WINTER 2023

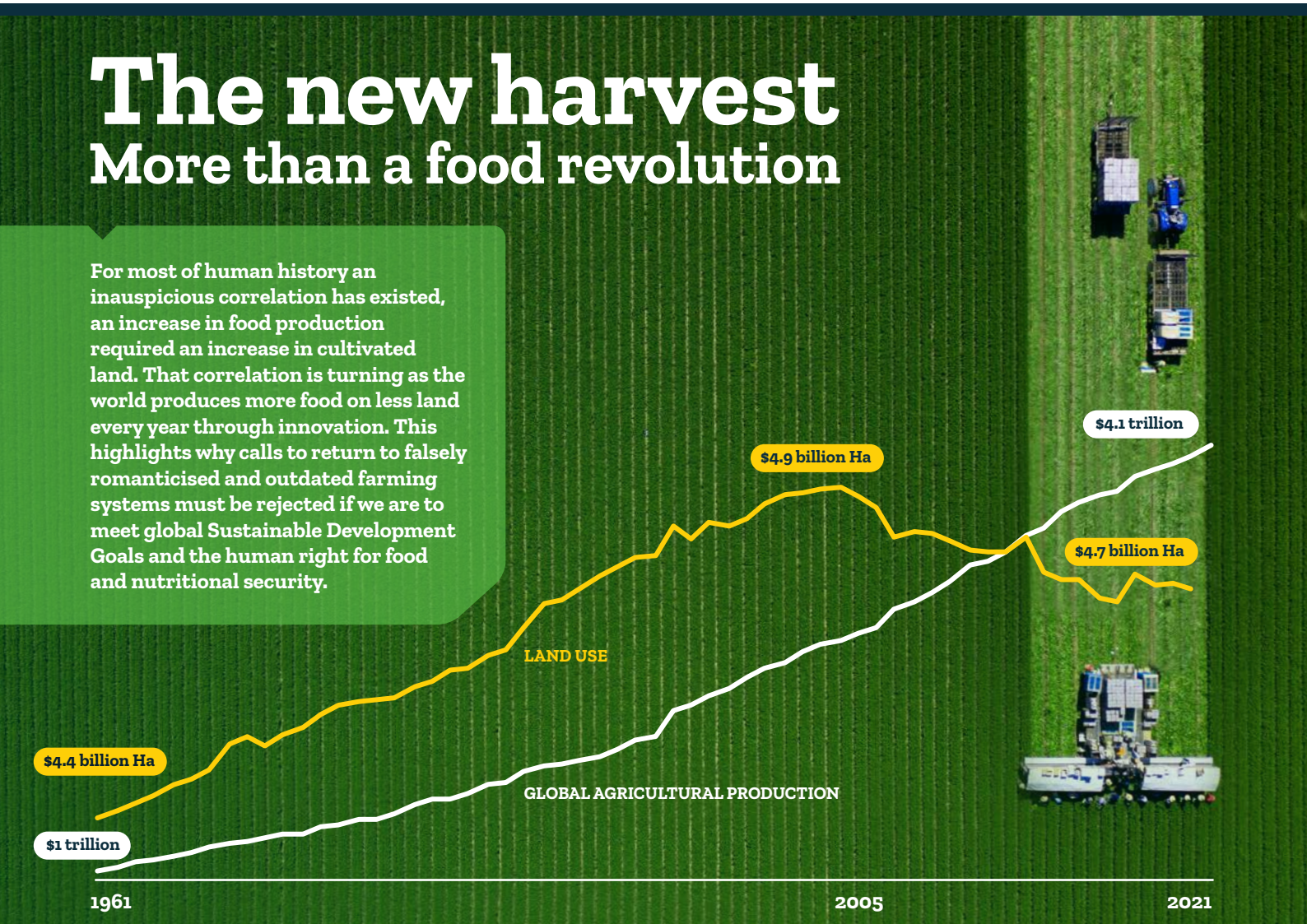
CropLinks

THE LATEST PLANT SCIENCE INDUSTRY NEWS

The new harvest

More than a food revolution

For most of human history an inauspicious correlation has existed, an increase in food production required an increase in cultivated land. That correlation is turning as the world produces more food on less land every year through innovation. This highlights why calls to return to falsely romanticised and outdated farming systems must be rejected if we are to meet global Sustainable Development Goals and the human right for food and nutritional security.



