Representing the Plant Science Industry

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31 January 2014

The Secretary
Budget Policy Division
Department of the Treasury
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Dear Secretary

On behalf of CropLife Australia, I provide the attached submission in response to the Treasurer's call for input to the 2014-15 Budget.

This submission identifies those areas where additional investment by government is required to ensure that Australia's regulatory system for agricultural chemicals can rapidly respond to emerging agricultural issues and facilitate Australian farmers' ability to compete in global markets.

The Government's election commitment to fund and develop a minor use and speciality crops agricultural chemical (agchem) program is warmly welcomed by CropLife, the plant science sector and the broader agricultural industry. The Government should be congratulated on such a good policy initiative. Such a program is crucial to the nation's agricultural productivity, our international competitiveness and is imperative to ensuring Australia's farmers have access to the tools and products essential for meeting the food security challenges of the future. CropLife has specifically called for such a program to be funded in our previous Budget submissions over several years and accordingly, I have included with this submission an outline of a nominal structure for such a program for the Government's consideration so that it might be implemented quickly.

I also commend Minister Joyce's quick action to commence a process of removing unnecessary and costly regulation in the agchem registration system, something that CropLife and the nation's farming sector have for some time been calling for. This too is a matter in respect of which CropLife has previously submitted to the Budget process and looks forward to such changes being implemented as a matter of urgency.

These issues all go to the long term growth and sustainability of Australia's plant science industry, which is a crucial support sector to Australia's farmers. The economic imperative of our industry in supporting Australia's farmers was highlighted through recent analysis by Deloitte Access Economics. I have enclosed a copy of that report for your information and reference.

Please do not hesitate to contact me should you require clarification or elaboration in respect to any aspect of this submission.

Yours sincerely

Matthew Cossey
Chief Executive Officer

Attach:

CropLife AUSTRALIA

Representing Australia's plant science industry

2014-15 PRE-BUDGET SUBMISSION

31 JANUARY 2014

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INTRODUCTION

CropLife Australia (CropLife) is the peak industry organisation representing the agricultural chemical and biotechnology (plant science) sector in Australia. CropLife represents the innovators, developers, manufacturers and formulators of crop protection and agricultural biotechnology products. The plant science industry provides products to protect crops against pests, weeds and diseases, as well as developing crop biotechnologies that are key to the nation's agricultural productivity, sustainability and food security. The plant science industry is worth more than $17.6 billion a year to the Australian economy and directly employs thousands of people across the country.

CropLife and its members are committed to the stewardship of their products throughout their lifecycle and to ensuring that human health, environment and trade issues associated with agricultural chemical use in Australia are responsibly and sustainably managed. Our member companies spend more than $13 million a year on stewardship activities to ensure the safe and effective use of their products. CropLife ensures the responsible use of these products through its mandatory industry code of conduct and has set a benchmark for industry stewardship through programs such as ***drum****MUSTER*, ChemClear® and Agsafe Accreditation and Training. Our stewardship activities demonstrate our commitment to managing the impacts associated with container waste and unwanted chemicals.

The plant science industry's crop protection products include herbicides, insecticides and fungicides that are critical to maintaining and improving Australia's agricultural productivity to meet global food security challenges in coming decades. Each of these products is rigorously assessed by the Australian Pesticides and Veterinary Medicines Authority (APVMA) to ensure they present no unacceptable risk to users, consumers and the environment. CropLife member companies can spend more than $250 million over 10 years, testing more than 140,000 compounds to find one new successful crop protection product. Without access to these tools, farmers may potentially lose as much as 50 per cent of their annual production to pests, weeds and diseases. According to a Deloitte Access Economics report released by CropLife Australia in 2013, 68 per cent of the total value of Australian crop production can be attributed to the use of crop protection products.

Crop protection products must be used sparingly, carefully and responsibly. The responsible use of agricultural chemicals must be supported by a regulatory scheme that maximises the benefits associated with their responsible use, while minimising the costs from excessive, inappropriate and ineffective regulation. Farmers need these products because of the benefits they provide to their businesses and consumers need these products to ensure they have access to safe, affordable and nutritional food. While it is important for governments to provide for appropriate and rigorous regulation of pesticides and biotechnologies, any regulation must be mindful of the effects that poorly considered and excessive regulation will have through increasing production costs, discouraging investment and innovation, while not delivering any improvement in safety, health or environmental outcomes.

The 2014-15 financial year represents a period of significant change for registrants and developers of agricultural chemical products. New approaches to regulation potentially involve significant additional cost to registrants that may have detrimental impacts on the capacity of companies to provide Australian farmers with innovative new products. The Australian Pesticides and Veterinary Medicines Authority's (APVMA) Cost Recovery Discussion Paper highlights the significance of some of these costs[1] associated with unnecessary regulation. The focus, however, is on ensuring that Australia's regulatory system for agricultural chemicals is effective, efficient and provides an opportunity for governments to ensure they have all the necessary tools in place to support Australian innovation in agricultural production.

This submission identifies those areas where additional investment by governments is required to continue to drive innovation and to ensure Australia's regulatory system for agricultural chemicals can rapidly respond to emerging issues and facilitate Australian farmers' ability to compete in global markets.

For noting, the plant science industry has since 196 also been providing Australian agriculture with the benefits of crop biotechnology in the form of genetically modified (GM) crops. The utilisation of these innovations has delivered significant benefits in producing safe and affordable food, feed and/or fibre to the nation and the world. GM crops that are in the innovation pipeline have the opportunity to further improve the environmental benefits by allowing more efficient use of water, nutrients and other crop production inputs. Future GM crops will produce healthier oils and starches and other major human health benefits, as well as have a greater tolerance of salinity and acid soils.

[1] http://www.apvma.gov.au/consultation/public/2012/interim_cost_recovery.php

Similar to the regulatory approval process for crop protection products, every GM crop in Australia is subjected to intense scrutiny and rigorous regulatory assessment. The Gene Technology Regulator approves all aspects of research and development with genetically modified organisms (GMOs) and any new GM crop product. Food Standards Australia New Zealand is required to approve any GM food ingredient and the APVMA regulates those GM crops with inbuilt pest protection. The GM canola and GM cotton crops that are grown in Australia have passed all of these regulatory assessments and delivered Australian farmers $611 million[2] in additional farm income benefits during the period 1996-2011.

Emerging global food security challenges highlight the critical need to properly support Australia's farming sector and the critical supporting industries to agriculture, such as plant science. Should the following identified activities and initiatives be funded and implemented, they would complement current reform processes and result in a comprehensive package of reforms.

Australian agriculture and its associated industries generate over $150 billion each year and underpin 12.1 per cent of Australia's GDP. The agricultural chemical and biotechnology industry is an integral input driving this performance.

[2] Brookes G and Barfoot P (2013) 'GM crops: global socio-economic and environmental impacts 1996 – 2011', PG Economics, Dorchester, United Kingdom

PROPOSED REFORMS

1. Introduction of a comprehensive, publicly funded program for minor use and speciality crop uses of agricultural chemical products.

Attachment A outlines one proposed structure that could be adopted for this reform. CropLife has long advocated for the introduction of a comprehensive, publicly funded program for minor uses of agricultural chemical products. The current Government's election commitment to allocating $8 million to a minor use and specialty crops program is significant and welcomed by CropLife, the plant science industry and the nation's farming sector.

Other countries such as the United States have had a minor use program for decades. As a result of the targeted investments made by that program, the United States' production of horticultural products as a proportion of agricultural production is significantly greater than in Australia. Economic analysis of the United States' minor use program has estimated that for **every dollar invested, the program facilitates a return to the United States' economy of US$500**.

The European Union is also moving towards implementation of a minor use program to assist its growers access necessary crop protection products.

Currently, in the absence of a minor use and specialty crops program, agricultural chemical products are only registered in circumstances where there is an economic incentive to do so. Registrants will only register a product provided the cost of doing so can be recovered through sales. As the cost of developing data and registering products continues to increase, so too does the risk that growers of minor crops will not have adequate tools to control pests, weeds and diseases. The small size of Australia's crop protection product market on a global comparison means that it is critical for the Government to implement this initiative so that Australian agriculture is assured access to the latest innovations from the plant science industry despite the cost inhibitors connected with the APVMA registration system.

A lack of pest and weed control options has a number of consequences. Farmers may be forced to rely on a permit system that is not ideally suited to facilitating the development of new uses on product labels. Should a farmer not have access to a registered or permitted product, they may be forced to rely on some state legislation that may in some circumstances allow 'off-label' uses. Off-label uses are not risk assessed. Some off-label uses may therefore result in unacceptable risks to users, consumers or the environment. For these reasons, CropLife does not support off-label use of agricultural chemical products.

