

# AHRI CELEBRATES ITS 20TH ANNIVERSARY

## AUSTRALIAN HERBICIDE RESISTANCE INITIATIVE (AHRI) CELEBRATES ITS 20TH ANNIVERSARY



Hugh J. Beckie and Stephen B. Powles; School of Agriculture and Environment, The University of Western Australia, Perth, WA, Australia outline the achievements of the Australian Herbicide Resistance Initiative

### History and mission

On February 24, 2019, the Australian Herbicide Resistance Initiative (AHRI) hosted a dinner function with 100 invited stakeholders in Perth, Western Australia to celebrate its 20th anniversary. AHRI is a Grains Research and Development Corporation (GRDC) initiative, which was inaugurated in 1998. Prof. Stephen Powles was AHRI Director for 20 years until June 30, 2018 when Prof. Hugh Beckie assumed the role (Figure 1). Originally called the Western Australian Herbicide Resistance Initiative (WAHRI), it was renamed AHRI in 2009 following a review that recommended a national role. Last year, AHRI marked 20 years of GRDC funding, operating as a research and communications group out of the School of Agriculture and Environment, The University of Western Australia (UWA) (web site: <http://www.ahri.uwa.edu.au>). UWA funds Prof. Beckie and Powles as well as providing infrastructure support for the AHRI team. The current 5-year GRDC AHRI grant ends in June, 2020. AHRI also receives substantial funding from the Australian Research Council (ARC), China Scholarship Council (in support of two PhD and two post-doctoral positions), as well as various industry partners.

The core mission of AHRI is strategic and applied research to minimise the adverse impact of herbicide resistance and crop weeds on Australian cropping. AHRI is a global leader in research (over 10 highly-cited articles), development, and extension/communications (RDE) of herbicide resistance and its management for profitable and sustainable cropping systems in the Australian grains industry. The AHRI mantra is “more crop, less weeds – sustainably!”

AHRI comprises a multi-disciplinary team of about 20 full-time equivalent (FTE) personnel (Figure 2). Activities range from fundamental research at the biochemical, physiological, and molecular level, to the biology and population ecology of major crop weed species, through to the development of agronomic and herbicide management strategies, tactics, and practices. AHRI has five main programs: (1) resistance mechanisms, led by Dr. Qin Yu; (2) resistance surveillance, led by Ms. Mechelle Owen; (3) resistance evolution, led by Dr. Roberto Busi; (4) resistance management, led by Dr. Mike Ashworth; and (5) resistance communications, led by Ms. Jessica Strauss. Ms. Lisa Mayer is the AHRI Centre Manager (also Project Manager of WeedSmart, an industry-sponsored initiative to promote herbicide sustainability). Four Extension Agronomists based in the Western (Peter Newman), Southern (Greg and Kirrily Condon), and Northern GRDC regions (Paul McIntosh) are critical to effective, continual targeted communications with AHRI stakeholders across multiple platforms, from social media to regular RDE publications such as ‘AHRI Insight’.



**Figure 1.** Official handing over of AHRI's leadership from Professor Stephen Powles (left) to Professor Hugh Beckie (right) in July, 2018.

### Some accomplishments

Below is a list of some major AHRI applied achievements of direct relevance to the Australian grains industry:

Western Australia grainbelt-wide (500 field) regular surveys of herbicide resistance conducted in 1999, 2005, 2010, and 2015 that establish and monitor the ongoing extent and degree of herbicide resistance in major crop weed species (e.g., Owen *et al.*, 2014). These surveys are part of the surveillance network of herbicide-resistant weeds across the nation. These systematic surveys have provided the hard data quantifying the resistance problems as well as identifying herbicides still effective for grain growers. Ultimately, it has enabled strong communication messages on herbicide sustainability.

Glyphosate sustainability in Australian agriculture. AHRI has provided good science, proving glyphosate resistance evolution in major weed species (Powles *et al.*, 1998). In turn, this science has been used to communicate effective messages that has helped grain growers keep glyphosate working in Australian agriculture.

Harvest weed seed control (HWSC) – a new weed control tool for grain growers. AHRI researched and established the efficacy of the range of HWSC practices and mounted nationwide training and communication efforts that have resulted in the widespread adoption by Australian grain growers of HWSC tools. AHRI research, know-how, and involvement was pivotal to the commencement of development of the now-commercialised Harrington Seed Destructor and other HWSC techniques (Walsh, 2018; Walsh *et al.*, 2012).



**Figure 2.** AHRI's team in 2017 (left to right): Jinyi Chen, Huan Lu, Qiong Peng, Lang Pan, Lisa Mayer, Roberto Busi, Danica Goggin, Jessica Strauss, Mechelle Owen, Mike Ashworth, Gayle Somerville, Steve Powles, Qin Yu, Heping Han.

Damaging effect of cutting herbicide rates. Through comprehensive experiments with established and new herbicides, AHRI demonstrated that cutting herbicide rates can lead to rapid herbicide resistance evolution (Neve & Powles 2005). These studies have enabled extensive AHRI communications that has reversed the previous bad practices of cutting herbicide rates in Australian cropping, leading to greater herbicide longevity and sustainability.

Ryegrass integrated management (RIM) bio-economic model of cropping and weed control. AHRI led the development, implementation, and communication of the RIM model, which simulates long-term scenarios of various cropping and weed management options in Australian grain farming systems (Pannell *et al.*, 2004). This decision-support system has directly or indirectly helped growers and the agri-food industry as a whole to understand the necessity and benefit of diverse weed management tactics and practices for sustainable crop production. Models have since been developed for some other major crop weeds of Australian and global agriculture.

Early introduction into Australia of the block-buster herbicide Sakura™ (pyroxasulfone). Pivotal early AHRI research established the promise of pyroxasulfone for Australian grain cropping (Walsh *et al.*, 2011). Subsequent efforts based on

good science resulted in the early introduction of pyroxasulfone into Australia and its subsequent widespread success in Australian grain cropping. Today, growers are reliant on pre-emergence herbicides such as pyroxasulfone to manage weed resistance to many post-emergence herbicide products.

### Conclusions

With well over AUS\$1 million investment by GRDC and UWA in a new AHRI Agronomy Laboratory, which was opened on June 26, 2018, expectations are for increased RDE in crop agronomy in the future. Prof. Beckie's vision for AHRI is a global center of excellence for crop/weed (resistance) RDE, contributing to the profitability and sustainability of the Australian grains industry. He will continue the momentum of innovative RDE at AHRI, ensure strong funding support for current and future RDE activities, and prioritise resources as needed to address emerging issues. If growers are profitable, with good short-term cash flow, they are in a good position to innovate and adopt technologies and recommended weed management tactics and practices that will grow their farming enterprise in the decades ahead.

### References

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