CropLife Australia

April 2023

Developing Australia's Science and Research Priorities and National Science Statement - A conversation starter

Department of Industry, Science and Resources

1 INTRODUCTION

CropLife Australia is the national peak industry organisation for the agricultural chemical and plant biotechnology (plant science) sector in Australia. CropLife represents the innovators, developers, manufacturers and formulators of crop protection (organic, synthetic and biologically based) and agricultural biotechnology products and innovations. CropLife's membership is made up of both large and small, patent holding and generic, and Australian and international companies and accordingly, CropLife only advocates for policy positions that deliver whole of industry and national benefit.

CropLife welcomes the consultation on *Developing Australia's Science and Research Priorities* (the Priorities). Investment in science is critical to enabling Australian businesses and institutions to innovate in the face of ongoing and emerging global challenges and opportunities to drive national prosperity and wellbeing. Toward these objectives, the challenge of maintaining global food security and the opportunity for Australia to continue to develop its comparative advantage in agriculture should continue to be at the forefront of Australia's science and research priorities.

While the current Australian Research and Science Priorities, established in 2015, identify the priority of food production and connected priorities of soil and water and environmental change, the context in which these areas will be researched continues to change. Importantly, investment across all priorities will need to be undertaken as part of an integrated approach that delivers outcomes aligned to global goals on climate change and maintaining natural environments. This includes the prioritisation of research effort towards the Australian Government's policies to lower greenhouse gas emissions, bolster Australia's biosecurity system to protect productive agriculture and natural environments while continuing to grow Australia's food production capacity.

Australia is well placed to deliver on the global imperative to increase food security due to the innovative nature of its farmers and their willingness and ability to integrate of world leading technologies into the farming system. The Priorities should operate to guide the R&D and commercialisation efforts of the research institutions, in collaboration with private sector partners, to grow the productivity and sustainability of Australian agriculture through:

- The discovery and implementation new agricultural technologies, products and practices; and
- Facilitating the adoption of international technologies into Australia's farming systems.

CropLife's members, are well placed to continue their strong partnerships with Australian farmers, researchers and environmental land managers to deliver real solutions that work in Australian conditions, as well as take Australian plant science innovations to the world.

In pursuit of these goals, CropLife submits that the Priorities should include following:

- The development and integration of crop protection products and biotechnology into Australian farming systems and environmental management in a way that:
    - Enables the sustainable intensification of agricultural production systems delivering increased global food security and minimising the need for further deforestation of natural environments to meet the world's nutrition requirements.
    - Delivers functional and cosmetic food quality outcomes that reduce food waste, maintain Australia's reputation into domestic and international markets and delivers value back to the farm gate.
    - Develops crops that enable new products with health and environmental benefits.
    - Manages biosecurity threats to productive agriculture and the natural environment.
- Improving community confidence in the use of innovation that is powered by science through enhancing Australia's regulatory science capacity and science communication capabilities.

While not in the scope of the Chief Scientist's work to revitalise Australia's research and science priorities, the Australian public will only fully reap the benefits of focused research and development towards these goals when accompanied by appropriate policy settings that incentivise commercial investment. Presently, there are substantial regulatory barriers that limit the ability for private sector investors to commercialise critical processes and products. This impedes private investment in research and development in Australian agriculture and limits access to and application of these advances denying the societal benefit that crop protection products and biotechnology innovations offer.

This is of particular importance to Australia, where our relatively small size of market can reduce the incentive for commercialisation of new products and technologies. The Australian market for crop protection products is less than five percent of the global market and approximately one seventh the size of the US and EU markets. Therefore, providing investors in the science and research required for the development and commercialisation of these products in Australia with an appropriate period of protection for their intellectual property is important to ensuring Australian farmers receive access comparable to those in other jurisdictions. This period of time should take into account the duration required for mandatory pre-market regulatory assessment and approval.