CropLife promotes improved harmonisation of state control of use regulations in Australia to remove duplication and inconsistencies, and to reduce unnecessary costs to industry. CropLife members find it difficult, confusing and costly to meet the multiple regulatory requirements of all the jurisdictions in Australia. A comprehensive, publicly funded program for minor uses of agricultural chemical products would enable registration of chemical products for use on minor and specialty crops, thereby reducing the need for off-label uses and providing a platform by which national harmonisation could occur.

A lack of available pest and weed protection products provides a significant barrier to the development of new agricultural industries. New crops are less likely to be commercially cultivated for domestic and export markets if there are no options for pest control. Horticultural crops in particular face challenges as the smaller areas under production often make it uneconomic for registration of new chemical products.

The consequences are not limited to minor crops. Major commodities such as wheat and barley can still be susceptible to minor pests and diseases that are not significant enough to justify investment by registrants to extend labels or develop new control technologies. Pests may not always be a problem for a particular crop, or unusual and unexpected weather conditions in a particular season may lead to new pest and disease pressures.

Australia's smaller market size (when compared to the United States, Europe or Canada) means it is uniquely susceptible to the effects of excessive regulatory cost on the availability of chemical products for minor uses.

An appropriately targeted, moderately funded minor use program in Australia can safeguard Australian agriculture by increasing its productivity and diversity. Ensuring that farmers have access to adequate crop protection technologies can also facilitate:

- Development of new industries growing new crops for domestic and overseas markets;
- Agricultural development of new regions for new crops as pest issues can be sustainably controlled; and
- Ongoing sustainable production within existing farming systems as new tools facilitate better, more effective and long-lived resistance management strategies.

Critically, support for minor uses can reduce risks to users, consumers and the environment from off-label use. It will also minimise reliance on APVMA issued permits increasing its capacity to provide high quality risk assessments and registrations.

In CropLife's previous Budget submissions we have estimated that total funding of about $45 million spread over four or five years would be the likely requirement for a full program. If structured properly, such a program would attract further investment from crop protection product companies, grower groups and RDCs that would deliver an even better value proposition for the Australian taxpayer and deliver even bigger returns to the Australian economy.

What is essential is that the program is structured so that the funding provided by government goes directly to correcting the market failure caused by a mandatory regulatory system and not simply absorbed in administrative costs by the Department of Agriculture or the APVMA. Funding must generate real outcomes that deliver more registered uses of crop protection products that assist farmers improve farm output or facilitate new crop opportunities.

2. Reallocate funding from the National Produce Monitoring Scheme

The previous Government failed to implement or fund a minor use program. It instead implemented a National Produce Monitoring Scheme within the now Department of Agriculture at a cost of more than $25 million over 5 years. The scheme's sole function is to identify known pesticide residue related issues that a minor use and specialty crops program would solve, thereby making a minor use and specialty crops program a significantly better investment for the expenditure of $25 million. As mentioned above most estimates suggest that a targeted, moderately funded minor use program in Australia would require one-off funding in the order of $45 million.

CropLife recognises the importance of having a national residue monitoring scheme, but does not support it being established before a minor use and specialty crops program. An appropriately targeted, moderately funded minor use program in Australia will enable the majority of off-label and permitted uses to be assessed by the APVMA and registered if appropriate. This will allow appropriate maximum residue limits to be implemented and as a result, significantly reduce incidences of pesticide residues in minor crops exceeding the Australian Standard.

It must be noted that the Department of Agriculture already has a well-established residue monitoring program in the National Residue Survey (NRS). The NRS tests the domestic and export produce from participating industries including meat, fish, grain and a small number of horticultural industries, and is funded through levies or direct payments from those participating industries. Providing the appropriate encouragement to industries to participate in the NRS would provide a national residue monitoring program that utilises existing infrastructure and would benefit from the economics of scale.

3. A new publicly funded program to clear the backlog of chemicals listed as a priority for review

CropLife notes that the Government's election policy commitment to repeal the previous Government's recently passed legislation imposing unnecessary re-registration requirements for active constituents and chemical products is currently with stakeholders for comment as part of the *Proposed Agricultural and Veterinary Chemicals Legislation Amendments* consultation paper. There is already over 60 different active constituents that have been nominated for, or are currently under review. Adding an additional, arbitrary time based, unnecessary re-registration process on top of the current model would have only added significant administrative work load to the APVMA and redirect resources away from the target review process while not providing any public benefit.

Once an active constituent comes under review, approval holders and product registrants are invited to engage and contribute to the review. This engagement is time consuming and costly. Often a chemical review process will also require approval holders and registrants to develop new data sets to demonstrate that a newly identified risk is acceptable, negligible or nonexistent.

Registrants and approval holders therefore already make significant contributions to the chemical review program. Not only do registrants pay to develop the data sets to be assessed by the APVMA, but the sales levy paid on all products also funds the chemical review program.

A greater public funding contribution to the APVMA's capacity to review chemicals will improve the capacity of the APVMA to conduct chemical reviews and demonstrate the importance of addressing the existing chemical review priorities before adding additional chemicals or products to the existing backlog.

4. CropLife suggests that Australia's regulatory system may also benefit from a greater financial contribution from public sources

Currently, the cost of the APVMA is almost entirely met through application fees and levies recovered from applicants and registrants of agricultural and veterinary products. This has led to some public criticism that agricultural chemical manufacturers have captured the APVMA, leading to perceptions that the decisions of the APVMA are not independent and expose users, consumers and the environment to excessive risks from chemical use.

CropLife accepts that cost recovery is an important and appropriate tool to recover the costs associated with the APVMA's risk assessment and registration functions. That stated, CropLife accepts that an equally strong and valid argument might be made for the APVMA to be fully funded though general revenue.

While CropLife accepts the need for cost recovery, different elements of the APVMA's functions may be considered separately. CropLife does consider that there may well be a difference between the registration and assessment functions of the APVMA and the monitoring, compliance and enforcement functions. The significant public benefit enjoyed by consumers and the environment from assurance about the safety, quality and integrity of the regulatory system justifies consideration of the appropriate level of public funding.

Currently, in addition to funding the regulatory scheme for agricultural chemicals, CropLife and its member companies contribute to, and support a range of other stewardship programs that support the safe, sustainable and responsible transport, handling and use of agricultural chemicals. Our ***drum****MUSTER* and ChemClear® programs are world leading initiatives to responsibly deal with waste containers and chemical products. Our resistance management strategies support the effective responsible use of chemical products to delay and prevent the development of pest and weed resistance. Our accreditation and training program also ensures that facilities that handle and store agricultural chemical products are compliant with all Commonwealth, state and territory legislative requirements. These activities minimise the burden on jurisdictions to enforce their legislation.

Collectively, CropLife members contribute $13 million each year to stewardship activities that reduce the risk from agricultural chemicals throughout their lifecycle. Other parts of the crop protection sector contribute another $3 million, totalling $16 million from industry each year.

The APVMA's monitoring, compliance and enforcement activities are critical to supporting and maintaining the integrity of the current regulatory system. Maintaining this integrity does require that the APVMA take a broad approach to monitoring and compliance. The APVMA must not only focus on product registrants and approval holders, but manufacturers and importers that deliberately seek to avoid Australia's regulatory system.

Publicly funding monitoring, compliance and enforcement activities of pesticides will offer significant benefits to governments, industry and the community. It will:

- Ensure that the magnitude and scope of compliance and enforcement activities can be effectively matched to the size of the problem. It need not be restrained by the APVMA's limited budget;
- Demonstrate that registrants and approval holders have not captured the regulator and increase public perception of an independent compliance function;
- Address current inequity where the APVMA provides resources to identify non-compliance, gather evidence and conduct prosecutions, but is not able to access the proceeds from any fines imposed. Under the *Better Regulation* package of reforms, introduction of more extensive civil penalty provisions may result in a greater reliance on fines for legislative breaches; and
- Facilitate greater voluntary stewardship initiatives by industry to support government compliance functions.

CropLife considers that an appropriately funded regulatory scheme should reflect the commitment of all interested to enforcing the regulatory scheme. Increasing the public resourcing for compliance and enforcement would represent a significant increase in the Government's commitment.

Alternatively, comprehensive public funding for the APVMA would lead to a much greater perception that the APVMA was independent of any inappropriate influence by industry. Comprehensive public funding would also significantly reduce barriers to market entry for smaller registrants and facilitate the deployment of new products by small and medium businesses tailored for smaller crops and industries.

Noting the *Review of the Australian Government Cost Recovery Guidelines* being finalised by the Department of Finance, CropLife considers it imperative that any revised guidelines provide clarity on exactly what can and cannot be cost recovered, and exactly what agency expenses can be included for calculating cost recovery fees and levies. CropLife does not consider the revised guidelines are clear enough with regard to this matter.

