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From fringe to forefront: A new era in biocontrol

Agriculture is entering an exciting and necessary phase of transformation. Faced with mounting challenges – resistance to chemical pesticides, growing consumer demand for sustainably produced food and fibre, regulatory pressures, and the need to protect biodiversity – growers, agronomists and scientists are turning to nature’s own pest management tools: biocontrol agents such as insect parasitoids and predators.

Biological control is not a new concept. Parasitoids such as *Trichogramma* and *E.hayati* and predators like *Chrysoperla* (green lacewings), have long played supporting roles in integrated pest management (IPM) programs across the globe. Proven efficacy and scalability have historically been barriers to widespread adoption, but with advances in aerial delivery, along with encapsulation and automation technologies, beneficials can now be released across thousands of hectares in a single application, transforming their practical potential for broadacre systems like cotton, canola, and corn.

What makes parasitoids so compelling is their ecological precision – they do the scouting work for you. Using a combination of visual, chemical and tactile cues, parasitoids seek out the host pest, lay their eggs in or on the host and feed on its insides, thereby killing it. An early, preventative approach is essential to cost-effective and efficacious pest management when mass-releasing parasitoids in broadacre crops. When released upon first sign of the pest, parasitoids can provide multi-generational suppression and overwhelm the pest before it reaches damaging levels.

The global biologicals market is expected to match the scale of synthetic chemical crop inputs within 20 years, according to data shared by Shane Thomas of Upstream Insights. The biologicals market is expected to grow by 12 per cent annually as new tools, delivery systems, investment and regulatory frameworks emerge to support adoption. Importantly, biologicals are also significantly cheaper and faster to develop than synthetic products. According to Dr.

Pam Marrone (Co-founder and Executive Chair of the Invasive Species Corporation), most biologicals cost under USD \$6 million and take less than 5 years to bring to market – a sharp contrast to the hundreds of millions and decade-long timelines associated with synthetic pesticide development. Thankfully, Australia has a relatively supportive regulatory environment for microbial biologicals, but global bottlenecks could still affect access to newer strains and products.

Investment and innovation are surging in the biologicals space. Despite a tough funding environment, in 2024 biological companies raised tens of millions in funding for agtech innovations like peptide-based biopesticides, biofungicides, microbial biostimulants and nitrogen-fixing microbials. Grower confidence in biologicals is also rising. A 2024 survey by the Stratovation Group found that most farmers were aware of biologicals and early-adopting farmers rated their use and benefits as highly positive. However, education remains a limiting factor. Among growers who have never used biologicals, over 50 per cent cited a lack of knowledge or uncertainty about efficacy as key barriers. Further adoption of biologicals hinges on rigorous field validation, education and clear, practical guidance.

Australian agriculture has long been known for its rapid adoption of modern technologies – autonomous machinery, no-till systems, GPS-guided equipment, remote sensing, water saving innovations and climate-smart farming practices. Now, we have the opportunity to lead the way in broadacre ecological innovation. By integrating mass-releases of parasitoids and predators into mainstream IPM, growers are moving closer to meeting the sustainability targets increasingly expected by consumers and required for long-term viability with global trading partners.

The trajectory is clear: from cost savings and ecological benefits to regulatory momentum and grower satisfaction, the case for insect biocontrol is stronger than ever. Parasitoids and predators are no longer niche tools - they’re scalable, science-backed solutions for the future of agriculture. ■