Modern agriculture is in the spotlight as it has a big job to do. With nearly 10 billion people to feed by 2050 using less land, water and inputs than ever before, we need to be smarter about how we produce our food. Sustainable intensification is enabling a harmonious balance between urgent priorities - ending hunger, reducing agriculture's impact on anthropogenic global warming, and restoring ecosystems.

Revolutionary digital technology, innovative seeds and modern crop protection products have significantly improved farming practices over the past 60 years. These innovations continue to change the face of agriculture both here in Australia and globally. Farmers today, with access to these products and innovations, produce food more efficiently, productively and sustainably than ever before.

By improving yield while also reducing inputs, we're feeding a growing population while protecting natural environments and native habitats. By reducing crop losses, we're also maximising scarce resources like water, fertilizer, and energy. With a science-based approach to farming policy and practice, the times are changing, for the better. This will be even more important over the next 60 years.

Inside this issue

REPRESENTING THE BEST OF THE PLANT SCIENCE INDUSTRY

CropLife Australia

Matthew Cossey
Chief Executive Officer, CropLife Australia

"With climate stresses, a growing global population and rising land-use issues, the organic/agroecological policy obsession is a mindless distraction from what is desperately needed: an innovative, evidence-based policy strategy to promote the sustainable intensification of agriculture."

David Zaruk, The Risk-Monger.

For 17 years, David was a professor at Odisee University College, Université Saint-Louis and Vesalius College. David has been an EU risk and science communications specialist since 2000 and part of the team that set up GreenFacts to encourage a wider use of evidence-based decision-making in the EU on environmental health matters.

From the CEO

The moral imperative of delivering food and nutritional security for all requires growing more food more sustainably as well as reducing food loss and waste at every stage of production and consumption.

It is only through the innovations developed by the plant science industry that farmers can implement the modern, sustainable farming practices that are required to feed the world. These tools allow farmers to grow more with less and improve the sustainability of their local environment while also reducing the need for more land to be diverted to food production. This not only protects unique natural environments around the world but also avoids the greenhouse gas emissions that result from the deforestation otherwise required to increase global food production.

Closer to home, these tools allow Australian farmers to live out the closely held value of ensuring the land they steward is handed on in better shape than when they started farming it.

The impact of innovations, like crop protection products and new crops that are enabled by biotechnology can be seen in global yield increases. Cereals such as wheat, corn and rice have increased yields from just under two tonnes per hectare in 1960 to around six tonnes per hectare today. That is over three times as much food from the same amount of land.

To put this into perspective, had global crop yields remained at 1961 levels, an additional 1.5 billion hectares of land would have been converted from native forests, nature reserves and grasslands to cultivated agricultural land just to feed ourselves.

Reducing crop losses and food wastage is also crucial to maximise the use of arable land and manage the finite resources required to grow them.

Weeds, insect pests and diseases can destroy 30-40 per cent of a crop, either by eating it before it can be harvested, or by disease infection during transport and storage which renders the crop unpalatable or unsafe for eating. In Australia alone, without the ability for farmers to use crop protection products, almost three-quarters of the value of the food produced would vanish, resulting in foods like strawberries completely disappearing from Australian store shelves.

This edition of CropLinks celebrates the contributions of the plant science industry in protecting the significant gains of the Green Revolution and also the future technologies and innovations that will underpin our next agricultural revolution; growing more with less and protecting the environment.

In the balance

A recipe for sustainability

Falsely premised food fads create an unhealthy public discourse about food that doesn't benefit our health or the environment. So what does the science say?

To choose sustainable food sources is a dizzying equation of indicators, contradictions and factors outside the control of the consumer. The truth is, the more environmental indicators built into the equation the more it blurs the actual environmental impacts of food production.

Plant science innovations and a little common sense in the kitchen help Australians make smart food choices to support the environment, agriculture and live healthier, more sustainable lives.

Reduce food waste

Every year in Australia, 2,600 gigalitres of water and 25 million hectares of land is used to grow food that is wasted by consumers.

Eat 5 a day

Regardless of whether they are conventionally grown or organic, fruit and veg have the same nutritional value and a lower environmental impact than less nutritious processed foods.

Ditch the discretionaries

On average, discretionary foods like processed snacks, baked goods and alcohol account for up to 40 per cent of diet related water, energy, emissions and land use. Just sticking to the Australian Dietary Guidelines could reduce greenhouse gas emissions by 25 per cent.

