

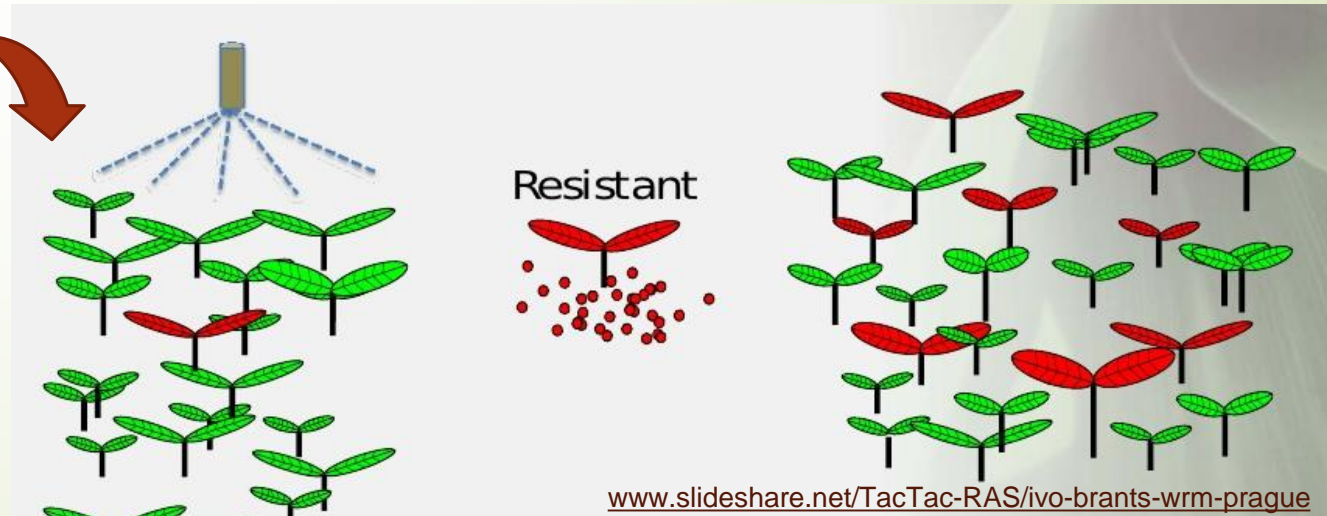
**Drought stress elicits heritable herbicide
resistance in the grass weed
Alopecurus myosuroides (blackgrass)**

**Vian H. Mohammad, Colin P. Osborne & Robert P.
Freckleton**

Department of Animal and Plant Sciences, University of Sheffield, Sheffield, S10 2TN, UK

Objectives

- whether exposure to stresses such as drought tends to promote the evolution of herbicide resistance;
- how rapidly herbicide resistance can be selected in populations with different exposure histories; and
- whether such evolution is mediated through inherited genetic change or via non-genetic mechanisms.



Drought stress experiment

Alopecurus myosuroides

Five different populations

Seeds of all populations planted

Plants exposed to different levels of drought stress (30DAG)

None

Medium drought

High drought

Growth and survival recorded

Seeds of first generation collected

Herbicide treatment experiment

Seeds of first generation of droughted parental plants planted

plants exposed to a dose of fenoxaprop-p-ethyl herbicide (at 3-4 tiller stage)

Lethal dose
40 g a.i. h⁻¹

Sublethal dose
20 g a.i. h⁻¹

4 weeks after the herbicide application survival, damaged and dead plants recorded

