Deloitte Access Economics

The economic impact of paraquat

Syngenta Australia Pty Ltd

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1 Executive Summary

Syngenta Australia Pty Ltd engaged Deloitte Access Economics to conduct an independent assessment of the economic impact if paraquat was deregistered for use in Australia. Syngenta manufactures and markets paraquat under the name Gramoxone® and Spray.Seed® (the latter is a paraquat + diquat mix), and is one of several manufacturers worldwide. This study considers all products containing paraquat that are sold in Australia, not just those marketed by Syngenta. A full list of products containing paraquat is in Table C.1.

While Syngenta has funded this study, they did not specify the assumptions or parameters used in the economic modelling. The work incorporated scientific literature as well as comments and suggestions from external subject matter experts and users of paraquat in Australian agriculture. Deloitte Access Economics has not independently verified the scientific evidence, and have relied on it to infer these economic impacts.

It is acknowledged that the estimates in this report are based on these perspectives, and that there is ongoing discussion about potential health implications of paraquat use. This report focuses on the economic impact of paraquat on agricultural production and does not aim to quantify these other potential health effects.

Background

Paraquat is a herbicide used for a range of crop protection purposes.

This report addresses the economic impact of paraquat, so that its economic benefits can be considered in determining the implications for agriculture of any future regulatory action relating to paraquat products.

The role of paraquat

The herbicide paraquat is off-patent and is sold under a variety of brand names by a number of manufacturers, and in mixtures with other herbicides. Based on the scientific literature and stakeholder contributions, there are several key uses for paraquat in agriculture:

1. **A non-selective herbicide.** Paraquat is used as a non-selective herbicide to control a wide spectrum of weeds both before sowing annual crops and within perennial crops.
2. **To control glyphosate-resistant weeds.** Glyphosate is a widely-used and effective herbicide, except in cases where resistant populations of weeds have become established, or where glyphosate is not fully effective for other reasons. Paraquat is commonly used in controlling weeds, either in rotation with, or as a double-knock application after, glyphosate. In combination, glyphosate and paraquat enable minimum tillage crop production methods.

3. **A herbicide that does not run off into waterways.** Paraquat binds tightly to the soil and becomes inert in the soil,[1] so does not leach into sensitive river or marine environments. The most relevant application is for controlling weeds in sugarcane crops adjacent to the Great Barrier Reef.
4. **A herbicide that can be used in wet climates.** Paraquat is rainfast within minutes after application. This is valuable in climates where there are infrequent windows of dry weather to apply glyphosate.
5. **A herbicide that can be sprayed in vineyards and orchards.** Paraquat is a contact herbicide and does not affect roots or bark (it is only effective when sprayed on green plant material), so can be sprayed to control weeds much closer to, and under, vines and fruit trees, in comparison to other herbicides.

There are other uses for paraquat, including as a desiccant or harvest aid, and to control 'hard to kill' weeds. However, the above list provides the main applications for which research shows there are few substitutes and the potential for significant economic impacts.

Modelling and results

The scenario modelled here is that all herbicides that contain paraquat are no longer available for sale from 1 July 2013 and after a 12 month period all farm inventories of paraquat are assumed to be exhausted. From 1 July 2014, it is assumed that there is no equivalent effective alternative to paraquat. The economic modelling reflects what would happen under this scenario to farm output, production and exports, as well as downstream economic impacts on the sectors that process farm outputs (such as food and beverage manufacturing).

Estimation of the value of paraquat was supported by consultations with subject matter experts and industry stakeholders. Three methods of estimating impacts were used, as a cross check on the different data sources available.

Together, these three methods of estimating the value of paraquat build up a picture of its contribution to agriculture, as summarised in the figure below. Direct expenditure is the smallest estimate of the value of paraquat, as it must be worth at least what is spent on it, in order for rational farmers to purchase it in the first place. The net present value of this weed control cost is estimated at $570 million, based on retail value, over a 10 year period.

Consideration of the pro-rata impact of paraquat provides a larger estimate of its value. This method attributes a proportion of the gross value added of agricultural output attributed to paraquat as a share of all herbicides (a straight pro-rata share without allowing for interaction with glyphosate). This takes into account its contribution as a herbicide, inclusive of what is spent to purchase and apply it. This measure of the value of paraquat is estimated at $1.3 billion over a 10 year period.

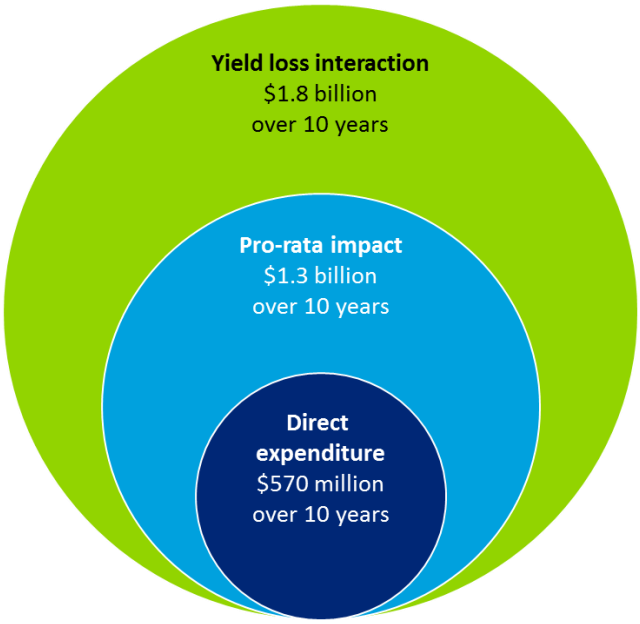
Finally, the yield loss interaction method considers what would happen in the absence of paraquat, with glyphosate resistance increasing exponentially before plateauing. This method includes the direct effects of paraquat (killing weeds directly) and the positive

[1] See for example http://www.epa.gov/oppsrrd1/REDs/0262red.pdf

externality generated by paraquat (maintaining the effectiveness of glyphosate to kill weeds as well). This leads to an increasing yield loss over 10 years and accounts for paraquat's contribution to production, but also its contribution to crop protection more broadly. The resistance management role of paraquat in supporting the ongoing use of glyphosate is a further measure of its value considered in this method, resulting in a higher estimate of its value. Over a 10 year period, the net present value of this yield lost (less the cost of purchasing) is estimated at $1.8 billion. This only includes agricultural yield impacts.

The economy-wide impacts on the Australian economy and industry over the period of 2013-2025 were estimated using Computable General Equilibrium (CGE) modelling. The impact on GDP is estimated at $362 million per annum by 2025. The absence of paraquat is expected to reduce Australian exports on average by $109 million per annum below the business as usual case. The loss of full time employment is expected to peak at 594 FTE employees in 2017. Agricultural output is expected to decline by $390 million per annum by 2025 (all $ figures are in 2012-13 dollars).

Figure 1.1: Estimation of the value of paraquat on farm output, three methods



The scientific literature shows that paraquat is an important element of an integrated weed management strategy (in combination with glyphosate), and is without a close substitute. The absence of paraquat would result in a significant reduction in the options available for weed management, leading to an annual decline in agricultural output of $390 million, and a decline in GDP estimated at $362 million per annum by 2025 (in 2012-13 dollars).

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