



COUNCIL OF AUSTRALASIAN WEED SOCIETIES

Medal for Leadership Recipient

Associate Professor Michael Walsh

Position currently held: Director – Weeds Research – University of Sydney

Dr Michael Walsh has for decades conducted R & D focused on weed control solutions. His research and the impact of his research is clear nationally and internationally. His research has delivered achievements in crop and pasture agronomy, herbicide technology and weed and crop science. Globally he is well known as a field-orientated weed scientist and agronomist. He is acclaimed for his pioneering research on harvest weed seed control (HWSC). The term HWSC embraces a range of techniques associated with grain harvest that constitute non-herbicidal means of targeting weeds. For decades there has been the need for practical, economically acceptable non-herbicidal weed control techniques. However, few such techniques were practicable until the work of Dr Walsh and colleagues. In the 1990s, Dr Walsh began research to develop systems that destroy weed seeds during crop harvest. Techniques that were subsequently developed and tested and published in research journals included narrow windrow burning (Walsh and Newman, 2007), Bale Direct system (Walsh et al., 2013), Harrington seed destructor (HSD) (Walsh et al., 2012), iHSD (Walsh et al., 2018a) and chaff lining (Walsh, 2018). Dr Walsh obtained the hard data showing HWSC systems to be effective at targeting weed seeds during harvest, with the potential to control > 90% of collected seed of major weed species. By publishing this research in respected research journals M Walsh ensured credibility for this work, as well as communicating his results to end-users. In a landmark continent-wide study, Dr. Walsh conducted a trans-nation HWSC study (Walsh et al., 2017a). The degree of difficulty and scale of this study shows the tenacity and commitment of Dr Walsh. He purchased and trucked a grain harvester to farm sites across WA, SA, Victoria and NSW to evaluate a range of HWSC techniques nationally. This odyssey consumed 10,000 kilometres and many months on the road. Many obstacles had to be overcome, including machinery breakdowns, road closures, pests and snakes, fire outbreaks, fatigue etc. Through his tenacity and ability this marathon trip and research yielded hard-won quantitative data on the effects of a range of HWSC techniques, nationwide (Walsh et al. 2017a). It is this hard-won data across vast regions that gave his peers, farm advisers and growers the confidence to adopt HWSC techniques. Furthermore, the long term positive impact of incorporating HWSC into weed management programs was confirmed in a long-term focus field study.

Walsh, M.J., P. Newman and S.B. Powles. 2013. Targeting Weed Seeds In-Crop: A New Weed Control Paradigm for Global Agriculture. *Weed Technol.* 27: 431-436.

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Walsh M.J. and Powles S.B. 2007. Management strategies for herbicide-resistant weed populations in Australian dryland crop production systems. *Weed Technology* 21, 332-338.

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- Walsh MJ, Powles SB (2014) High Seed Retention at Maturity of Annual Weeds Infesting Crop Fields Highlights the Potential for Harvest Weed Seed Control. *Weed Technol.* 28:486-493
- Green JK, Norsworthy JK, Walsh MJ (2020) Distribution of common cocklebur and palmer amaranth seed exiting the combine for harvest weed seed control in soybean. *Crop, Forage & Turfgrass Management* n/a:e20064
- Norsworthy JK, Green JK, Barber T, Roberts TL, Walsh MJ (2020) Seed destruction of weeds in southern US crops using heat and narrow-windrow burning. *Weed Technology*:1-8
- Schwartz-Lazaro LM, Norsworthy JK, Walsh MJ, Bagavathiannan MV (2017) Efficacy of the Integrated Harrington Seed Destructor on Weeds of Soybean and Rice Production Systems in the Southern United States. *Crop Sci.* 57:2812-2818
- Schwartz LM, Norsworthy JK, Young BG, Bradley KW, Kruger GR, Davis VM, Steckel LE, Walsh MJ (2016) Tall waterhemp (*Amaranthus tuberculatus*) and Palmer amaranth (*Amaranthus palmeri*) seed production and retention at soybean maturity. *Weed Technol.* 30:284-290

Peer recognition:

Peer recognition of Dr Walsh is abundantly evident in that his research and the communication of his research has resulted in the widespread adoption of HWSC in Australia. Peer recognition by members of the Australian and the international weed science community is most quantifiable by citations of his research and by recent awards that he has received. A pivotal paper by M Walsh et al is a current Web of Science highly cited paper entitled “*Targeting weed seeds in crop: A new weed control paradigm for global agriculture*”, published in the research journal *Weed Technology*, 2013. There are very few research papers in the discipline of weed science that achieve the global recognition of being a Web of Science highly cited paper and therefore this achievement is tangible, quantifiable evidence of M Walsh national and international recognition by his professional peers in weed science, crop science etc.