Similarly, there remains a lack of clarity around when levies can be used in addition to fees under a cost recovery model. Equally important is a justification of the efficiency of a levy system, particularly with regard to ensuring that agency operations are not being inappropriately subsidised by larger levy payers.

Attachment B outlines expected costs associated with these proposals.

CONCLUSION

Australia's farming sector, agricultural competiveness and the broader economy would benefit from a greater public funding contribution to the agricultural chemicals regulatory system. A moderate, specific and targeted program of investment has the potential to significantly improve Australia's agricultural productivity through continued innovation and development of plant protection products for minor and emerging industries.

The current Government's election commitment to allocating $8 million to a minor use and specialty crops program is significant. Though most estimates suggest that a targeted, moderately funded minor use and specialty crops program in Australia would require one-off funding in the order of $45 million, CropLife considers that investing the $8 million already committed, together with the remainder of the $25 million currently allocated to the previous Government's National Produce Monitoring Scheme, in a minor use and specialty crops program, will safeguard Australian agriculture by increasing its productivity and diversity. It will also ensure that farmers have access to adequate crop protection technologies and significantly reduce the need for off-label uses, which will provide a platform for which national harmonisation in state control of use regulations could occur, and potentially return $500 for every $1 invested.

Specific investments in monitoring, compliance and enforcement will also improve consumer perceptions regarding the independence of the APVMA. While CropLife does not accept the claims that the APVMA has been 'captured' by industry, specific investments to enhance the monitoring, compliance and enforcement functions of the APVMA would substantially address concerns regarding regulatory capture.

A program to no longer apply cost recovery to the APVMA would comprehensively address claims of regulatory capture. Provided that assurances regarding approval and registration performance were maintained, this alternative option would improve community faith in the independence of the APVMA as well as reducing barriers to Market entry for minor use products.

Providing additional funding to clear the backlog of current chemical reviews will provide additional assurance that the chemical products used in Australia are safe. It will provide an equitable and transparent base upon which a continuation application scheme can be introduced.

ATTACHMENT A

PROPOSAL FOR AUSTRALIAN MINOR USE PROGRAM

Australia can learn from minor use solutions that have been adopted in North America (eg. the IR-4 Project). It needs, however, to be remembered that the agricultural research infrastructure in Australia is different to that of the United States or Canada. For example, Australia does not have access to the Agricultural Research Stations that are active in the United States. On the other hand, Australia does have a range of agricultural Research and Development Corporations (RDCs) that perform similar research for many, but not all grower industries.

It is also important that any future approach in Australia is consistent with the strategic framework that was agreed between the states and the Federal Government in 2005.

Figure 1 below represents the proposed approach. Details on each step of the process follow.

FIGURE 1: AUSTRALIAN MINOR USE PROGRAM – PROPOSED PROCESS

STEP 6

REGULATORY ASSESSMENT AND APPROVAL
(APVMA)

STEP 5

SUBMISSION COLLATION AND REGULATORY SUBMISSION
(undertaken by the Specialty Crops Unit)

STEP 4

FIELD TRIALS COMMISSIONED TO SERVICE PROVIDERS

STEP 3

ANNUAL PRIORITISATION PROCESS

STEP 2

UNIT COLLATION
(includes seeking manufacturer support)

STEP 1

GROWER NOMINATIONS

STEP 1: GROWER NOMINATIONS

Growers will be responsible for identifying gaps in pest control options and submitting these to the Specialty Crops Unit (the Unit). There is a number of ways that this could be achieved:

1. Growers submit requests directly to the Unit.
2. Associations and relevant peak industry bodies submit a consolidated list of priorities to the Unit.
3. RDCs utilise their existing research priority setting processes to determine the priorities of the growers they represent.

STEP 2: UNIT COLLATION

If requests were made directly to the Unit then it would consolidate these into a single list and discuss with the relevant association, peak industry body and registrants. If there is a lack of support by the industry or the registrants, then the requests would not be progressed.

The Unit would also examine likely regulatory data requirements and associated costs, including the availability of existing supporting data both domestically and internationally (in potentially reducing local costs and fast tracking regulatory solutions).

If requests were made via an association or peak industry body, then the industry wide priorities would at that stage be developed and submitted to the Unit for collation. Similarly, if RDCs were the method for communicating priorities to a central unit, then these bodies could prioritise needs on an industry by industry basis.

STEP 3: ANNUAL PRIORITISATION PROCESS

The prioritisation process could involve an annual workshop where consolidated grower request lists are scored according to established criteria. The criteria for determining the higher priorities could include the following:

1. Funded projects maximise opportunities for crop group approvals.
2. The chemistry involved in the project is not a candidate for regulatory review and/or seeks to reduce risks posed by existing crop protection products.
3. The project addresses a need for pest control or enhances adoption of IPM.
4. The economic importance of the pest to the industry (relative to industry size).
5. The level of Unit funding that has already been allocated to an industry (ie. an equity principle).
6. The use has the support of a registrant to register the use.

Another option for allocating projects is on the basis of crop groups. This could take into account the number of representative trials required to gain a crop group approval, as well as the number of minor crops in a crop group. There could be different tiers of funding for different crop groups to ensure this is considered.

STEP 4: FIELD TRIALS COMMISSIONED TO SERVICE PROVIDERS

The Unit will negotiate the contract for undertaking the research trials each year. The trials will be undertaken by the accredited service provider that is most competitive in respect of quality, capacity and price.

Commissioned trials would involve a mix of both efficacy/crop safety and residue trials.

The following principles could underpin the contracting of research trials:

- *Maximum contract size*

  Given the amount of research that could be contracted by the Unit, the negotiation of large contracts, rather than a series of small contracts, would seem sensible. If a number of different bodies were simultaneously seeking to contract the work, then the cost of each trial is likely to be increased as a result of the increased demand. The negotiation of larger contracts would, however, allow the Unit to be seen as a major contract annually for which different research providers would compete.

- *Good Laboratory Practice*

  Residue trials should be conducted in accordance with Good Laboratory Practice (GLP). This is the standard of data required for the Australian Pesticides and Veterinary Medicines Association's (APVMA) submissions and international data sharing, as well as establishment of Maximum Residue Limits in overseas markets, which are considered important aspects to the potentially broader international objectives of the Unit and regulatory outcomes.

  This component is not negotiable so all bids for the annual contract will need to be submitted by GLP accredited facilities.

STEP 5: SUBMISSION, COLLATION AND REGULATORY SUBMISSION BY THE UNIT

It is proposed that regulatory submissions would be prepared by the Unit. It is important that a single body is responsible for writing regulatory submissions as this would ensure they are of a suitable and consistent quality, as well as ensuring adequate reporting for the Unit's deliverables. This approach has been shown to be effective in both the United States and Canada.

Once a research project is completed, the scientific data would be submitted to the Unit by the service provider. The Unit would then use this information to construct a regulatory submission and submit this to either the registrant(s) or directly to the APVMA for regulatory assessment (with any associated fees).

STEP 6: REGULATORY ASSESSMENT AND APPROVAL

The APVMA will assess the submissions for regulatory approval according to the same criteria as other registration applications and the use would normally be one that would be approved as an onlabel use, rather than offlabel permit mechanisms.

The Unit (or the partner registrants) would pay the registration fees for the application, which would ensure that the APVMA has sufficient resources to promptly progress the applications.

OTHER ELEMENTS OF THE PROPOSED UNIT

- *Registering long-standing permits*

  During the first two years of the Unit's operation it is not expected that there will be many results from commissioned trials available for regulatory approval, due to the time taken to run the trials, analyse samples and submit results.

  In this period, the Unit will concentrate on registering long-standing permits that do not have outstanding data requirements, in cooperation with state government evaluators and/or partner registrants.

- *Gap analyses*

  Every 3-4 years each industry would perform a gap analysis that would examine which plant pests and which control tools are priorities for that industry. The gap analysis would be incorporated into the industry strategic plan. Lower risk products would be prioritised for future work. In time, this approach would provide the basis for prioritisation of projects undertaken by the Unit.

  In order to ensure that industries perform this task, it is proposed that from Year 4 of the program, any industry that could not show a strategic need for a pest control would not be able to access funding through the program. The implementation of this requirement has been postponed until Year 4 to allow all industries the opportunity to complete this analysis.

- *Reduced risk pesticides*

  Since 2000, over 80% of IR-4's research has involved new pest management technology with biopesticides and reduced risk chemistries. This focus on reduced risk compounds was achieved by a three pronged approach consisting of partnering with the agricultural chemical companies, educating specialty crop stakeholders and partnering with the Environmental Protection Agency to facilitate specialty crop registrations.