We all have a role to play in a more sustainable food system. Through innovations in biotechnology and pesticides, the plant science industry does its part to help farmers produce more fruit, vegetables and grains on less land while reducing on farm crop loss by 30-40 per cent.

Crop Protection

Mapping it to manage it:
Saving native habitats with smartphones

Invasive weeds devastate crops, destroy pristine natural ecosystems and have cost the economy a staggering $200 billion since the 1960s. Now, the use of smartphones to better detect and eradicate weeds with tools like specialised herbicides is changing the conservation game.

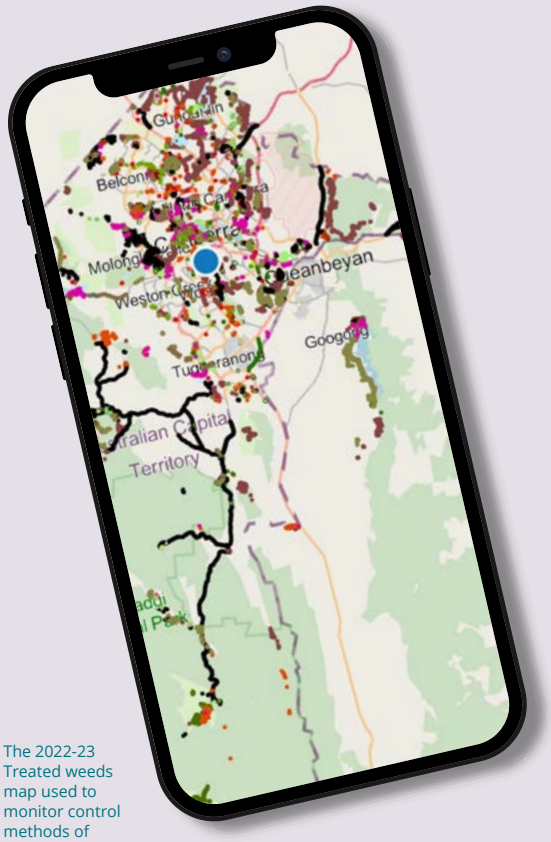
Over the past 10 years, ACT Parks and Conservation Services has trailblazed a new way to collect data through GPS precision mapping. With novel smartphone apps, land managers are playing a game of *Pokémon GO* with weeds across 7,340 hectares of native land and parks – and they're winning.

A decade of precision mapping and data sharing shows that targeted land management strategies like spot spraying with specialised herbicides has been crucial to conservation efforts in the ACT.

Many thousands of sites once dominated by blackberry, serrated tussock, nodding thistle and Mexican feather grass have been restored back to their former glory.

These integrated pest management strategies have not only been crucial to land restoration, but also to mitigating spread across remote areas and preventing many high-risk new and emerging invasive plants from establishing despite recent La Niña events.

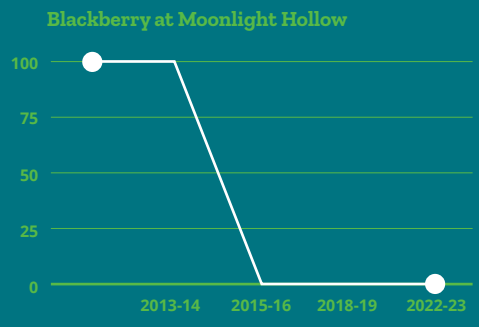
This case study is one that all governments could benefit from. The plant science industry continues to significantly invest in research and development of new innovative products that support Australia's environmental land managers in their conservation efforts. Now all Australians can help map it to manage it by downloading the Canberra Nature Map or iNaturalist.

