



FERTILE GROUND

AGILENT AIDS RESEARCHERS' QUEST FOR DROUGHT-TOLERANT CROPS



Associate Professor Ute Roessner

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Wheat is one of the world's most important crops and, if you're a scientist trying to make the plants more drought tolerant, one of the most challenging.

Associate Professor Ute Roessner of the University of Melbourne knows this first hand.

She and her colleagues at the Australian Centre for Plant Functional Genomics have been using Agilent instruments to study both wheat and barley, two of Australia's most important crops, to see if they can find ways to make them stand up to environmental stresses.

In the land down under, two forms for stress—drought and salty soil—seem to come with the territory.

What makes wheat particularly challenging to study is the sheer size of its genome. In fact, the wheat we use to make bread has three complete genomes in the nucleus of each cell—and each of those genomes is nearly twice the size of the human genome.

Roessner finds this fact quite ridiculous, but there it is—and it's far from the only challenge.

If you want to understand the mechanisms that make some plants more stress-tolerant than others, you must also consider factors such as metabolomics—Roessner's specialty.

(Her Agilent-equipped lab is part of Metabolomics Australia, a consortium of universities and research institutes that provides high-throughput metabolomics services to life science researchers from all over the country.)

Roessner has established and validated GC/MS and LC/MS methodologies using industry-proven Agilent systems, and she is exploring how metabolomics and other "omics" studies can be combined to support food sustainability and quality.

"We're mainly interested in roots, but if you do a field study with real drought conditions, you cannot look at the roots," she says. "There's no way to take them out of the soil and prepare them for metabolomics without washing away vital clues, so we have to look at leaves."



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AGILENT CASE STUDY: EMPOWERING RESEARCHERS

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Along with the challenges come some distinct advantages, however.

The good thing about plants is you can cross them and produce a population of 200 children—inconceivable with humans—and you can tell exactly which part of the genome comes from which parent. Then you can measure traits such as yield, flower time, plant height, and the presence of metabolites.

“We’re able to relate each metabolite profile back to the part of the genome that was altered between the two parents to see which parent influenced the profile,” Roessner says.

This kind of quantitative trait loci, or QTL, analysis is common in plant research where selective breeding has long been used to develop crops with desired traits, but her lab is among the first to combine QTL analysis with metabolomics.

What makes Roessner’s ongoing research uncommonly fertile, she points out, is a suite of Agilent’s precision instruments (single- and triple-quadrupole GC/MS systems as well as quadrupole time-of-flight and triple-quadrupole LC/MS systems, plus data-processing equipment and data-analysis software), which she and her team rely on for fast, accurate results.

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