TURF TRIAL INFORMATION

EFFECT OF H2PRO WETTING AGENTS ON CROP GROWTH AND PHYSIOLOGY

H2Pro®

Lancaster University

Centre for Global Eco-Innovation

SUMMARY

- **Three-year PhD to examine complex range of plant benefits arising from use of H2Pro wetting agents.**
- **Independent Trial completed at Lancaster University.**
- **Applying H2Pro TriSmart and AquaSmart to sandy soils increased water availability for plant root uptake.**
- **Use of H2Pro TriSmart and AquaSmart increased leaf water status, so plants in a drying soil were less stressed than control plants.**
- **Use of H2Pro TriSmart and AquaSmart increased the 'rhizosheath' formation for the test plants, the rhizosheath being the soil intimately associated with and attached to the plant roots.**
- **Use of H2Pro AquaSmart significantly increased plant biomass (for barley and maize) by over 30%, indicating improved nutrient uptake.**

Image 1: Measuring plant water potential in a pressure chamber.

METHODS

Three years of laboratory and glasshouse trials completed at Lancaster Environment Centre under the supervision of Professor Ian Dodd allowed PhD candidate Vasileios 'Billy' Giannakopoulos to complete his PhD on use of H2Pro wetting agents – and their affect on crop growth and physiology. A range of experiments were completed though the PhD measuring the effect of H2Pro wetting agents on a diverse set of plant characteristics; plant stem and leaf water potential, stomatal conductance, whole plant gas exchange (transpiration and photosynthesis), evapotranspiration, rhizosheath formation, win-rhizo root scanning and plant tissue nutrient content. Model plants (barley and maize) were used on occasion to allow for experimental design.

RESULTS

1. Extensive experimental work demonstrated that using H2Pro TriSmart or AquaSmart would significantly increase soil water potential and base water potential (A & B). The application of wetting agent adjusted the physical status of the water in the soil, by lowering surface tension forces, so made it easier for plant roots to extract.

2. The experimental work demonstrated a significant increase in plant 'rhizosheath' following applications of H2Pro TriSmart and AquaSmart (C). The rhizosheath is the volume of soil intimately associated with the plant roots and root hairs. Increasing the rhizosheath soil, could be an additional mechanism by which the wetting agents could be influencing plant water uptake – especially in a drying soil situations, maintaining higher water VMC closer to the roots.

3. A final experiment on wheat and barley demonstrated a significant increase in dry shoot biomass following applications of H2Pro AquaSmart (D). This would indicate the plant is better able to access nutrient resources following wetting agent application, however, no significant increase in tissue N, P or K content was measured.

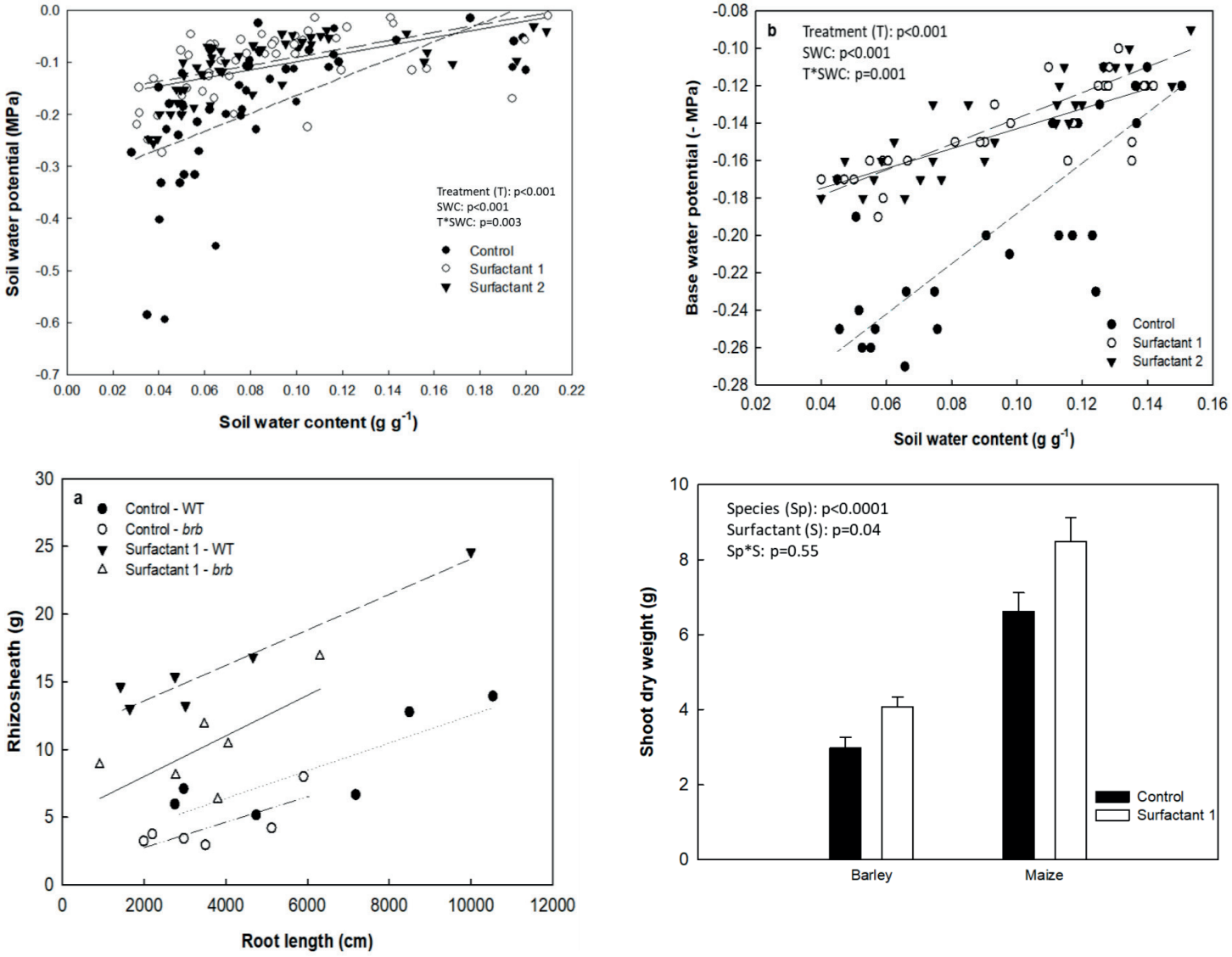

Figure 1. Key results from the study.
A - soil water potential. B - Base water potential. C - Rhizosheath mass. D - Shoot dry weight.

Conclusion

This PhD represents the most extensive assessment of above ground plant physiology factors in relation to application of surfactants that has been conducted to date. Applications of H2Pro wetting agents led to some significant changes in water availability and plant water status, this could be especially important in drying soil situations.

Publication

Giannakopoulos, V, Puertolas, J, Owen, A & Dodd, I.C. 2020. Applying surfactants decrease turf water use under high evaporative demands in glasshouse conditions. 7th ETS Conference Proceedings, Turf solutions for the future. 28-29.

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