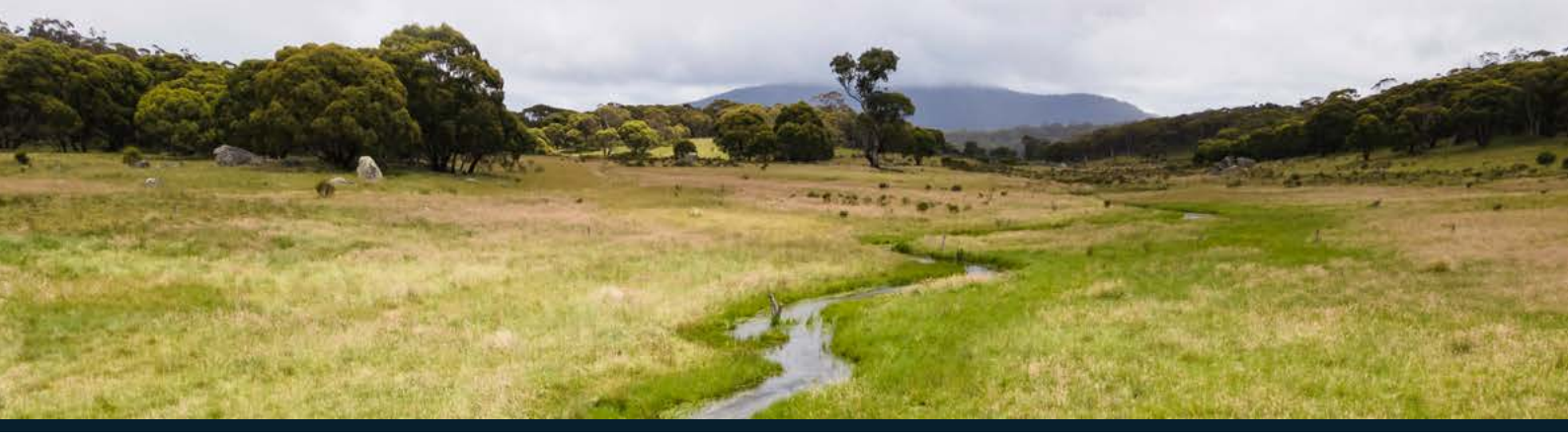


The 2022-23 Treated weeds map used to monitor control methods of different weed types.

Control of blackberry in Northern Namadgi National Park

Blackberry weeds are 'transformers' of native habitats. Since 2013, precision mapping has been able to detect, track and treat infestations of blackberry in Northern Namadgi National Park allowing native plants to repopulate.





A moment in history:
A storm looms over global food security

On February the 8th 1983, a giant wave of dust swept over Melbourne city, turning day into night. To this day, it remains Melbourne's worst dust storm in history, dumping an estimated 100,000 tonnes of dry topsoil over the city caused by a confluence of excessive tillage and drought. Decades on, all eyes are on the European Commission as it deliberates over a decision to ban one of the most important agricultural innovations of our time.

The judicious use of glyphosate, other specialised modern herbicides and cutting-edge science supporting evidence-based land use policy has accelerated sustainable conservation and zero-till farming practices since the 20th century. As a result, glyphosate has been hailed as one of – if not the most - important chemistries ever developed to revolutionise agriculture.

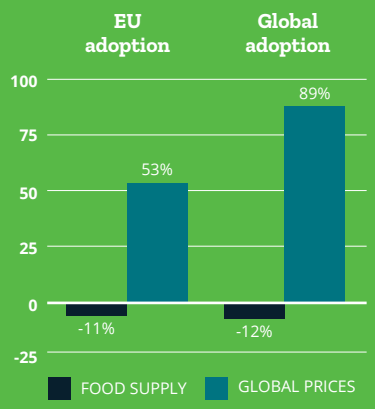
This year, the use of glyphosate in European countries reaches a crossroads as the re-authorisation of glyphosate expires. The dramatic dichotomy between global scientific consensus and public policy and regulation (especially in Europe) has sparked global apprehension about what comes next for global food security and the possible return to a bygone era.

Australia is fortunate to have a regulatory system that is based on scientific, independent assessments rather than activist propaganda and politically based decision making. It's time that Europe's decisions are also based on the same.

Any changes to the regulation of agricultural chemicals in Europe will result in critical crop protection tools and associated import tolerances being unnecessarily withdrawn from the European market, severely impacting Australian trade. Furthermore, if such a precedent was followed in Australia, farmers would be forced to switch to less effective techniques and resort to old destructive, labour-intensive, and counter-intuitive practices like tillage.

This year, the use of glyphosate in European countries reaches a crossroads

Who should go hungry?



If EU Farm to Fork strategies were adopted globally, global food production is estimated to reduce by up to 12% and increase the number of food-insecure people in the world by 185 million.

Source: USDA Economic Research Service

Crop Biotechnology

From waste to resource:

Plants yield new precision separation technologies

There's a reason why the old-time prospectors checked gum leaves for gold. It's the same reason scientists are looking to plants for new circular economy solutions. Membrane separation mechanisms turn waste into a resource.