Ensuring scientific research is accompanied by appropriate regulations and arrangements that protect intellectual property will promote the growth of new industries across agriculture, medicine and the environment, and will ensure Australia remains a world leader in science and innovation.

2 DISCUSSION QUESTIONS

(1) What are Australia's greatest:

a. *challenges* that science could help to address?

b. *opportunities* we should seize?

c. strengths we should maintain or build?

2. Does Australia have the capability and capacity needed to address these challenges, opportunities and strengths? If not, how could we build this?

Food Security, Biosecurity and Sustainability

The United Nations estimates there will be 9.7 billion people on Earth by 2050, around 30 per cent more than in 2017[1]. On 15 November 2022, the population officially crossed 8 billion[2] en route to this milestone. This continued increase will require raising overall food production by up to 70 per cent by 2050 to meet this populations food and nutritional requirements,[3] with up to an additional 40 million metric tonnes of grains and oilseeds required to be produced every year to meet the needs of the growing population.[4]

The tools and technology of the plant science industry are indispensable to anchoring Australia's contribution to global food security while delivering against societal ambitions to reduce climate change and protect the natural environment.

Crop Protection Products

Crop protection products (pesticides) are crucial to innovation in the production systems used by Australian farmers. These tools include fungicides, herbicides and insecticides and they are crucial to maintaining and increasing food production and the value of the agriculture industry to the Australian economy. Deloitte Access Economics 2018 report '*Economic activity attributable to crop protection products*', identified that up to $20.6 billion of total Australian agricultural output (or 73 per cent of the total value of crop production) is attributable to the use of crop protection products.[5]

One example of how pesticides enable innovation in modern farming practices such as minimum-till and no-till farming (that is farming with minimal or zero tillage) that allow farmers to maximise productivity and drive improved environmental outcomes. Minimum and no-till

1 https://www.who.int/en/news-room/fact-sheets/detail/pesticide-residues-in-food
2 https://www.un.org/en/dayof8billion
3 http://www.fao.org/fileadmin/templates/wsfs/docs/Issues_papers/HLEF2050_Global_Agriculture.pdf
4 Stefan Vogel, "Outlook for the Global Grain and Oilseed Market" (Presentation to the Australian Grains Industry Conference, 27 July 2022).
5 https://www.croplife.org.au/wp-content/uploads/2018/04/Deloitte-Access-Economics-Economic-Activity-Attributable-to-Crop-Protection-Products_web.pdf

practices utilise herbicides to manage weeds without the need for tillage preserving soil moisture and improving the environmental outcomes from cropping.

ABARES has credited no-till farming as being part of the suite of modern farming practices that have reduced the sensitivity of Australian grain farming to dry seasons. Their analysis identified that a 1 in 20 year drought in 2013-14 only reduced productivity of Australian grain farmers by around 26 percent compared to a reduction in productivity of 37 percent to similar drought conditions in 1979-80.[6] Likewise, no-till farming reduces the greenhouse gas emissions resulting from heavy horsepower tractor operations and loss of soil carbon.[7] Herbicide enabled no-till practices also minimise soil erosion and degradation, enable water conservation and enhance nutrient retention.[8] Further, because of the globe's growing demand for food, the productivity impact of pesticides in the Australian farming system reduces the risk of further deforestation elsewhere in the world to increase production. This avoids the greenhouse gas emissions and nature loss associated with land use change globally.[9]

Pesticides have a double role in protecting Australia's biosecurity during containment and eradication of invasive species which could cause catastrophic implications for sustained food production. One recent example is the deployment of insecticide-treated baits to eradicate potential infestations of varroa mite in New South Wales. Pesticides are also crucial in managing and mitigating established weeds, diseases and insect pests.

