Modelling weed suppression in intercropping systems

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Introduction

- Agricultural yields are impacted severely by weed pressure
- Herbicide use subject to increasingly stricter regulations
- **Intercropping** has the potential of enhanced **weed suppression** due to **competitive selection**
- The details of selection and the effect of different intercropping systems on **performance** are poorly understood
- **Plasticity** is a potential mechanism of selection.

Research questions

- What is the effect of **plant trait plasticity** on **weed suppression** in different cereal-legume intercropping systems?
- What is the effect of different **intercropping systems** on the system's **weed suppression and yield**?

Methods

- Field data on crop biomass, yield, weed biomass, plant trait plasticity
- Plant model development in Julia using VPL[1]
- Focus on modelling plant plasticity

Results

- Intercrop **weed biomass** nearly as low as that of the sole crop cereal

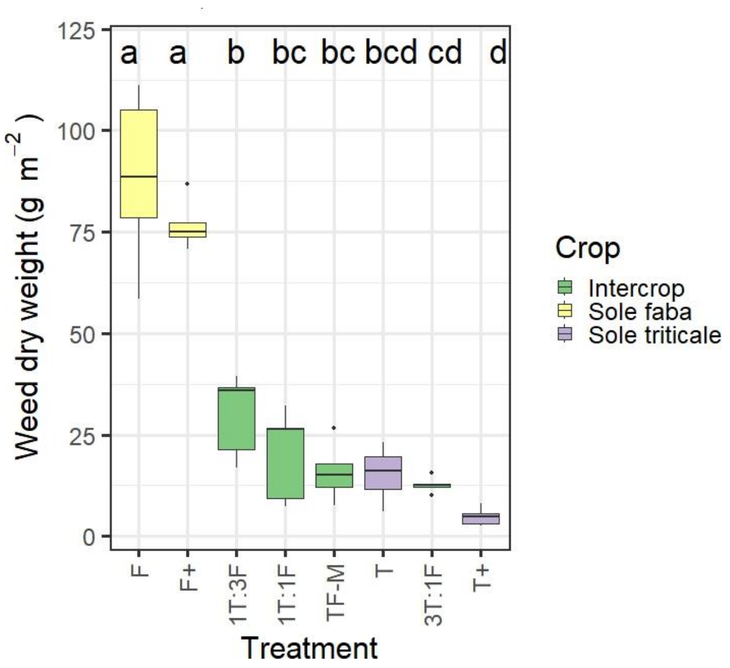


Figure 1 Weed biomass in plots with triticale (T), faba (F), with high density (T+ and F+), row intercrops in various proportions (1T:1F, 3T:1F, 1T:3F), and mixed 1:1 intercrop (TF-M) ($p < 0.001$).

- Intercrop **light interception** and **canopy cover** nearly as high as sole crop cereal

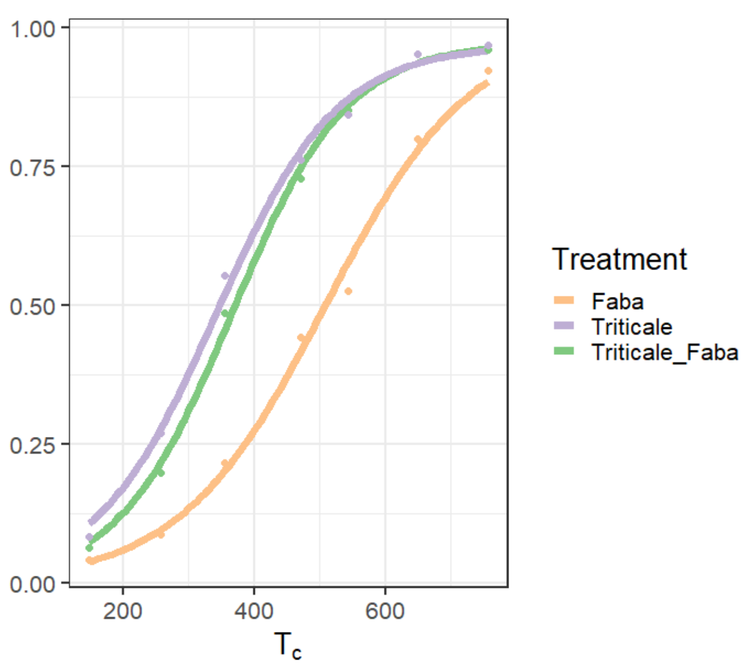


Figure 2 Proportion of light interception (p_{li}) over cumulative daily average temperature (T_c) of faba and triticale sole crops and 1:1 row intercrop.