  A component of an Australian program would be dedicated to researching biopesticides and biological methods for controlling pests in various crops. These control measures can be used in conjunction with more traditional chemical control methods to address restrictions on withholding periods and reentry intervals.

  It is proposed that one of the criteria to be used to determine funding for projects will be the use of reduced risk chemistry. An exception to this criteria would only occur when there were no effective reduced risk chemistries available for the proposed use pattern.

- *Priority Data Projects*

  Increasingly, certain broadly used chemicals have been subjected to regulatory reviews and use restrictions. Owing to a number of factors, these chemicals are often disproportionately important to specialty growers. It is therefore important that a national minor use program assist these industries in finding suitable and cost effective replacements.

- *International Collaborations*

  As noted at *Minor Use 07*, international collaboration offers huge opportunities for reducing costs of regulatory approvals for specialty crops. In particular, joint projects with the United States and Canada provide real opportunities for work and data sharing. Cost reductions result from the reduction in the time and extent of trial work that needs to be conducted domestically.

  It is proposed that the Unit would have a specific budget for conducting joint trials with other international minor use programs. This would initially equate to around three projects per year. As confidence between the different national programs increases, the number of joint projects would also be likely to increase.

- *Communication*

  It is important that an initiative of this size has a communications strategy to ensure the numerous and diverse stakeholder industries are all aware of what the Unit can offer. This would be based on the strategy developed by the Minor Use Taskforce in 2005.

ATTACHMENT B
EXPECTED COSTS

(All figures in million dollars)

Proposal 1: National Minor Use Program

Year	2013/14	2014/15	2015/16	2016/17	2017/18
Annual Cost	1.5	3.5	5	5	5
Total: $20.0					

Project 2: Chemical Review Clearance

Year	2013/14	2014/15	2015/16	2016/17	2017/18
Annual Cost	2.4	3.6	4.8	4.8	4.8
Total: $20.4					

(Costs based on current AERP and CRP costs in December 2011 Cost Recovery Discussion Paper. $2.4m permits 5 reviews to be concluded each year. $4.8m should permit all outstanding high-priority reviews to be completed within the next 5 years (from 2014/15 at a rate of 10 per year. Some gradual ramp up will be required to permit registrants time to develop additional data if required.)

Project 3a: Compliance, Investigation and Enforcement and Information activities.

Year	2013/14	2014/15	2015/16	2016/17	2017/18
Annual Cost	2.375	2.375	2.375	2.375	2.375
Total: $11.875					

(Costs based on current costs of HGP scheme, AgQA and investigation and enforcement costs contained in the December 2012 Cost Recovery Discussion Paper)

Project 3b: Public funding of the APVMA

Year	2013/14	2014/15	2015/16	2016/17	2017/18
Annual Cost	32.8	34.4	32.9	32.9	32.9
Total: $165.9					

(Costs based on expected expenditure as outlined in the APVMA's December 2012 Cost Recovery Discussion Paper)

Deloitte Access Economics

Economic activity attributable to crop protection products

CropLife Australia

2013

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Glossary

ABS	Australian Bureau of Statistics
APVMA	Australian Pesticides and Veterinary Medicines Authority
CPP	Crop protection products, also known as pesticides or agrichemicals, which are applied in both conventional and organic agricultural systems. Also includes chemicals such as plant growth regulators.
FTE	Full time equivalent
GDP	Gross domestic product
GOS	Gross operating surplus

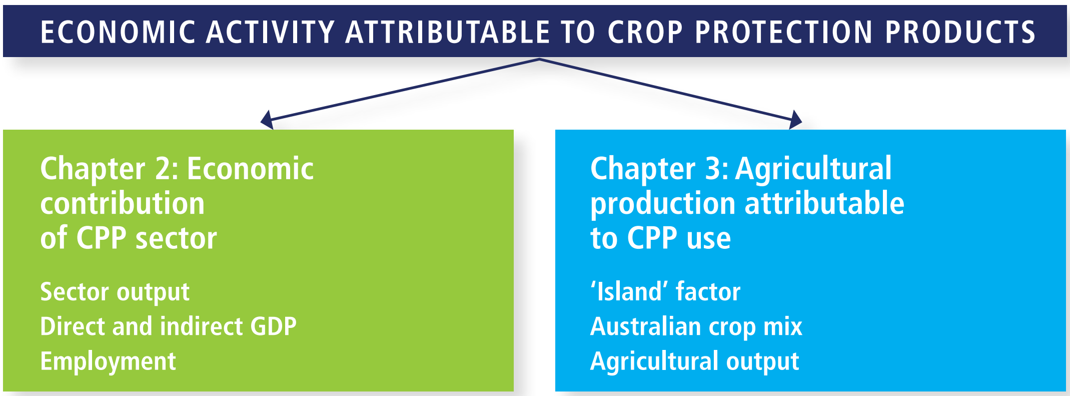
Executive summary

Deloitte Access Economics was engaged by CropLife Australia to estimate the contribution of the crop protection industry to the Australian economy, and the Australian agricultural output attributable to the use of crop protection products (CPP).

CPP include herbicides, fungicides and insecticides, which are widely used in many sectors of the economy. For industry — particularly agriculture — it is a means of increasing the productivity of land. Governments also use CPP to control invasive or non-native species on public land (such as roadsides and in national parks). They are also widely used by households for backyard gardening and pest control, in commercial buildings and maritime applications. That noted, this report focuses on the contribution of CPP in these agricultural and government uses, excluding use in households, buildings and maritime applications.

The approach used in this study is twofold, and is summarised in the diagram below.

- firstly, estimating the direct and indirect economic contribution of the CPP manufacturing sector to GDP and employment; and
- secondly, estimating the amount of Australian agricultural production attributable to CPP, in terms of the value of farm output attributable to CPP, building on previous work by Mark Goodwin and Associates for the United States, adjusted to reflect the different pests and diseases in Australia versus the United States (referred to here as the 'island' factor).