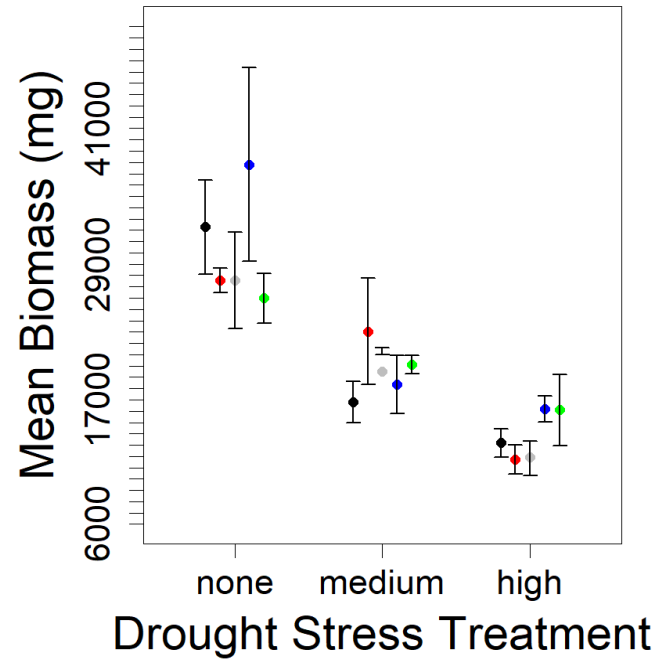
survival

damaged

dead



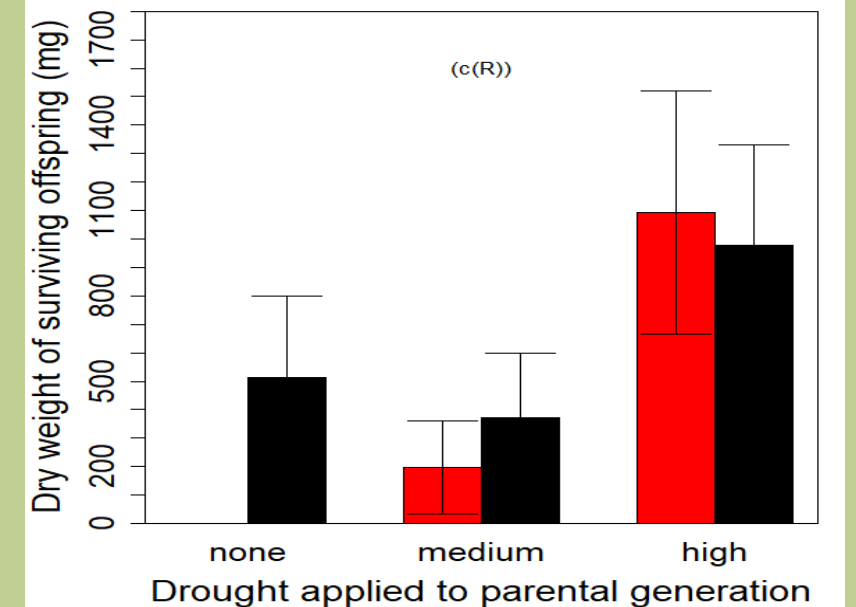
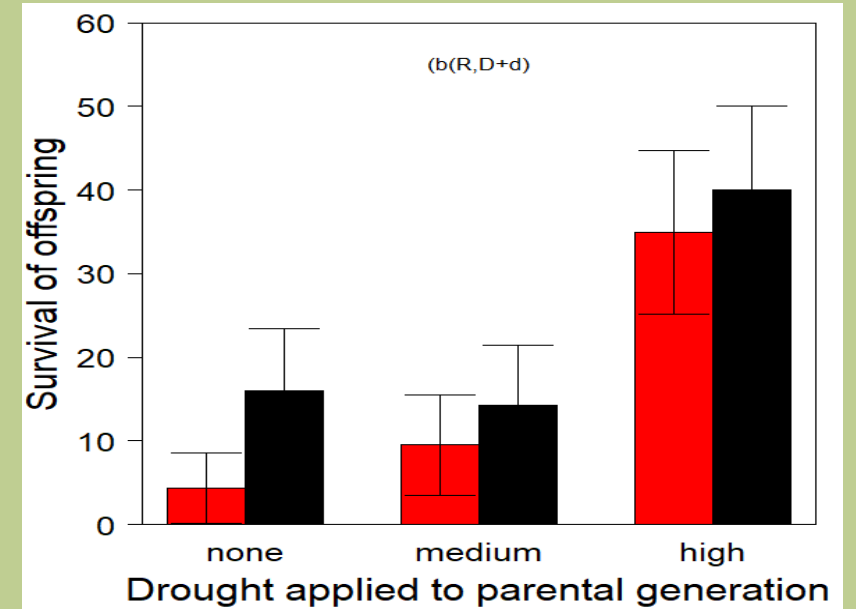
Effect of drought treatment



Populations
● pop1_UK ● pop2_UK ● pop3_FR ● pop4_UK ● pop5_FR

Results *Alopecurus myosuroides* (blackgrass)

Herbicide resistance of F1 offspring



Herbicide dose
■ lethal ■ sublethal

- Drought stress led to herbicide resistance in black grass.
- Resistance was heritable and evolved in a single generation.