Kin Recognition in *Beta vulgaris*

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Introduction

- Reflected light from plant canopies has a reduced red to far-red ratio (R:FR) and this is similar among green plants (Fig. 1)
- Plants respond to reduced R:FR by altering their growth and morphology (shade avoidance) (Montgomery, 2016)
- Shade avoidance studies often recommend early weed removal for reducing the effects on crop growth and yield (Rajcan et al. 2004; Page et al. 2010)
- Whether crops are able to distinguish reflected light quality of conspecifics from that of heterospecifics still remains unknown

Objective

Evaluate the response of *B. vulgaris* to reflected FR light from selected species

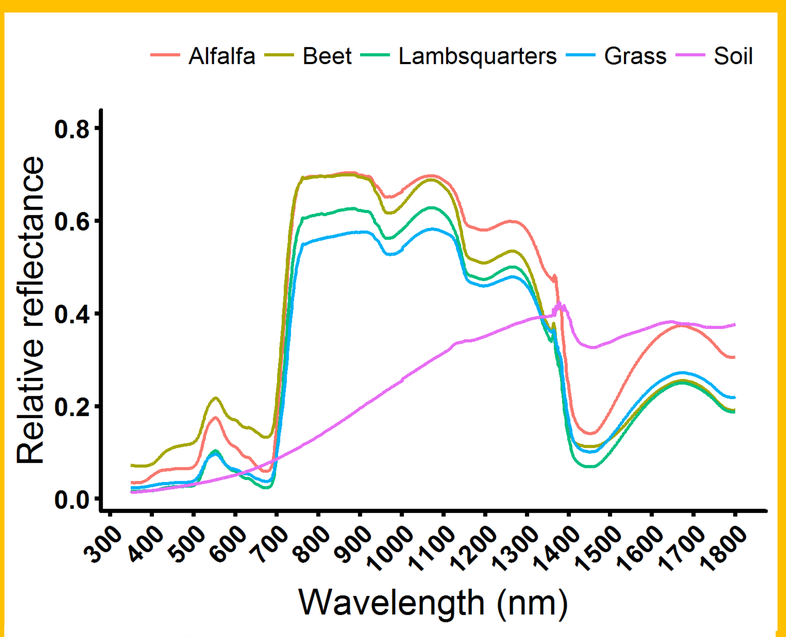

Figure 1. Reflectance spectra of species used in the study

Figure 2. Study method ensuring no resource competition

Methods

- *B. vulgaris* seeds were planted in 3 L plastic pails in June 2016
- The study methods ensured there was no competition for water, nutrients, and light (Fig. 2)
- Five treatments: sugarbeet (*B. vulgaris*), alfalfa (*Medicago sativa*), common lambsquarters (*Chenopodium album*), Kentucky bluegrass (*Poa pratensis*), and no weed/bare soil (control)
- Completely randomized design with 10 replicates
- Plants were harvested at 63 days after planting (DAP)
- Statistical data analysis: ANOVA in R Statistical Software. Alpha = 0.05

Results and Discussion

- Number of leaves (Fig. 3A) and leaf area per plant (Fig. 3B) were significantly influenced by neighboring plants
- Root fresh weight (Fig. 3C) and root to shoot dry weight ratio (Fig. 3D) were not significantly influenced by treatments
- The control treatment had 2 to 3 more leaves than all other treatments (Fig. 3A)
- Leaf area in the control was 23 to 37% greater than all other treatments (Fig. 3B)
- Reflected far red light has been reported to influence leaf area and number of leaves in crops (Rajcan et al. 2004; Page et al. 2010; Schambow et al. 2015)
- *B. vulgaris* may not be able to distinguish reflected FR light of neighboring *B. vulgaris* from other plants species such as weeds