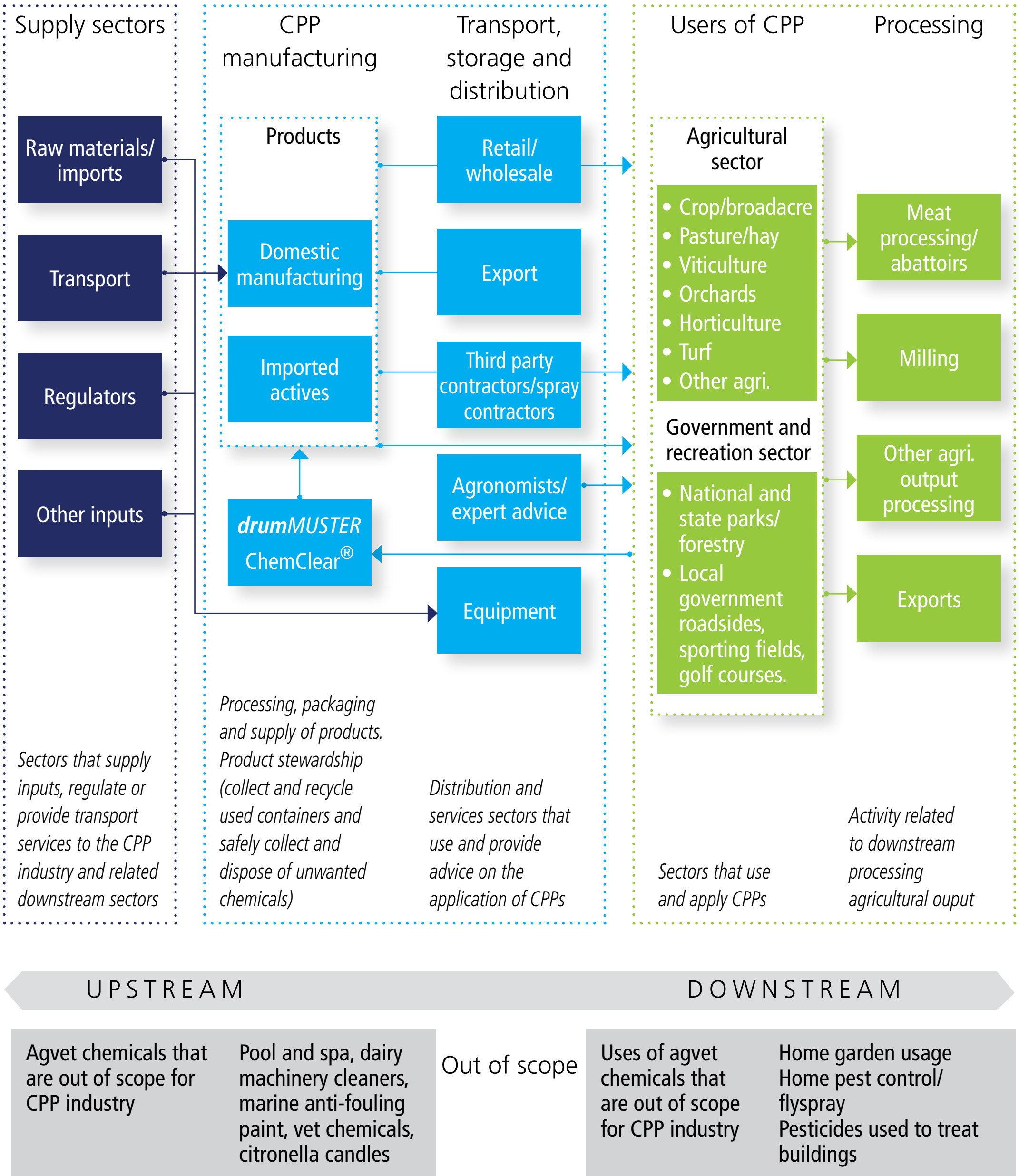
Economic contribution

The Australian CPP sector produced almost $2.5 billion in output in 2011–12, as measured at the factory gate (APVMA, 2013). This revenue generated by the sector contributes a total of $1.8 billion to value added, made up of a direct contribution of $620 million and indirect contribution of $1.2 billion in supply sectors. These direct and indirect contributions are made up of gross operating surplus and wages.

In terms of employment, the CPP sector also contributes just over 9,250 in full time equivalent (FTE) employees, made up of about 2,050 directly in the CPP manufacturing sector and 7,200 in the sectors that supply inputs to the CPP sector.

As illustrated in the following diagram, there are many economic linkages between the CPP sector, its upstream supply sectors, the distributors of CPP, the users of CPP and the downstream sectors that process the output from the users of CPP.

CPP INDUSTRY LINKAGES AND RELATIONSHIPS



Agricultural production attributable to CPP

The total value of Australian crop production attributable to CPP is estimated as the sum of the attributable value of production for field crops (broadacre), vegetables, fruits and nuts and other crops (mostly forage crops). The output attributable to CPP is based on current farming practices — it is not a scenario of the impact if all CPP suddenly became unavailable, or changes to farming practices.

In aggregate, it is estimated that up to $17.6 billion of Australian agricultural output is attributable to the use of CPP, or up to 68% of the total value of crop production. Over half of this contribution is from fungicides, reflecting their significant contribution to the value of production of vegetables, fruits and nuts. This estimate includes the contribution to organic crop production.

This report presents an economic contribution of CPP and an estimate of its value based on the share of yield attributable to the use of CPP. This study is not a cost-benefit analysis and does not consider or compare the relative magnitudes of costs in relation to the benefits, for example costs to the environment and potential health implications of their use.

The economic contribution (the amount of value added involved in manufacturing and applying CPP, which can be compared against GDP) is a different concept to the amount of agricultural output that is attributable to the use of CPP (which cannot be compared against GDP, but can be compared as a % of agricultural output). As such, these two different concepts cannot be added together.

For each dollar of agricultural output, the direct plus indirect economic value added associated with that output is approximately $0.84.[1] Therefore, $17.6 billion of Australian agricultural *output* equates to direct plus indirect value added of up to $14.8 billion is attributable to the use of CPP.

The use of CPP is a core part of current farming practices for many crops, fruits and vegetables cultivated in Australia. The estimates reported here relate to the current economic activity attributable to the production and use of CPP, and cannot be interpreted as an estimate of the change in output that would occur if different farming practices (such as mechanical rather than chemical methods of weed control) were adopted.

Deloitte Access Economics

1 Derived from ABS 2008–09 input output tables, catalogue 5209.0.55.001

1 Background

Deloitte Access Economics was engaged by CropLife Australia to estimate the contribution of the crop protection products (CPP) industry to the Australian economy, and the Australian agricultural output attributable to the use of CPP.

CPP include herbicides, fungicides and insecticides, which are widely used in many sectors of the economy. For industry — particularly agriculture — it is a means of increasing the productivity of land. Governments also use CPP to control invasive or non-native species on public land (such as roadsides and in national parks). They are also widely used by households for backyard gardening and pest control, in commercial buildings and maritime applications. That noted, this report focuses on the contribution of CPP in these agricultural and government uses, excluding use in households, buildings and maritime applications.

The scope of CPP is broad, and includes chemical products that are naturally occurring as well as chemicals which are synthetic. That is, the chemicals derived from naturally occurring substances, as used by the organic agriculture sector, are included as CPP.

This report builds on previous work by Mark Goodwin and Associates, which estimated an equivalent contribution for agriculture in the United States. Further details about previous studies are provided in Section 1.2.

This report presents an economic contribution of the CPP industry and an estimate of the share of agricultural output attributable to the use of CPP. This study is not a cost-benefit analysis and does not consider or compare the relative magnitudes of costs in relation to the benefits; for example, costs to the environment and potential health implications of their use.

The economic contribution (the amount of value added involved in manufacturing and applying CPP, which can be compared against GDP) is a different concept to the amount of agricultural output that is attributable to the use of CPP (which cannot be compared against GDP, but can be compared as a % of agricultural output). As such, the two different concepts cannot be added together.

1.1 Crop protection products

Crop protection products, also known as pesticides or agrichemicals, comprise of natural and synthetic chemicals used to control insects, diseases and weeds in food crops and plants. Crop protection products in varying forms have been used in agriculture for over 150 years[2].

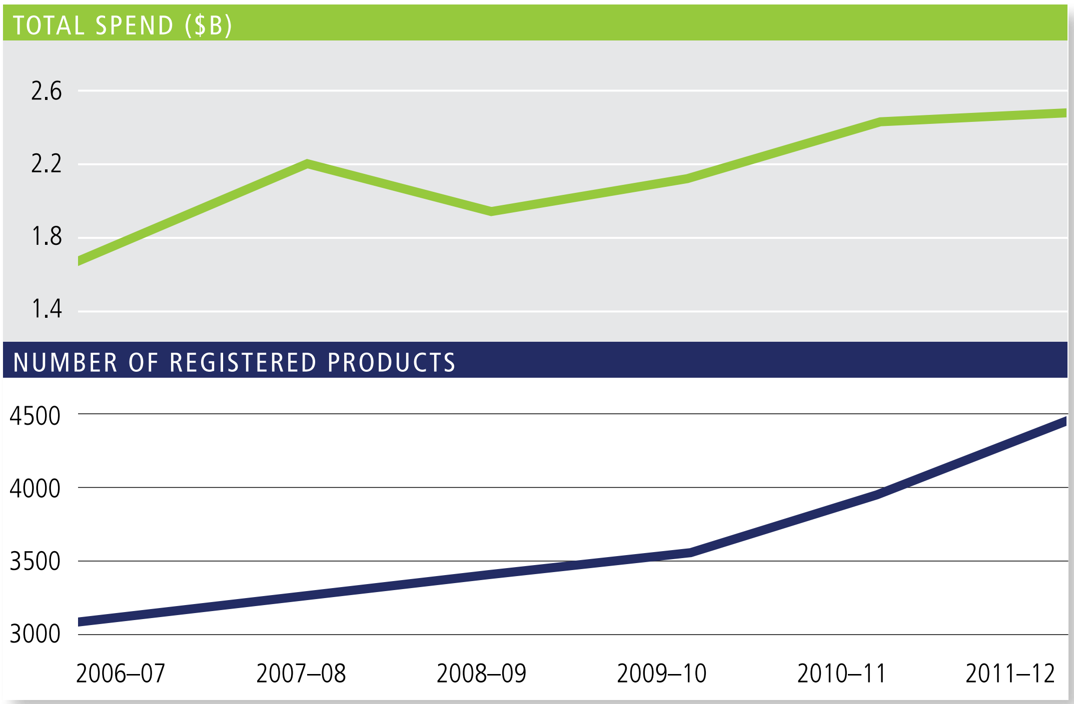
In Australia, agricultural chemicals are controlled by the Australian Pesticides and

Veterinary Medicines Authority (APVMA) up until the point of final retail sale. This includes pre-market risk assessment, approval and registration of products as well as defining the content of labels describing instructions for safe and responsible use. States and territories control the use of products after this point including creating and administering rules for access to products, training and licensing of users, as well as any additional requirements for use such as record keeping or other restrictions.

As more products have been registered in recent years, usage has continued to grow, as shown in Chart 1.1. In the 2011-12 financial year, almost $2.5 billion was spent on 4,427 registered crop protection products.

2 http://www.jstor.org/discover/10.2307/3493576?uid=3737536&uid=2&uid=4&sid=21102310663487

Chart 1.1: Crop protection products in Australia



Source: APVMA, various years

These products can be classified into four broad categories.

