Kin recognition and communication in a clonal plant species (*Glechoma hederacea*)

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Background

- How plants compete can be influenced by the genetic identity of their neighbour(1).
- This kin recognition and selection has been widely studied in animals, however, it has only recently been applied to plants.
- Studies of different species have found contradictory results with the mechanism of recognition being highly debated (2).
- Abiotic stresses (such as drought), may alter the interaction, by potentially increasing the cost of the interaction.
- We aimed to identify whether kin recognition was present in the clonal species *Glechoma hederacea* and whether the abiotic stress of drought had an affect on the interaction between kin neighbours.

Hypotheses

1) Root growth will increase in the presence of neighbours.
2) Root growth characteristics will alter in the presence of kin neighbours.
3) The drought treatment will alter root growth, and change the interaction with kin neighbours.

Methods

- Split-root design, kin (N=40) and non-kin (N=40) neighbours.
- Two watering conditions, drought and control.

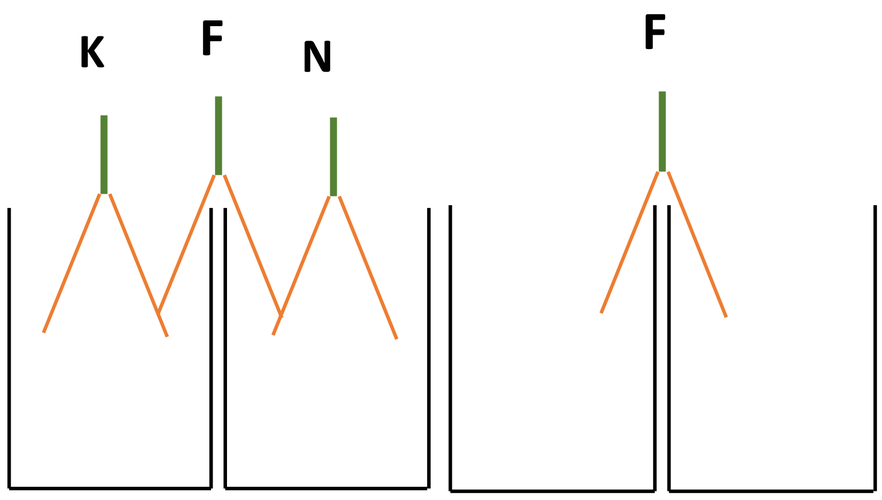

Fig. 1. Split-root design with and without neighbours (control).

Measured characteristics after 36 days-

- GiaRoots analysis-
  Root length, Network length distribution, Maximum number of roots
- Root Biomass

Results

Presence of neighbours-
Maximum number of roots increased with neighbours present.

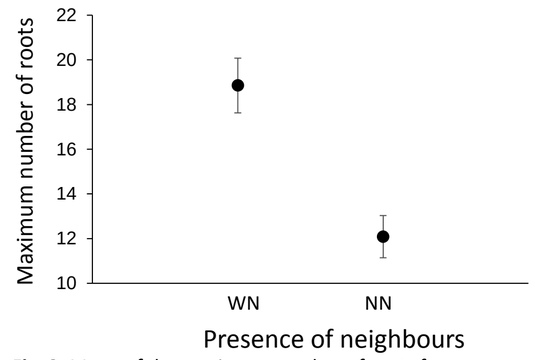

Fig. 2. Mean of the maximum number of roots for presence of neighbours (±SE). WN= with neighbours (N=76). NN= no neighbours (N=80).

Kin recognition-
Network length distribution increased with kin neighbours.

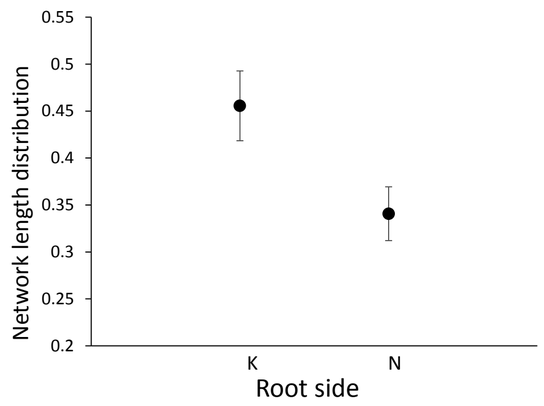

Fig. 3. Mean network length distribution (±SE) for the different root sides of the focal plant. K= root side next to kin neighbour (N=38). N= root side next to non-kin neighbour (N=38).

Drought-
Drought altered root growth for all measured characteristics.

Discussion

- This is the first study to include a 'choice' element when looking at kin recognition, eliminating individual plant differences.
- Network length distribution increased when next to kin neighbours, which we speculate is a mechanism to avoid kin competition. This avoidance of competition in a clonal species could potentially provide the plant with the opportunity to gather more resources.
- Drought as expected changed root structures, however, it did not appear to influence the interaction with kin. A longer term study with a abiotic stress may have an impact for kin competition.
- Differences found between studies with different species could be due to their different growth mechanisms and characteristics analysed.

Conclusions

- **Can detect the presence of neighbours.**
- ***Glechoma hederacea* can recognise kin from non-kin neighbours.**
- **Abiotic stress from drought affects root structures**.

References
1-Dudley, S. & File, A. (2007) Kin recognition in an annual plant. *Biology Letters,* **3**, 435-438.
2-Bais, H. (2014) Shedding light on kin recognition response in plants. *New Phytologist,* **205**, 4-6.

Acknowledgements
Thank you to all of my supervisors for their support during my time at the University of Lincoln, who without I would not be where I am today. Also thank you to all the technical staff that helped me fix many hiccups.