- **Plasticity** responses visible in number of tillers, tiller angle, and plant height

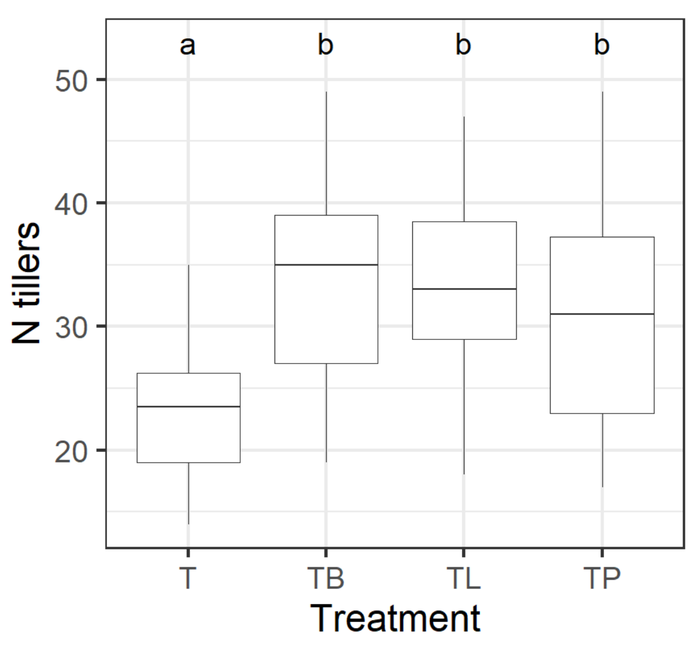
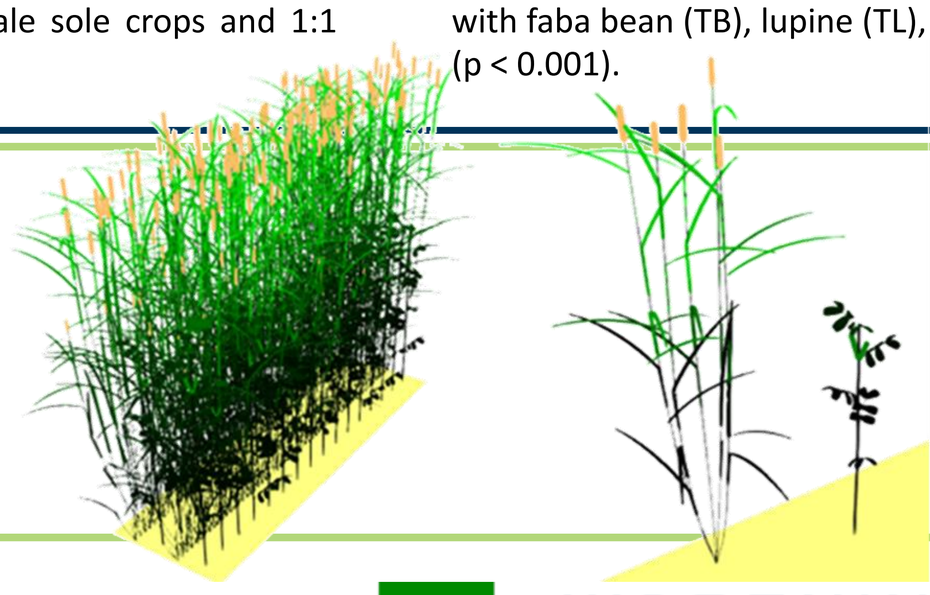


Figure 3 Number of tillers of triticale sole crop (T), and triticale in 1:1 row intercrop with faba bean (TB), lupine (TL), and pea (TP) ($p < 0.001$).

Future work

- Functional-structural plant model development
- Quantification of plant trait plasticity
- Quantification of intercrop planting patterns



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