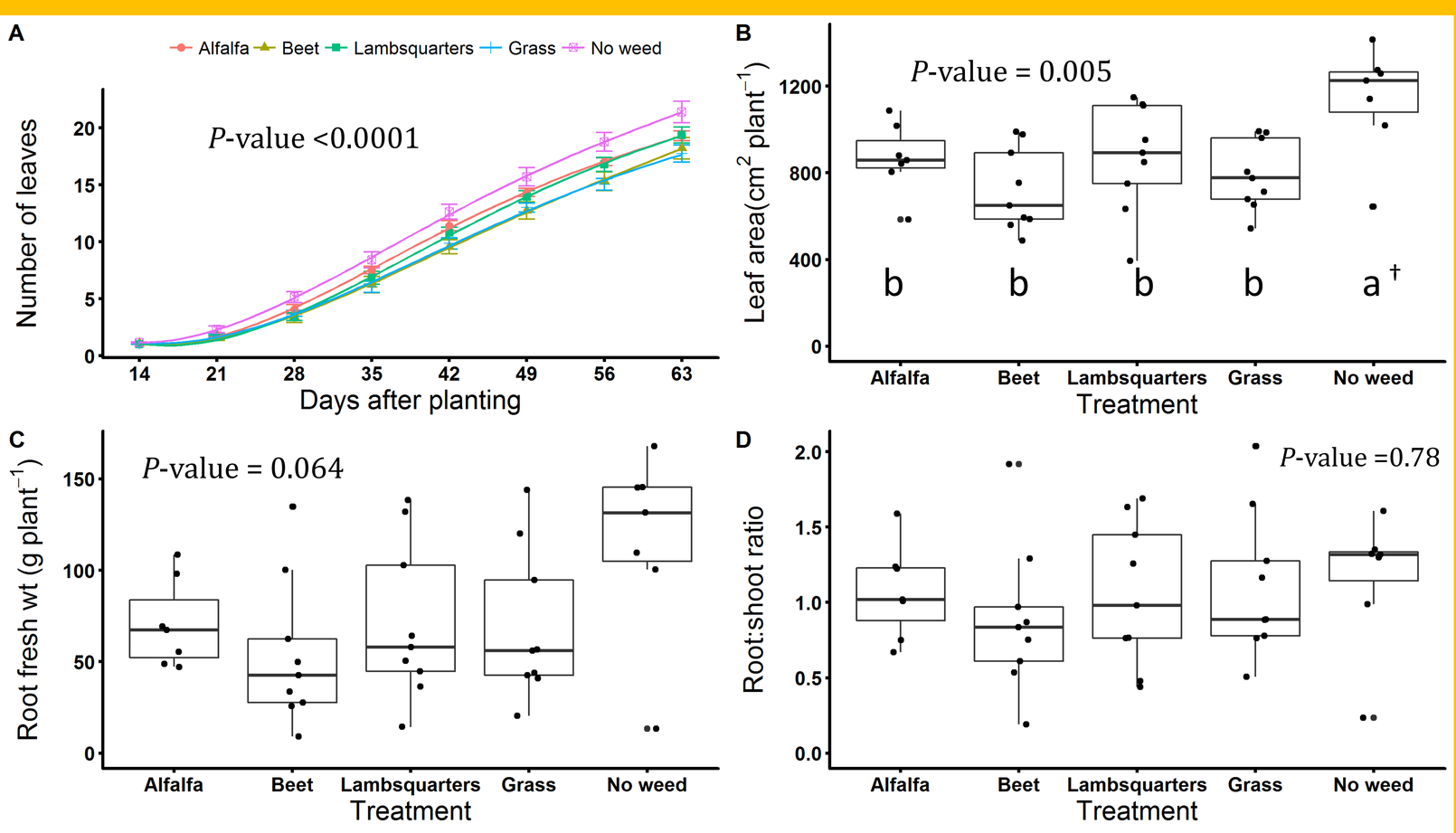

Figure 3. Number of leaves (A), leaf area (B), root fresh weight (C), and root to shoot ratio (D) of *B. vulgaris* as influenced by reflected far-red light from five species
†Treatments followed by same letters are not significantly different at 0.05 significance level

Future Research

- Effects of shade avoidance response on the critical period of weed removal
- Effects of resource competition on shade avoidance response
- Non-structural carbohydrate partitioning

References

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