Plants are incredibly tolerant to environmental challenges, developing survival adaptations over millions of years to extract, separate and store minerals, metals and contaminants from the soil. Their cell membrane components can identify specific molecules, separate them from their surroundings and transport them to their desired location. Plants compartmentalise their resources.

And that's precisely what's needed in mineral extraction and water purification.

Researchers at the Australian National University (ANU) have been studying these inherent separation processes for crop engineering applications in Australia, like drought resilience and salt tolerance.

Now this research is being used in new wastewater recycling technologies to clean water and harvest valuable metal, mineral and scarce nutrients.

It's estimated that global wastewater contains three million tonnes of phosphorus, 16.6 million tonnes of nitrogen and 6.3 million tonnes of potassium. The recovery of these nutrients could offset 13.4 per cent of global agricultural demand for these resources. The ammonia and hydrogen also locked away in this messy mix of wastewater could power 158 million households – but only if these molecules can be purified.

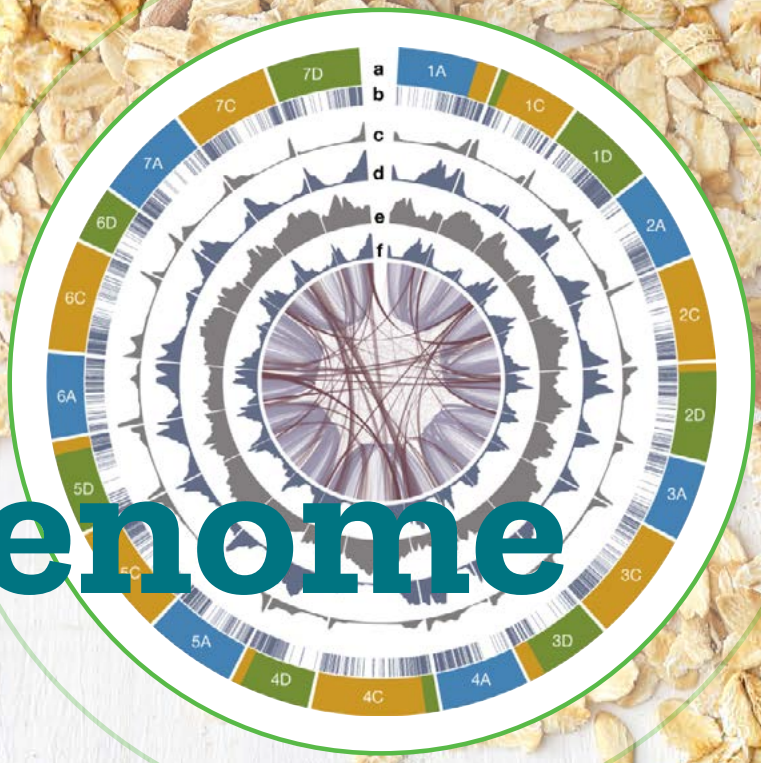
Advances in precision separation technology could also provide flood and drought-prone communities across Australia with reliable access to clean drinking water.

"Clean water and the security of nutrient resources underpin agricultural productivity. Development of technologies to sustainably manage these resources is essential for food security in Australia and globally," said ANU plant scientist Dr Caitlyn Byrt.

"It's hidden in plain sight. Nature has already solved issues related to managing those sorts of resources. Once understood, billions of years' worth of accrued evolved biological capability can be applied to new technologies,"

Dr Byrt concludes.

Decoding the oat genome



The Goldilocks of cereals

Highly restrictive gluten-free diets are often associated with lower intakes of whole-grains and soluble fibre, leading to higher rates of bowel cancer and heart disease. The first genetic mapping of the humble oat cereal could be a game changer for plant breeding and personalised nutrition, especially for sufferers of coeliac disease.

Oat is an old crop with a low carbon footprint and substantial health benefits, but its inclusion in gluten-free diets remains controversial in scientific circles. Unlike wheat and barley, oats don't contain storage proteins like gliadin which trigger harmful inflammation in people with coeliac disease, but a distantly related protein called avenin has resulted in conflicting recommendations and regulations across countries creating confusion for consumers.

In Australia and New Zealand, oat products cannot include 'gluten-free' claims, but higher thresholds in Europe and the United States don't recognise avenin as gluten.

Ground-breaking new research by the CSIRO, the Walter and Eliza Hall Institute of Medical Research, Edith Cowan University and others has mapped the highly complex mosaic oat genome which could bring greater clarity to this complex issue.