- **Herbicides**—products intended to prevent or reduce the growth of weeds. These can be either:
  - selective (chemicals which kill weeds specifically without harming crops); or
  - non-selective (chemicals which stop the growth of plants indiscriminately).
- **Insecticides**—chemicals which aim to control insects in plants and crops.
- **Fungicides**—products whose purpose is to prevent or manage fungal diseases in plants.
- **Other**—includes other pesticides (such as miticide, molluscicide, vertebrate poison) as well as chemical agents (adjuvants and surfactants).

Key reasons for use of CPP include:

- to decrease and control pests and diseases
- to reduce the need for crops and plants to compete with weeds and other invasive plants
- to increase the yield of crops or protect biodiversity
- to protect and maintain infrastructure such as buildings and roads through pest or weed control.

For this report, agricultural use of crop protection products is in-scope, with household and commercial use considered out of scope. Exports of CPP are included in the estimation of the industry's economic contribution, but the overseas crops treated with those exported CPP are excluded from the estimate of the value of Australian agricultural production attributable to CPP. Chapter 2 explains these linkages in more detail.

1.2 Previous studies

Although crop protection products are well established worldwide, there is limited research on their economic contribution. This section details a few key studies.

The most comprehensive and recent study undertaken to date is Mark Goodwin and Associates' 2011 report "The Contribution of Crop Protection Products to the United States Economy". The report was commissioned by CropLife America, and details the value of selected crops which is attributable to agrochemicals.

This was achieved in a three stage methodology. For each crop identified, Goodwin Consulting:

1. determined the proportion of crop value attributable to herbicides, insecticides and fungicides, using previous studies published by the Crop Protection Research Institute[3]
2. determined the total value of the crop by state
3. determined the total economic value attributable to agrochemical use by multiplying (1) and (2).

Aggregating, Goodwin concludes that that the direct contribution of crop protection products to the US economy is $81.8 billion, with flow-on benefits amounting to $166.5 billion across 20 industries, and approximately 1 million jobs across the country.

This study was similar to a Canadian equivalent, "Cultivating a vibrant Canadian economy", published by CropLife Canada in 2011. This report considered the contributions of crop protection products as well as plant biotechnology.

After evaluating several potential methodologies, the Canadian report quantifies the contribution of agrochemicals by comparing yields between conventional and organic crops. It then calculates the value of crops attributable to crop protection products as the difference in yields multiplied by the price of crops.

The report concludes that, for the most commonly grown crops in Canada[4], the value generated by the increased yields associated with the use of agrochemicals and plant biotechnology is almost CA$8 billion.

In Australia, the AECgroup published a report on the "Economic Impact of State and Local Government Expenditure on Weed and Pest Animal Management in Queensland" in 2002. The report conducted a cost benefit analysis of state and local government spending on a set of pest and weed management initiatives. One of the initiatives examined was the eradication of Siam Weed. The study found that every $1 spent on this program (including spraying, maintenance and border protection costs) resulted in between $9.90 and $26.80 of benefit.

CropLife Australia estimates that CPP increases Australian crop yields by about 40% as well as increasing the value of our production by around $13 billion each year (CropLife Australia, 2012). This was based on a synthesis of international studies citing ranges between 30% and 50%, but without a specific adjustment for Australian production.

After a review of the literature, Deloitte Access Economics' approach has been based on the CropLife America report and adjusted for the Australian context. This is detailed further in the following chapters.

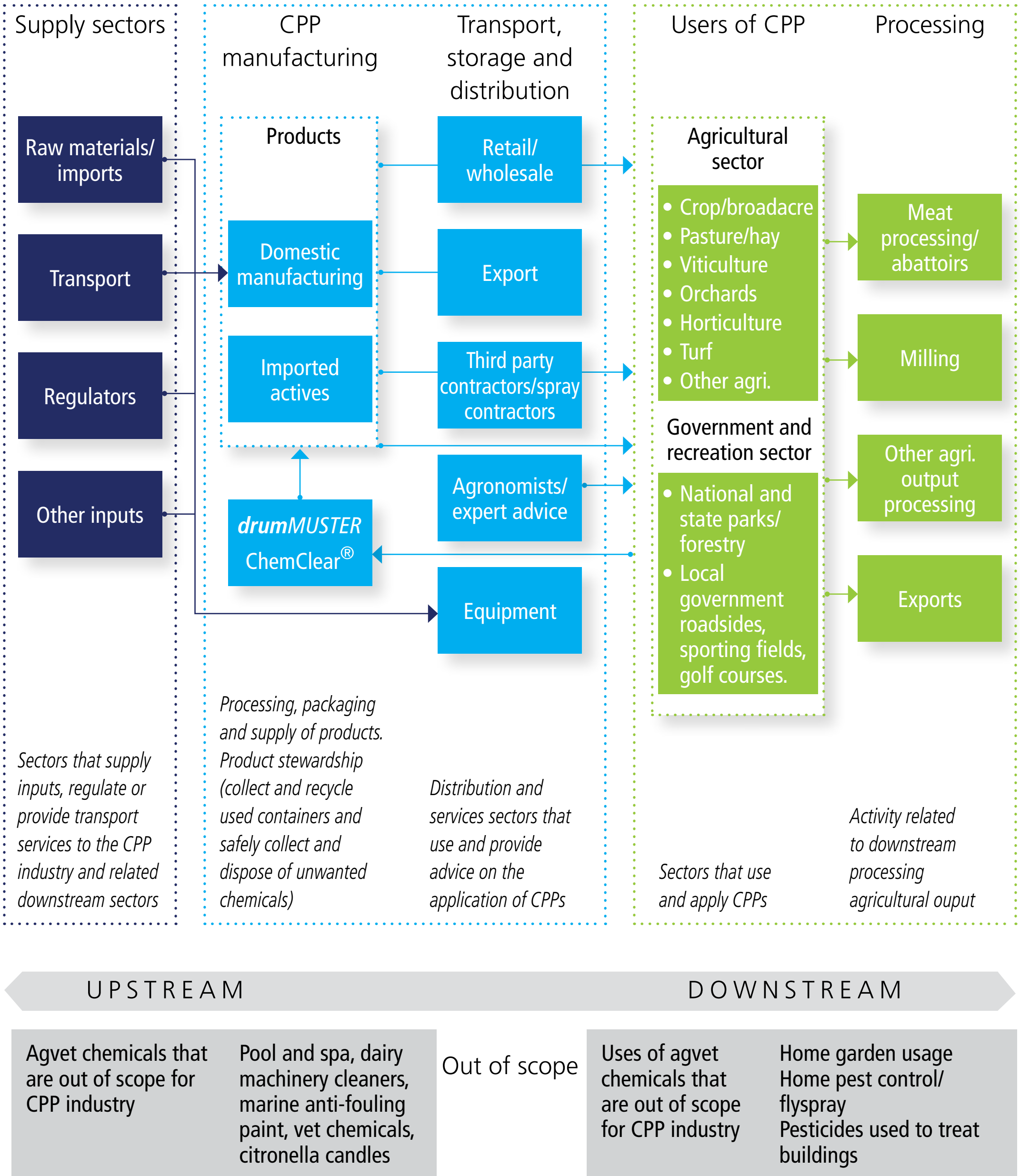
3 Gianessi, L., and Regier, N., 2006; Gianessi, L., and Regier, N., 2005; Gianessi, 2009.
4 Including 16 field crops, 29 vegetable crops, 13 fruit crops and potatoes.

2 Economic contribution of CPP

This section outlines the economic contribution the CPP sector makes to value added, consistent within the National Accounting Framework, so that the results can be compared with GDP statistics produced by the ABS. The analysis here outlines the direct contribution of the CPP manufacturing sector and the indirect contribution from its sectors that supply inputs to the CPP sector, as illustrated in Chart 2.1.

2.1 CPP industry linkages and relationships

Chart 2.1: CPP industry linkages and relationships



The above diagram also highlights a number of linkages to sectors that provide services to the end-users of CPP products.

These sectors include the third party contractors like spray contractors and the agronomists that service the sector and help to optimise farm practices. It is noted that there are several types of agronomists. Some are employed by CPP companies (distribution agronomists), hence have their costs embedded in the retail cost of CPP as employees of chemical resellers. Private agronomists, on the other hand, independently generate revenue (over and above sales of CPP) through their work as consultants. These agronomists potentially add tens of million dollars per year, on top of the agronomist value included in CPP industry revenue, through their other work in areas such as crop nutrition and marketing. That is, not all of private agronomists' revenue can be attributed to CPP.

