

Australia to invest \$8.1M in developing smart sprays and cold plasma to optimise crop production

19 March 2025 | News

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Murdoch University in Western Australia is leading two new Grains Research and Development Corporation (GRDC) investments to improve profitability and sustainability for Australian grain growers.

A novel biodegradable spray for broadacre farming will be developed, along with cold plasma treatment for improving growth, vigor and yield in wheat and canola.

The two projects show GRDC's appetite for innovative, exploratory research to reach new frontiers for Australian grain growers, said Sustainable Cropping Systems Manager Dr Uys Lourens.

“These new projects aim to develop and trial novel treatments to optimise productivity of crops, and if successful, lead to commercial application pathways for these technologies in broadacre agriculture,” Dr Lourens said.

Murdoch University is leading the smart sprays project, which involves an investment of \$8.1 million over three years. Two new biopolymer products will be developed and tested: a soil spray to facilitate water harvesting, and a sticky spray. By 2028, growers will receive the results and recommendations from the research projects.

Dryland crops typically transpire only 20-40 percent of rainfall, while 60-70 percent is lost to evaporation, and 5-20 percent to runoff.

Professor Daniel Murphy, Director of the CSIRO Murdoch Bioplastic Innovation Hub, said the soil spray would facilitate rainfall runoff into the furrow and reduce soil evaporation, increasing the water available for transpiration and plant water use efficiency.

“The sticky spray would be applied to crops to potentially deliver chemicals, nutrients or antifreeze proteins from bacteria,” Prof Murphy said.

Antifreeze proteins protect against potential crop damage due to frost and provide growers with an opportunity for in-season management of frost events.

These different approaches to smart spray production will diversify GRDC investment in this area, and offer growers different price points, scalability, and effectiveness options.

Murdoch University is leading a three-year, \$5.1 million project with partners the Department of Primary Industries and Regional Development (DPIRD) in Western Australia, the South Australian Research and Development Institute (SARDI), which is a division of Primary Industries and Regions South Australia, and Neymyrup Economics.

Wheat and canola seeds and plants will be treated with cold plasma or plasma activated water to investigate and quantify their agronomic and economic benefits.

Using an electric current, radio frequency, or microwave energy, cold plasma is formed by ionizing a gas (including air). It can be fed through water to create plasma activated water, enabling liquid application. The use of cold plasma technology in crop production offers a sustainable technology for seed treatment and application during plant growth which could improve grain yield.

Kirsty Bayliss, associate professor at Murdoch University's Harry Butler Institute, said previous research has shown that germination rates can be increased.

“We will now also be testing plasma activated water to increase nutrients and manage disease levels. We are excited to test this technology at a large scale in field trials across Australia,” A/Prof Bayliss said.

Dr Lourens said international research on cold plasma application had shown wheat yield gains of between 6 to 61 %, indicating a significant opportunity for Australian growers.

“This investment will trial and evaluate the application of cold plasma and plasma activated water to both canola and wheat seeds and developing plants. Through rigorous economic analysis, it aims to provide a definitive answer as to whether this technology should be implemented by growers. This includes a potential adoption pathway if implementation is economically sound.” Dr Lourens said.