PoC Project: Using leaf waxes from brassica waste to produce novel film anti-transpirants for increasing crop drought tolerance

Academic PI: Professor Peter Kettlewell, Harper Adams University
Academic Collaborator: Professor Ray Marriott, Bangor University
Industrial Collaborator: Freshtime

The Challenge
Drought is a massive global problem that reduces food crop yield. Applying anti-transpirant coatings and temporarily blocking leaf pores is a potential way to reduce water loss and drought damage in crop plants. Currently, anti-transpirants are manufactured from high-cost polymers and can only be economically justified on high-value, mainly ornamental, plants. If we could produce a lower-cost polymer, it might be possible to use it to reduce drought damage in large-scale food crops.

Project Goals
Our short term goal was to find a lower-cost film anti-transpirant. In the longer term we aim to contribute to Global Goal for Sustainable Development #2 Zero Hunger by promoting the use of film anti-transpirants for reducing drought damage to crop yield

Conclusions
We extracted wax from leaf waste using a solvent created by pressurising and heating carbon dioxide gas to liquefy it. We compared an experimental anti-transpirant, based on the extracted leaf wax, with a commercially-available anti-transpirant in experiments on oilseed rape plants and wheat plants grown in pots in glasshouses. Our experimental polymer was much more effective than the high-cost commercial product because a much lower concentration of wax gave a similar reduction in water loss from the plants to a high concentration of the commercial product, in both well-watered and drought-stressed plants.

Project outputs
• Helped to develop a collaboration with University of Florida by allowing a visiting PhD student from USA to use the wax on peanut plants during her short research project.
• Further collaboration with Freshtime and Suprex/Bangor University is intended.