A recent study by researchers at the CSIRO and Flinders University demonstrated that invasive plants are the costliest pests in Australia, costing $200 billion since 1960.[10] In 2021, the Invasive Species Council's report 'Glyphosate: A Chemical to Understand' highlighted that herbicides offer the only truly effective option for removing invasive weeds from Australia's bushland reserves and that, without them, most of the remaining indigenous vegetation in Australia would decline in both quantity and quality.[11] The deployment of pesticides in safeguarding Australia's magnificent biodiversity also indirectly supports the long-term sustainability of food production in Australia. A biodiverse landscape is a resilient landscape, better able to absorb and mitigate pest outbreaks.

6 Neale Hughes, Kenton Lawson, Haydn Valle *Farm performance and climate: Climate-adjusted productivity for broadacre cropping farms* (ABARES, April 2017) pp 25-28

7 Cooper, H. V, Sjögersten, S., Lark, R. M. & Mooney, S. J. To till or not to till in a temperate ecosystem? Implications for climate change mitigation. *Environ. Res. Lett*. 16, 54022 (2021).

8 Ogle, S. M. *et al.* Climate and soil characteristics determine where no-till management can store carbon in soils and mitigate greenhouse gas emissions. *Sci. Rep.* **9**, 11665 (2019).

9 Maartje Sevenster, Lindsay Bell, Brook Anderson, Hiz Jamali, Aaron Simmons, Annette Cowie, Zvi Hochman *Australian Grains Baseline and Mitigation Assessment: Main Report* (CSIRO, January 2022) pp 48-49.

10 Corey J A Bradshaw et al, 'Detailed Assessment of the Reported Economic Costs of Invasive Species in Australia', *NeoBiota, 67* (29 July 2021), 511–50 <*https://doi.org/10.3897/neobiota.67.58834*>.

11 *https://invasives.org.au/wp-content/uploads/2020/11/Glyphosate-A-Chemical-to-Understand.pdf*

Without access to these tools, farmers could lose as much as 50 percent of their annual production to pests, weeds and diseases, and environmental land managers would have no ability to prevent, eradicate and manage threats to the natural environment.

Ongoing research and development to identify new pesticides and ensuring these new innovations will be accessible to Australia, is imperative for maintaining and increasing food production in Australia, which underpins both domestic and international food security.

Biotechnology

GM crops, an application of modern biotechnology, play a crucial part in food security. They are just the next natural stage in centuries of plant breeding innovation, a step along the same path of technological innovation that led to Australian agricultural inventions such as the development of the 'Federation' wheat variety, Australia's first rust resistant wheat released in 1903 by William Farrer. The utilisation of these innovations has delivered significant productivity and environmental sustainability improvements in farming. Over 400 million hectares of GM crops have been cultivated worldwide since 1996 and over 1 trillion meals containing GM food ingredients have been consumed globally. GM crops are the most tested and regulated food product in history. There are no substantiated scientific reports of any food safety issues related to the consumption of genetically modified crops, nor any unexpected effects on ecosystems.

Since being first commercially cultivated in Australia in 1996, GM crops have contributed to global food security, sustainability and helped farmers to adapt to and mitigate climate change by:

- Increasing the value of crop production by US$186 billion.[12]
- Reducing pesticide usage (kg active ingredient) by 671 million kg.[13]
- Reducing CO_2 emissions in 2018 alone by 27.1 billion kg[14] (equivalent to taking 16.7 million cars off the road for one year, more than all the passenger vehicles registered in Australia; and 86% of all vehicles registered in Australia)
- Increasing the incomes of more than 17 million small farmers and their families – some of the poorest people in the world, and thereby helping to alleviate poverty.[15]

GM crops have also helped farmers financially. Globally, GM technology directly increased farm income by US$18.2 billion in 201616, with over half the gains going to farmers in

12 Brookes G and Barfoot P (2018) 'GM crops: global socio-economic and environmental impacts 1996-2016'. PG Economics, Dorchester, UK.

13 Ibid.

14 ISAAA (2019) 'Global Status of Commercialized Biotech/GM Crops in 2018: Biotech Crops Continue to Help Meet the Challenges of Increased Population and Climate Change. ISAAA Brief No. 54. ISAAA: Ithaca, NY.

