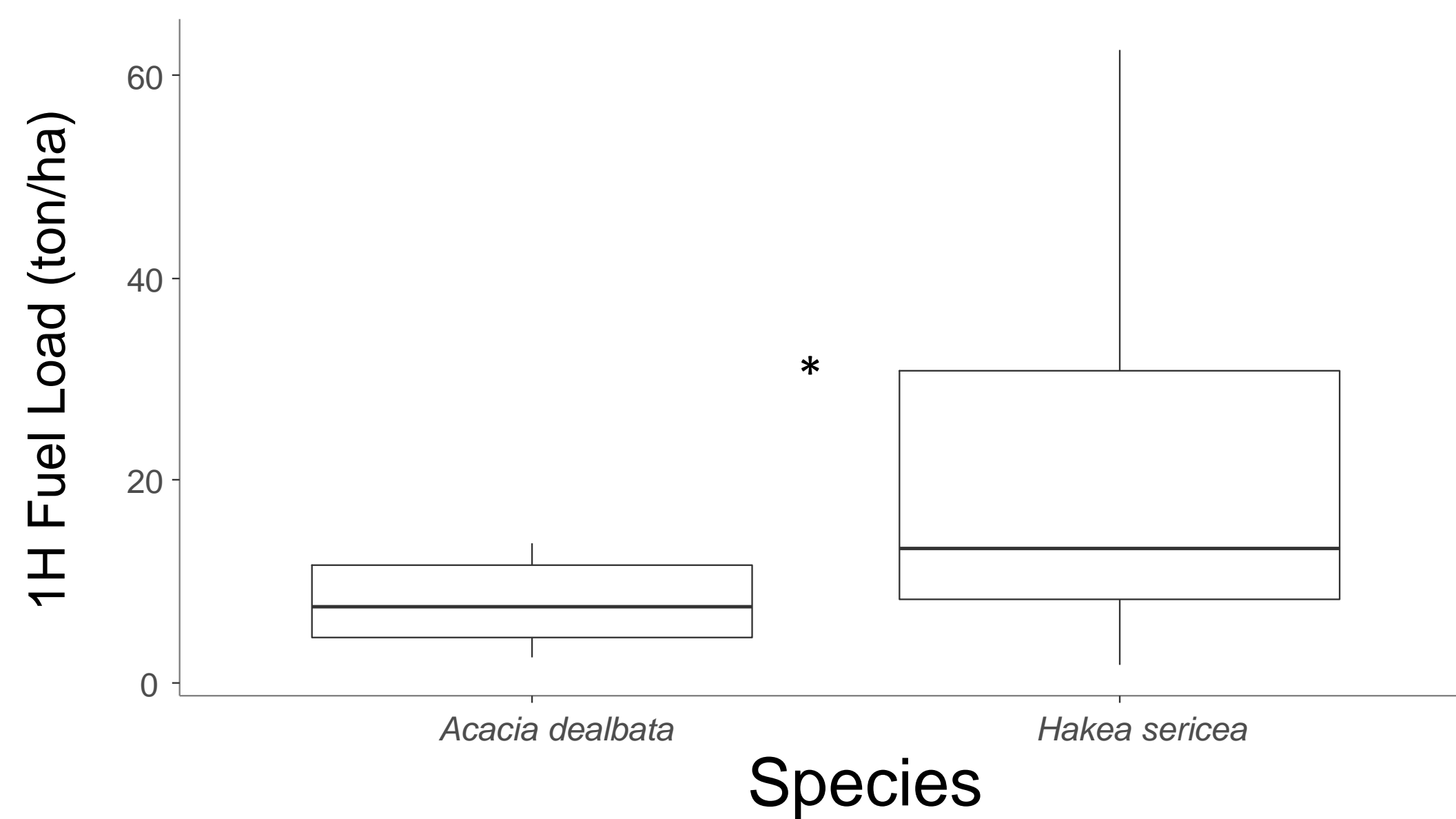
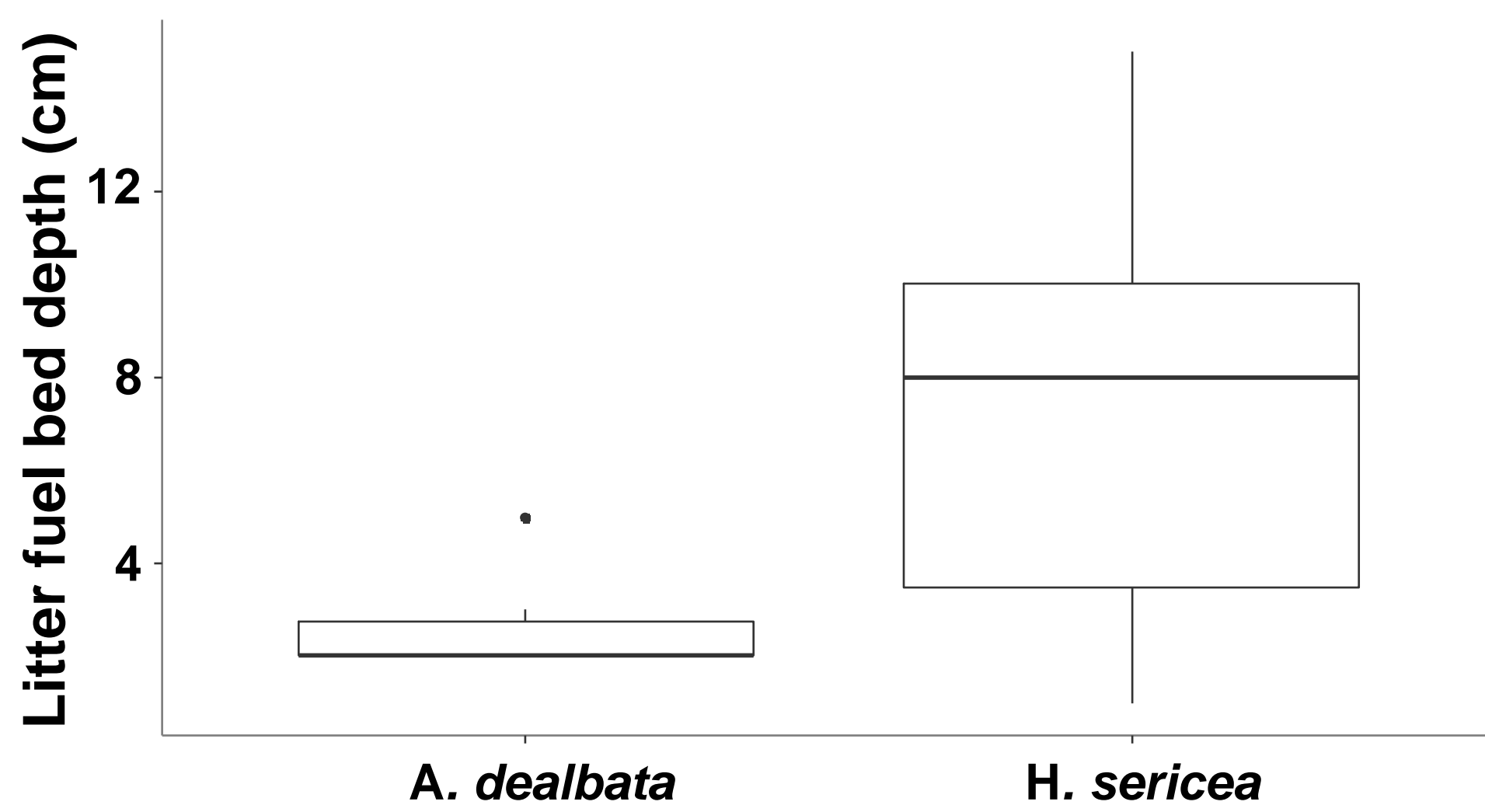