The sector also provides the product stewardship initiatives ***drum****MUSTER* and ChemClear® that return packaging to producers for reuse. ***drum****MUSTER* commenced in 1999 and has collected over 20 million agvet chemical containers across Australia since then, representing more than 25,000 tonnes of recyclable material. As part of this, there are over 3,000 personnel currently trained as ***drum****MUSTER* inspectors across Australia.

Further to these, CropLife has stewardship programs including the Agsafe Accreditation and Training Program, which ensures effective management of chemical risk through the supply chain, as well as resistance management plans, which aim to ensure the effectiveness and longevity of products.

The industry linkages diagram also specifies the users of CPP products, including the agriculture, government and household sectors. The economic contribution discussion below outlines the total production of the CPP sector and provides a breakdown of the sectors of use. Chapter 3 provides an assessment of the value the CPP sector makes to the key user of CPP: the agriculture sector.

2.2 Sector output

The Australian CPP sector produced almost $2.5 billion in output, in the Australian fiscal year 2011–12, as measured at the factory gate (APVMA, 2013). The APVMA provides information on the types of products produced with some information on how they are used.

The sector produces a wide array of products (a 'product' is a formulation of one or more active constituents ('actives') and other product elements), with herbicides, insecticides and fungicides making up a large share of the output. Herbicides made up just over half of this output, with $1.3 billion in output. Insecticides make up 22% of output (with about 5% being classified as household and 16.7% used on farms).

In addition the sector also produces chemical products that are used in other sectors' production processes, such as dairy cleanser, seed treatments and wood preservatives. There are also a number of products that are used in aquatic applications; for example anti-fouling marine paints and water sanitisers for use in pools and spas. APVMA data also outlines that the sector produces $1.3 million in dog and bird repellents.

Table 2.2: Sector output by type of product $m, 2011–12

Product	$m	Share (%)
Adjuvants/surfactants	83.6	3.4
Anti-fouling—boat	17.7	0.7
Dairy cleanser	11.6	0.5
Disinfectant/sanitiser	9.7	0.4
Fungicide	218.0	8.8
Growth promoters/regulators	38.1	1.5
Herbicide	1,301.9	52.6
Household insecticide	131.6	5.3
Insecticide	413.1	16.7
Miscellaneous	5.2	0.2
Miticide	21.2	0.9
Mixed function pesticide	26.9	1.1
Molluscicide	16.7	0.7
Nematicide	3.5	0.1
Pool Products/algicide	55.9	2.3
Repellent—dogs/birds etc.	1.3	0.1
Seed treatments	39.3	1.6
Vertebrate poison	30.2	1.2
Wood preservative	48.7	2.0
Total	**2,474.2**	**100.0**

Source: APVMA, 2013

Where are the products used?

As outlined above, actives are formulated into products and then distributed to a number of consumers. IBISWorld provides information on where the products that are produced in Australia are consumed. As expected, a high proportion (80%) are consumed in the agriculture sector, with broadacre making up 46% of the total. 13% of the products that are produced in Australia are exported. This is summarised in the following table.

Table 2.3: Sector output by type of product

Product	Share (%)
Broadacre farmers (wheat and other crop producers)	46.0
Forestry	1.0
Cotton producers	15.0
Horticulture producers	15.0
Sugarcane producers	3.0
Households	5.0
Government	2.0
Export	13.0
Total	**100.0**

Source: IBISWorld, 2013

Sector economic contribution

This section provides an account of how the sector contributes to the national economy. This is outlined as the sector's direct and indirect value added contribution, to gross domestic product (GDP) and the level of employment. To inform this analysis we have used the $2.5 billion in sector output along with the most recent 2008–09 Australian Bureau of Statistics (ABS) Input-Output tables.

The $2.5 billion in revenue generated by the sector contributes a total of $1.8 billion to value added. The CPP sector directly contributes almost $620 million to value added, made up of $345 million in gross operating surplus (GOS, essentially returns to capital) and $274 million in wages. The sector also contributes almost $1.2 billion through value added in the supply sectors.

The sector also contributes just over 9,250 in full time equivalent (FTE) employees, this is made up of about 2,050 directly and 7,200 in the supply sectors.

Table 2.4: Sector output by type of product

Contribution		$m
Direct—CPP		**619**
	GOS	345
	Wages	274
Indirect—Supply sector		**1,196**
	GOS	666
	Wages	531
Total		**1,815**
	GOS	1,011
	Wages	804

Employment	FTE
Direct (FTE)	2,049
Indirect (FTE)	7,205
Total (FTE)	**9,254**

Source: Deloitte Access Economics

With output of $2.5 billion and total contribution to value added of $1.8 billion, the value added multiplier for the CPP industry is 0.73. This suggests, similar to many other manufacturing sectors, a relatively high proportion of the inputs that go into the production process are supplied from overseas. This compares to veterinary and medical product manufacturing with a multiplier of 0.54, while human pharmaceutical products have a multiplier closer to 0.82.

Table 2.5 shows the major supply sectors to CPP manufacturing and processing as outlined in the ABS Input-Output tables. Over 20% of the intermediate inputs into the CPP sector come from the basic chemical manufacturing sector, in the form of other CPP products or other basic chemicals. The transport and wholesale trade sectors also contribute around 12% and 8% to inputs respectively. Petroleum-type products also constitute about 10% to intermediate inputs.

Table 2.5: Sectors that supply CPP manufacturing and processing, share

Product	Share (%)
Basic chemical manufacturing	21.1
Transport	12.3
Wholesale trade	7.8
Petroleum and coal product manufacturing	4.7
Gas supply	4.5
Professional, scientific and technical services	3.8
Non-residential property operators and real estate services	3.7
Building cleaning, pest control, administrative and other support services	3.4
Polymer product manufacturing	2.5
Other	36.3
Total	**100.0**

Sources: ABS, Input-Output tables

3 Australian agricultural production attributable to CPP

This chapter presents the methodology and our estimate of Australian agricultural production attributable to CPP. It is noted that this measure is not an 'economic contribution' in the sense that it cannot be compared with economic statistics such as GDP. Rather, it is an estimate of the amount of output from crop production that is attributable to CPP. For many agricultural crops (particularly horticultural and tree crops) it would not be possible to produce a crop without the use of CPP, or yields would decline substantially without the use of CPP.

Importantly, the value of agricultural production attributable to CPP is not the same as the 'economic impact' that would occur in a scenario where all CPP became unavailable — such a scenario may involve changes in behaviour and changes in farm practices that partly offset the absence of CPP. Rather, this report estimates the current production attributable to CPP (in 2011-12) based on current farm practices.

The methodology for estimating the contribution of CPP is based on Mark Goodwin and Associates' 2011 report "The Contribution of Crop Protection Products to the United States Economy", and the scientific literature on attributions of different crops that underpinned that report. The report was commissioned by CropLife America, and detailed the value of selected crops attributable to CPP (specifically herbicides, insecticides and fungicides).

Deloitte Access Economics has broadly used a similar methodology, making adjustments to bring the estimates in line with Australian agricultural production. Firstly, Australian production differs from American production due to different growing conditions and practices.

Secondly, the crop mix differs between Australia and America. A larger share of Australian production is broadacre crops, while American production has a larger share of horticultural produce. Within these categories there are differences in value and production of specific crops, which is taken into account in this analysis.

The following sections detail the adjustments made to take these factors into account.

3.1 The 'island' factor

Australia and America have very different agricultural industries due to a number of factors.

- **Climate and rainfall** — Australia generally has a warmer, drier climate which affects growth of weeds as well as crops.
- **Australia is an island continent** — geographic isolation from other countries and a rigorous quarantine system limit the prevalence of overseas crop pests and diseases. On the other hand, there are some pests and diseases unique to Australia, such as the native Queensland fruit fly.
- **Soils** — Australia is an old continent, with soils older and less fertile than those in America. This has implications for fertiliser use and plant competition from weeds and hence use of CPP.
- **Agricultural practices** — minimum tillage and GPS controlled cropping systems have higher adoption rates in Australia than in America (Australian Farm Institute, 2012) which can have an effect on soil-borne pests and diseases and need for pesticides. American agricultural production has a greater penetration of genetically modified crops (such as corn and soy) which can reduce the requirement of CPP inputs into these farming systems, particularly where crop varieties are resistant to specific pests and diseases.
- **Labour costs** — agricultural sector wages are considerably higher in Australia (over $20 per hour compared to around $8 per hour in America) which could make farmers more likely to use CPP in Australia to reduce reliance on labour (Australian Farm Institute, 2012).

The effect of these differences in agricultural production is different use of CPP in production. For example, application rates of particular pesticides vary, that is, the use of CPP per unit of production and per unit of cropping area.