It's revealed that oats bear closer genomic and protein similarities to rice, which is safe in coeliac disease, compared to wheat and other gluten-rich cereals.

This has allowed CSIRO researchers to confirm, on both a gene (DNA) and protein level, that oats contain fewer protein sequences that are known to trigger food allergy and intolerance.

The research is not only a step closer to the safe inclusion of oats into gluten-free diets, but also confirmed their high levels of soluble fibres that reduce blood cholesterol and improve heart health.

It also has major potential for breeding and cultivation of new varieties in Australia's oat industry. By decoding the oat genome, breeders can now identify and target specific traits through gene-editing to improve nutritional profiles, increase crop yield, or make the crop more resilient to disease or drought.

This breakthrough research may provide Australian farmers with unique, differentiated grain for the global market that will maintain Australia's position as a supplier of premium, high-quality grain that also delivers specific health benefits to Australians and the global population.

Kamal, N., Tsardakas Renhuldt, N., Bentzer, J. et al. The mosaic oat genome gives insights into a uniquely healthy cereal crop. Nature 606, 113–119 (2022).

Industry Stewardship

Rounding up industry's soft plastics

It's a Catch-22 with plastic - the very thing that makes it useful also makes it problematic. Soft plastics are one of the most difficult materials to recycle and make up 66 per cent of plastics used in agriculture. But with the advancement of recycling technologies and CropLife's long legacy of delivering genuine product stewardship initiatives, things are about to change.

Plastic packaging plays an essential role in Australia's agricultural industry, including protecting seed, pesticide and other agricultural inputs during transport, use and storage. Without commercial technologies and a viable collection and recycling program, packaging is left as on farm waste or sent to landfill at a cost both to farmers and the environment.

Out of the 90,000 tonnes of plastic used in agriculture, just seven per cent is recycled. Just as there are many different kinds of plastic, different technologies must be developed to deal with their constituent chemistries.

The ***drum***MUSTER® program started by CropLife, is responsible for more than a third of Australian agriculture's plastic recycling efforts. It uses traditional physical recycling methods that are limited to hard plastics like the two million HDPE chemical containers it collects each year. Since 1999 ***drum***MUSTER® has recycled over 58,000 tonnes of hard plastic into new products like wheelie bins, park benches and bollards.

drumMUSTER® is managed and operated by CropLife's not-for-profit stewardship organisation Agsafe and strongly supported by important strategic partners including the National Farmers Federation.

Soft plastics, such as those that make up agricultural plastic bags, have historically been more difficult to recycle due to their flexible and lightweight nature. Thankfully soft plastic recycling has come a long way in recent years, with significant advancements being made in the field. Today, innovative technologies like melt processing, pyrolysis and chemical recycling are enabling the conversion of soft plastic waste into useful products such as fuel, new plastic materials and even clothing.

Some of these technologies are being developed right here in Australia, providing an exciting opportunity to establish bagMUSTER® - Australia's first industry-led collection and recycling initiative for agricultural product bags.

In strategic partnership with the Australian Seed Federation, CropLife recently announced Agsafe, as the bagMUSTER® service provider.

Combined with the infrastructure of ***drum***MUSTER® as a delivery model, it's estimated that bagMUSTER® could remove another 22,000 tonnes of plastic from landfill each year and create a new circular economy for plastic.

bagMUSTER® pilot collection sites are set to launch in 2023.

Five ways

AI is transforming ag

Digital technology is as common as hats and gumboots on farms now. And while farmers today have access to a huge amount of data, artificial intelligence (AI) is unlocking its value. This helps farmers to make better informed decisions, faster.

Seasonal forecasting

AI powered weather monitoring provides farmers with recommendations on how best to manage their crops and inputs for more efficient, sustainable productivity.

Diagnosis

AI technology can monitor, detect, analyse and interpret data collected from the field 24/7 to provide farmers with information they can act on to nourish and protect their crops.

Precision application

Sensors detect weeds and AI equipped technology can determine if pesticide application is necessary and accurately apply precise amounts of the right herbicide. Ultimately saving farmers money and preventing herbicide resistance and spray drift.

Reducing food loss and waste

AI can be used to predict seasonal sales demands and help retailers order the right amount of food to mitigate food waste.

Efficient water use

AI tells farmers when and exactly how much to water based on a crops' needs and weather forecasts - saving every drop.