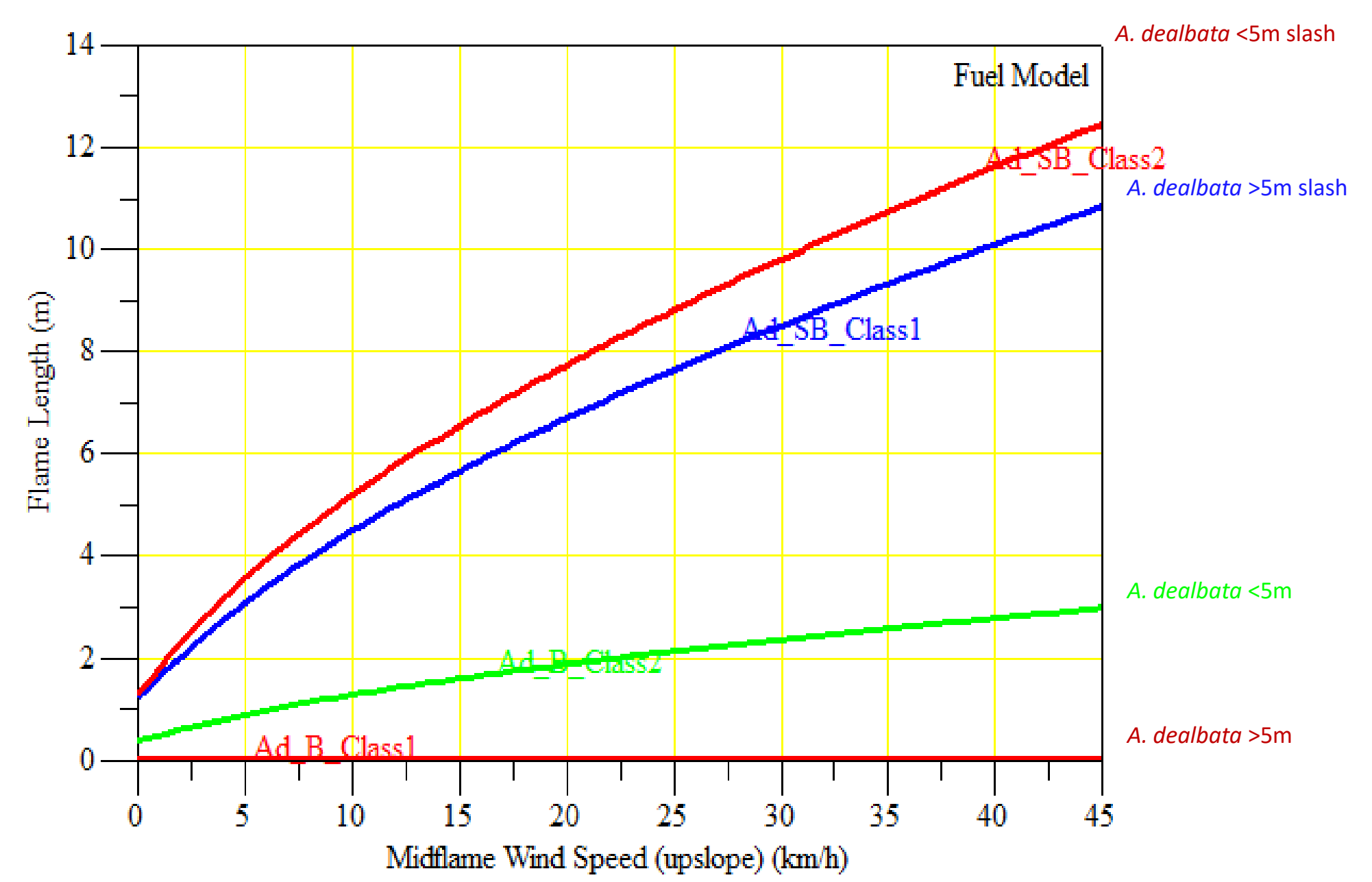
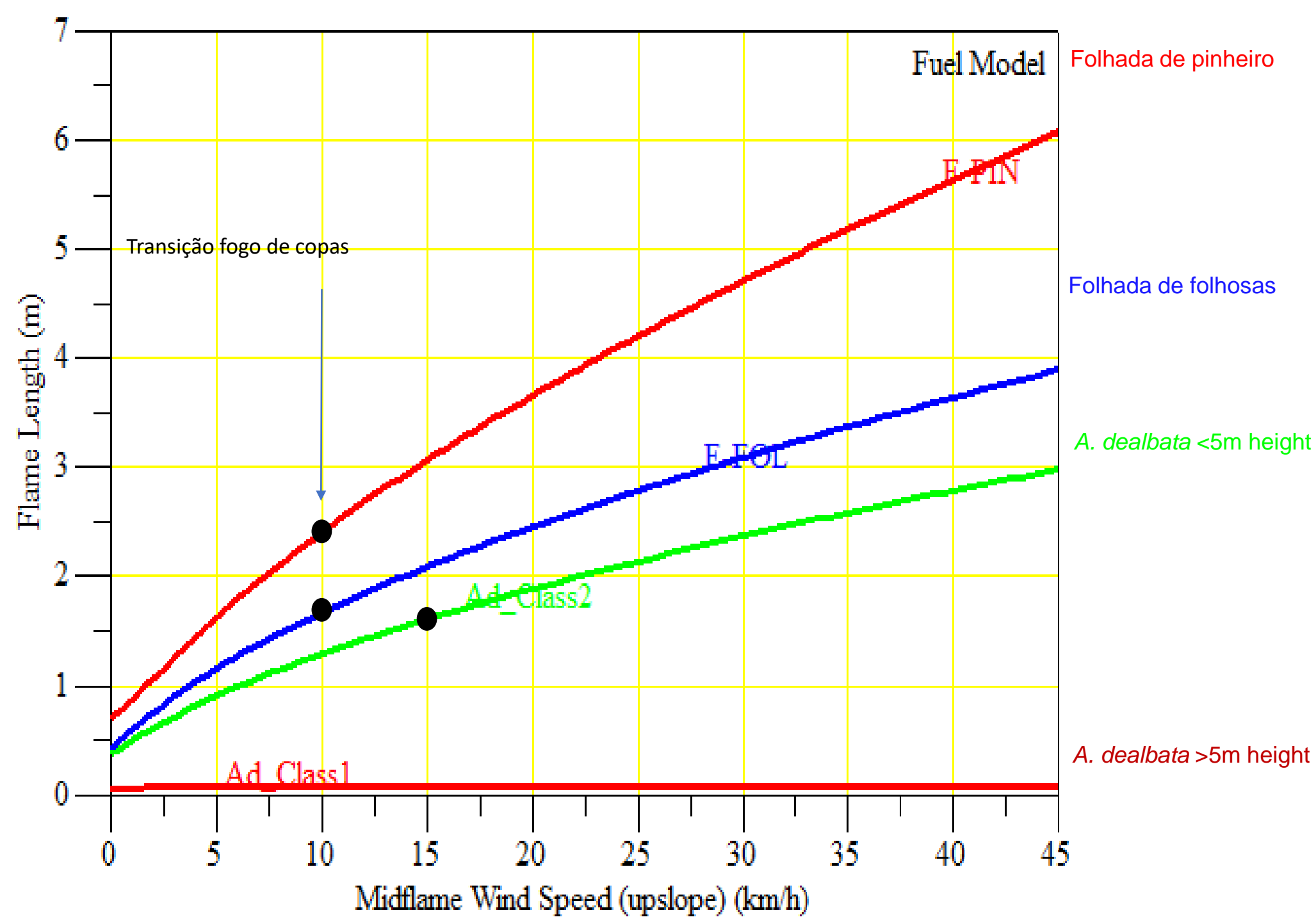






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## Acacia effects on fire





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## Fire effects on Acacia

