Australian Academy of Science
Ian Potter House, Gordon Street, Canberra ACT 2601

26 October 2018

Emeritus Professor Kym Anderson AC
c/o Primary Industries and Regions SA
GPO Box 1671
Adelaide, South Australia, 5001

By email: pirsa.gmreview@sa.gov.au

Dear Professor Anderson,

Re: Independent review of South Australia's moratorium on the cultivation of Genetically Modified (GM) food crops.

The Australian Academy of Science welcomes the opportunity to respond to the independent review of genetically modified food crops. The Academy's submission relates chiefly to the scientific aspects of the fifth term of reference:

e. Explore whether there are potential innovations likely to be available for commercial adoption by South Australia's agricultural industries prior to 2025 that would justify a reconsideration of the moratorium on grounds of economic benefit to the state.

The Academy considers that there are a number of potential innovations that are likely to be of relevance to South Australia's agricultural industries. In particular, innovations that use gene modification to improve insect resistance or herbicide tolerance, reduce insecticide use or allow improved herbicide regimes. Gene modification technologies have been demonstrated to bring these benefits in several markets.

In addition, gene modification technologies can improve the nutritional content of food crops, for example in applications such as "Golden Rice", a strain of rice enriched for vitamin A.

The Academy draws attention to a number of current and developing gene technologies likely to be of relevance to South Australian agriculture:

- **Gene editing:** Gene editing is an umbrella term for techniques which make small, targeted changes to an organism's DNA, using precise genetic tools such as the CRISPR/Cas9 system or other site-directed nucleases. Gene editing is now in wide use in agricultural research and several examples are in the early stages of deployment by industry. This technique has high precision and the outcomes are often indistinguishable from traditional breeding methods. Because of these factors, the review of the *Gene Technology Act 2000* currently underway is considering whether gene editing techniques should be considered gene modification technologies.
- **Topical RNAi technology:** RNA interference, or RNAi, is a technique which uses RNA constructs to modulate the expression of genes. This allows control of aspects of the development of an organism which may or may not alter the organism's genome.

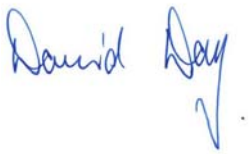
Topical or exogenous RNAi does not involve altering the organism's genome and by most definitions would not be considered a gene modification technology.

- **Disabled Cas9 enzymes:** Disabled Cas9 enzymes make use of Cas9's highly specific DNA binding properties but do not cut the DNA. This allows other targeted modifications, such as using a methyltransferase enzyme to make epigenetic modifications, or deaminases to make point changes to DNA without cutting it. Under present definitions, it is not clear if such applications would be considered a gene modification technology.
- **Cas9 ribonucleases:** Higher specificity of Cas9 gene editing can be achieved using delivery systems to provide Cas9 ribonucleoproteins directly to the cell rather than using transgenic methods, because of the high turnover of the ribonucleoprotein.

Extensive testing of genetic modification technologies has not demonstrated that they pose any risk to agricultural products compared to conventionally produced products. For this reason, the Academy considers that restricting use of these technologies through mechanisms such as the South Australian moratorium ultimately disadvantages consumers and producers through loss of access to new products or traits.

If you would like to discuss any aspect of this submission, please contact Dr Stuart Barrow at stuart.barrow@science.org.au or 02 6201 9464.

Yours sincerely,



Professor David Day FAA
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