CropLife members' news and events

Syngenta Growth Award nominees have been announced for this year. They include leading growers, farm advisers and community leaders from different regions across Australia and New Zealand, for their contributions to the industry. www.syngenta.com.au/growth-awards-2022.
syngenta.com.au

Nufarm Australia is proud to be a Gold Partner of the Agsafe Stewardship Conference and Awards 2023. The conference will hear from national delegates, regulators, and suppliers and recognise outstanding contributions to safety in the industry.
nufarm.com.au

Bayer recently launched a new global water strategy at the UN 2023 Water Conference in New York. With its new strategy, Bayer is making water an integral part of business decisions, investments and selection of suppliers. The water strategy reflects Bayer's position as a key player in the fields of health and agriculture and aims to have an impact that goes beyond its own business.
bayer.com.au

Sumitomo has partnered with the Hunter Valley Wine Country Landcare Group. Together they're helping implement sustainability principles into Hunter Valley viticulture operations. Plans include introducing plantings for pollinators and improving biodiversity.

sumitomo-chem.com.au

Corteva Agriscience teamed up with the Melanoma and Skin Cancer Advocacy Network to provide qualified dermatologists at industry events throughout the year. The initiative has helped diagnose multiple cases of skin cancer which is concerning, but highlights the value of the program to rural communities where access to a dermatologist can be limited.
corteva.com.au

In what could be a game changer for the management of aphids and papaya ringspot virus, Nutrien Ag Solutions has supported Australia's first application of Efficon on a block of vegetative watermelons and pumpkins at Rapisarda Enterprises. Nutrien is excited to make this product available to growers and is looking forward to seeing the positive effect it has on growers' productivity and profitability.
nutrienagsolutions.com.au

Australian Grain Technologies, Sipcam and Albaugh LLC have joined forces to ensure growers receive the full benefit of CoAXium Production System for barley while also protecting the technology through an industry stewardship program developed by Sipcam.
sipcam.com.au

Over the past few months, FMC has engaged with hundreds of growers, agronomists and consultants about safety and product stewardship. The 2023 program has focused on optimising spray application and pre-emergent herbicide use to help improve user experience and product performance for the benefit of all stakeholders.
fmccrop.com.au

BASF's inaugural Community Paddock Program has raised $15,000 for the Rupanyup Panthers Football and Netball club in North-West Victoria. Local growers Andrew and Rodney Weidemann, who have been involved in the club for a number of years, generously donated a 50-hectare barley paddock to the program during the 2022 growing season. https://crop-solutions.basf.com.au/CommunityPaddock
basf.com.au

The Eurofins Foundation is collaborating with the Australian Institute of Marine Science. The research project is analysing samples from the inshore Great Barrier Reef World Heritage Area for microplastic contamination and assessing analytical procedures to streamline seawater sample processing and analysis for marine microplastic monitoring programmes.
eurofins.com.au

ADAMA Australia recently awarded seven $5,000 community grants as part of its 2022/23 Cotton Community Campaign. The grants were awarded to local projects nominated by cotton growing communities across regional NSW and QLD for a much-needed boost. Congratulations to the winners!
adama.com/australia

The inaugural Elders WA Elite Horse Sale recently took place in Coolup, Western Australia. The weekend celebrated elite equine talent and community spirit, bringing together horse enthusiasts from across Australia to support rural West Australians and raise funds for the Royal Flying Doctor Service and Dolly's Dream.
elders.com.au

UPL has partnered with the World Business Council for Sustainable Development as part of a Wastewater Zero initiative. The initiative focuses on achieving sustainable water and sanitation management through zero pollution, zero freshwater impact, and low-carbon treatment.
upl-ltd.com

CropLife Australia

CropLife Australia is the national peak industry organisation representing the plant science sector in Australia.

CropLife's members are the world-leading innovators, developers, manufacturers and formulators of crop protection and crop biotechnology products. The plant science industry, which enables more than $20 billion a year of Australian agricultural production, provides products to protect crops against pests, weeds and diseases, as well as developing crop biotechnologies key to the nation's agricultural productivity, profitability and sustainability. CropLife is part of the plant science industry's 91 country international federation.

Representing the best of the plant science industry

Nufarm · Bayer · syngenta · ADAMA · Nutrien Ag Solutions · FMC · Corteva agriscience

Elders · BASF We create chemistry · UPL OpenAg · SIPCAM Innovation Not Imitation · Sumitomo Chemical · accensi

AgNova · autopak · DGL · ISK · nuseed · eurofins · PhilStic

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