Impact on the work of others:

The research of Dr Walsh has had real impact on the work of weed scientists, agronomists and farmers in that they have adopted HWSC, following his research and his sustained creative communication of his research. Dr Walsh has devoted considerable effort to communication with scientists, growers and the agricultural community. In a master stroke he mentored and facilitated for respected growers practicing individual HWSC systems to “tell their story” to their farming peers across all mainland Australian states. His previous manager, Professor Emeritus Steve Powles has stated that “these HWSC communication events led by Michael Walsh were the most powerful communication, with the most tangible adoption outcomes I

have ever witnessed”. Growers talking to growers was a huge success with the grower presenters able to address and alleviate many of the perceived practical barriers to adoption of HWSC systems. Internationally, Dr Walsh has been promoting in N America the science of HWSC systems and their practical value. He has worked to establish collaborative efforts with US colleagues in promoting these results to the N American weed science and agricultural research communities. Dr Walsh took persuasive Australian grower practicing HWSC systems to N America to deliver combined research outcomes and practical system information in workshops for weed scientists, growers and advisors at strategic locations across N America. These workshops enabled N American audiences to hear from their Australian colleagues the value of HWSC. Subsequently, there have been cropping industry based HWSC focussed tours to Australia by US growers, researchers and advisors. There can be no doubt that Dr Walsh has been pivotal and catalytic in introducing HWSC internationally. Through strategic collaborations he initiated research and development of HWSC systems for N American cropping systems (Schwartz et al., 2016, Green et al., 2020; Norsworthy et al., 2020; Norsworthy et al., 2016). These studies have led to HWSC being a core component of a major five year (2015 to 2020) USDA funded “Area-wide” project that has expanded on his initial research activities in this region (Shergill et al., 2020). Recently following a HWSC focused tour of Australia by US weed scientists Dr. Walsh has been invited to collaborate on a similarly large funded project in the US Pacific northwest. Michael Walsh identified this region for implementing HWSC systems due to the similarities in production system and weed control issues as occurs in Australian cropping regions. The wheat production systems of the Pacific northwest are plagued with herbicide resistant *Lolium multiflorum*, a similar scenario that led to the development of HWSC systems in Australia. Dr Walsh developed collaborative research activities with Prof. Drew Lyon at Washington State University (WSU) and his colleagues across the Pacific northwest region (Lyon et al., 2016). Dr Walsh arranged financial support to enable Dr. Drew Lyon to travel to and work for a period at the University of Sydney with Dr Walsh and colleagues. Despite a widespread US view that Palmer amaranth shattered seed before grain harvest, in 2012 Dr. Walsh initiated and was involved in the conduct of the first seed retention studies in the US aimed at identifying the potential for HWSC systems to target the extremely damaging Palmer amaranth at soybean harvest. These studies determined a very high Palmer amaranth seed retention level (~99%) at soybean crop maturity, clearly identifying the HWSC opportunity (Schwartz et al., 2016). This research has subsequently stimulated a series of similar studies conducted across N America aimed at establishing the potential for HWSC on numerous weed species in a range of cropping systems (Beckie et al., 2017; Burton et al., 2017; Goplen et al., 2016; Schwartz-Lazaro et al., 2017a; Tidemann et al., 2017).

Taken together this body of research and outreach conducted by Dr Walsh in Australia and in N America has resulted in an explosive adoption in Australia of the techniques of HWSC. Growers who were facing major herbicide resistance issues have greatly reduced their weed seedbanks by adopting HWSC. Similarly, as the US becomes plagued by herbicide resistant weed issues, N American field grain crop farming is on the cusp of adoption of HWSC. This represents a fabulous achievement by N Walsh and a very significant contribution to global agriculture and sustainable global food production.

In addition to his own research Michael Walsh has mentored many Honours, research project and several PhD students. At the University of Western Australia and at Sydney University he has supervised many students undertaking their research in weed science. He is a very effective supervisor with a lengthy track record of mentoring students and research staff in the weed and crop science areas of research.

National and international impact and recognition:

For his HWSC research M Walsh has recently received two international awards:

The Weed Science Society of America (WSSA) in 2022 awarded M Walsh with the inaugural “US-HRAC herbicide resistance management award”. Given the significant number of high quality weed science researchers in North America, with which Dr Walsh was competing for this award, it is a distinctive mark of the work of Dr Walsh that he was awarded this WSSA honour.

In 2022 Dr Walsh was awarded a prestigious Fulbright Visiting Scholar Fellowship award to continue his collaboration with US weed scientists and to work at several US universities in the second half of 2022. Fulbright fellowships are prestigious and very competitive. The USA WSSA Award and the USA Fulbright Fellowship are tangible evidence of the international impact and recognition of the HWSC research of Dr Walsh. The body of research and outreach conducted by Dr Walsh in Australia has resulted in an explosive adoption in Australia of the techniques of HWSC. Growers who were facing major herbicide resistance issues have greatly reduced their weed seedbanks by adopting HWSC. Similarly, as the US becomes plagued by herbicide resistant weed issues, N American field grain crop farming is on the cusp of adoption of HWSC. This is clear evidence of the impact of Dr Walsh resulting in the management of weeds and herbicide resistance issues, leading ultimately to a major contribution to sustainable global food production.