15 Ibid.

16 Brookes and Barfoot (2018) Op. Cit.

developing countries.[17]According to the meta-analysis published by Klumper and Qaim, GM crops have reduced pesticide use by 37 per cent (in turn, reducing emissions), while increasing crop yields by 22 per cent and increasing farmer profits by 68 per cent.[18]

GM crops under research and development in Australia will help our farmers address the unprecedented challenges they are facing in a changing climate. Analysis by Energetics, undertaken for the Commonwealth Bank of Australia identified that genetic modification of crops, pasture species and supplementary feed species would assist Australian agriculture to adapt to climate change.[19] GM traits being investigated at the national level will be crucial tools for farmers to combat drought, soil acidity and/or salinity, as well as emergent diseases.

There is also considerable Australian research into GM traits that will bring health benefits to consumers, such as healthier starches and oils modified to be lower in saturated fats and with improved cooking qualities.

The imperative for Australia to increase its ambition for research into biotechnology, including genetic modification and gene editing, is growing as other agricultural nations continue to develop research priorities and regulatory environments that are conducive to the research and commercialisation of biotechnology applications. For example, the Executive Government of the United States of America has recently tabled its plan *Bold Goals for U.S. Biotechnology and Biomanufacturing: Harnessing research and development to further societal goals*, which sets out the research priorities required to advance the American bioeconomy.[20] Specific use of accelerated breeding strategies and biotechnology, including gene editing, are key to the plans agricultural goals around productivity, reduction of greenhouse gas emissions, reducing food waste, improving nutrition, reducing food borne illness, and improving the biosecurity of crops and native trees.

Improving community confidence in the use of agricultural innovation through improved science communication and regulatory science practice

Misinformation about agricultural biotechnology and crop protection products creates additional risk to commercial investment in R&D and commercialisation in both technologies. GM crops, for example, are an ongoing target for misinformation and disinformation despite being similar to those that are currently regulated and are well-characterised commercial crops and/or traits that have a history of safe use in the environment. This is despite the relevant regulators (APVMA, Food Standards Australia New Zealand) providing public information on the safety of crop

17 ISAAA (2019) Op. Cit.

18 Klümper, W. and Qaim, M., (2014). 'A meta-analysis of the impacts of genetically modified crops'. PloS one, 9(11), p.e111629.

19 Commonwealth Bank of Australia (2019) '2019 Annual Report', p 59.

20 https://www.whitehouse.gov/wp-content/uploads/2023/03/Bold-Goals-for-U.S.-Biotechnology-and-Biomanufacturing-Harnessing-Research-and-Development-To-Further-Societal-Goals-FINAL.pdf

protection products and GM technologies, the regulatory process used to manage risks and the importance of the technologies to agricultural production.

As such, it is important that the Priorities guide public investment into improving science communication to assist the general community to understand and trust the scientific processes that not only underpin productive innovation but also the development of evidence-based regulation.

As part of the effort to improve public confidence in crop protection products and expand farmer access to safe and effective crop protection products, CropLife believes there is the opportunity to prioritise effort in research that supports Australia's regulatory science practice. While the APVMA is a world-leading, internationally renowned regulatory agency, to achieve these goals of public confidence and access, it is an imperative that the APVMA transitions itself into a true next-generation regulatory agency.

To support this transition, CropLife is supporting an initiative led by the University of New England to develop a Centre of Excellence that will support further developing the capacity and ability of Australia's regulatory scientists. The proposed Centre of Excellence would support the sustainability of agricultural practices and the protection of the environment through:

- Research and development that supports the development and implementation of data and platforms for robust, science based risk evaluation of crop protection products.
- Translates research into best practice application of crop protection products that manage risks to human health and environmental safety.
- Develops and evaluates industry stewardship arrangements.
- Training a new generation of regulatory scientists.