A factor is applied to the American data to make it applicable to the Australian context. This 'island' factor takes into account the differences in agricultural production outlined above through a ratio comparing CPP use in Australia and America. This is summarised in Table 3.1 below.

Table 3.1: The 'island' factor

	Australia (average 2006–2012)	America (2007)
Total CPP use (US$m)	$1,589	$7,869
Total crop area (million ha)	26.3	164.5
Total crop production (US$m)	$21,721	$135,806
CPP use/ha (US$)	$60.35	$47.84
CPP use/$ production (US$)	$0.073	$0.058
'Island' factor (ha)	1.26	
'Island' factor (production)	1.26	
Average 'island' factor	**1.26**	

Sources: ABARES, ABS, APVMA, University of Florida, U.S. Census Bureau, US Department of Agriculture

Data for Australian spend on CPP, crop area and the value of total crop production was collected for the years 2006–07 to 2011–12 inclusive. Average figures over this time period accounted for the different growing conditions in drought years (2006–07) and higher production in non-drought years (2011–12). American data was collected for 2007, when the latest Agricultural Census was conducted.

All values were converted to US$ using yearly average exchange rates to make them comparable across countries. CPP use per hectare and CPP use per dollar of production were then estimated from the above data. Australian CPP use per hectare was divided by American CPP use per hectare to derive an 'island' factor of 1.26. Similarly, Australian CPP use per dollar of production was divided by American CPP use per dollar of production to derive an 'island' factor of 1.26. The average of these provided an average 'island' factor of 1.26.

This factor implies that Australian use of CPP is 26% higher than use in American agriculture. While there may be a lower incidence of international pests and diseases affecting crop production, Australian use may be higher due to a greater preference for minimum tillage technologies (which are complemented by chemical weed control, rather than mechanical weed control) and higher labour costs which may limit the adoption of relatively more labour-intensive and less chemical-intensive methods of pest and disease management.

As discussed in the following section, the relative crop mix also affects the use of pesticides in agriculture, with horticulture representing a greater proportion of American production compared to in Australia.

3.2 The Australian crop mix

Other than the differences accounted for in the previous section, the Australian crop mix differs from American production. To some degree, the factors outlined above affect the relative proportions of crops produced in both countries.

Crops can be categorised into four broad categories:

- broadacre crops
- vegetables
- fruits and nuts
- other crops (mostly forage crops produced for livestock consumption).

The relative proportions of these crop groups have implications for the contribution of CPP. In particular, higher applications of CPP are generally used in high-value horticultural production compared to broadacre cropping. The Australian crop mix has a lower share of horticultural production compared to American agriculture.

Table 3.2: Crop production, Australia and America

	Australia (2011–12)		America (2007)	
	$m	%	$m	%
Field crops (broadacre)	15,194	59	69,851	51
Vegetables	4,944	19	14,851	11
Fruits and nuts	4,034	16	18,226	13
Other crops	1,706	7	32,878	24
Total crops	**25,876**	**100**	**135,806**	**100**

Sources: ABARES 2013, U.S. Census Bureau 2007. Note: sum may not equal to total due to rounding.

Further, within these crop groups, the value of yield attributable to CPP varies among individual crops. For example, the share of yield value attributable to CPP is higher for potatoes than it is for barley (Mark Goodwin and Associates, 2011).

Hence, the crop mix is accounted for separately in this analysis as it affects individual crops, whereas the 'island' factor accounts for total crop production.

3.3 Adjusting the American data

Gianessi (2005, 2006 and 2009) conducted a series of studies on the contribution of fungicides, herbicides, insecticides on crop production in America. These studies presented data by crop, for the share of value attributable to each product. A summary of these data is provided at Appendix A.

Mark Goodwin and Associates combined the findings of these studies in his 2011 report to provide an overall estimate of the contribution of CPP for American states. This was done by adding the herbicide, insecticide and fungicide percentage contributions to provide a total CPP contribution. These sums were capped at 100% even if the individual herbicide, insecticide and fungicide contributions exceeded this amount.

For this study, the crops were split into the four crop categories. Average herbicide, insecticide and fungicide contributions to value were estimated based on the mix of individual crops. This is separately described for each crop group below.

These averages were then multiplied by the 'island' factor to determine the Australian contribution to production. Finally, these contributions were multiplied by the value of crop production in the four groups (Table 3.2) to present the value of CPP to Australian production in dollar terms.

Field crops (broadacre)

Field crops include barley, canola, cotton, sorghum, sugarcane and wheat, among other crops. The full list of crops in this category is shown at Appendix A.

Within this category of crops, the proportion of value attributable to herbicide ranges from 16% for sunflowers up to 53% for rice. Insecticides and fungicides are important for production of hops (100% of value attributable to their use, or in other words, under current farming practices for hop production, a crop would not be possible without the use of CPP). Overall, corn and sorghum are relatively hardy, with a smaller proportion of total production being attributable to CPP (23% and 34% of value attributable to CPP, respectively).

The value contribution of herbicide, insecticide and fungicide was estimated based on data from Gianessi (2005, 2007 and 2009), weighted for the Australian crop mix by value of production. Wheat and sugarcane combined make up over half of the value of these broadacre crops in Australia.

Adjusting for differences in use of CPP in Australian agriculture, these weighted average contributions were then multiplied by the 'island' factor. This estimated an overall contribution to the value of Australian broadacre production of 51%. Herbicides make up more than half of this, with a contribution of 29% of crop value. In dollar terms, the contribution of CPP to Australian broadacre production is estimated at $7.7 billion.

Table 3.3: CPP contribution to value of field crops (broadacre)

	Herbicide	Insecticide	Fungicide	Total CPP
Weighted average contribution (%)	24	8	8	40
Australian contribution (%)	31	10	10	51
Value to Australia ($m)	4,480	2,174	1,384	7736

Source: Mark Goodwin and Associates 2011, Deloitte Access Economics. Note: sum may not equal to total due to rounding and weighting.

Vegetables

Crops included in this category include broccoli, carrots, lettuce and onions, with a full list included at Appendix A. For the purposes of estimation, herbs have been included in this category.

Vegetable crops have a relatively high dependence on CPP, in particular fungicides. Onions, for example, attribute 100% of their production to fungicides and CPP accounts for 95% and 92% of crop value for carrots and celery respectively. That is, these vegetables would be very difficult to grow commercially without the use of CPP.

Equally, along with CPP, these vegetables also require water, labour and land to produce a crop. The use of (say) water could also be attributed with 100% of onion output, as without water there would obviously be no production. As such, the estimates here should be interpreted as the amounts of production attributable to CPP, assuming all other requisites for production (water, labour, etc) are readily available.

In the absence of sufficiently detailed data to weight the mix of vegetable crops by value or volume of Australian production, an average was taken of the contribution of herbicides, insecticides and fungicide contributions from the Gianessi (2005, 2007 and 2009) data.

These average values were multiplied by the 'island' factor to account for CPP use in Australia compared to American use. This estimated an overall contribution to the value of Australian vegetable production of 100%, that is, the total value of vegetable production is attributable to the use of CPP. This is equivalent to $4.9 billion of production to the Australian economy.

Table 3.4: CPP contribution to value of vegetables

	Herbicide	Insecticide	Fungicide	Total CPP
Average contribution (%)	21	34	54	83
Australian contribution (%)	26	43	68	100
Value to Australia ($m)	1,284	2,107	3,358	4,944

Source: Mark Goodwin and Associates 2011, Deloitte Access Economics. Note: sum may not equal to total due to rounding and weighting.

Fruits and nuts

The fruits and nuts category includes apples, almonds, bananas, grapes, oranges and peanuts among others. The full list is presented at Appendix A.

Similar to vegetables, the value of fruits and nuts are more dependent on fungicides than other CPP, and has a relatively small contribution from herbicides. Grapes and papaya are particularly reliant on fungicides, with 100% of their value attributable to its use. Peanuts and almonds attribute 92% and 70% of production to fungicide use respectively.

The weighted average contribution of herbicides, insecticides and fungicides was estimated based on volume of production. It is acknowledged that individual fruits in general weigh more than nuts, while nuts are more valuable per kilogram of production. This may affect the estimate, but is used where there is insufficiently detailed value of production data.

Multiplication by the 'island' factor provides the estimate for the contribution of CPP to Australian agricultural production. While fungicide alone accounts for 100% of fruits and nuts production on average, and the contribution of all CPP is capped at 100%, it is acknowledged that herbicides and insecticides also contribute to the value of production.

The total value of CPP use on fruits and nuts production in Australia is estimated to be valued at $4.0 billion.

Table 3.5: CPP contribution to value of fruits and nuts

	Herbicide	Insecticide	Fungicide	Total CPP
Weighted average contribution (%)	5	46	83	95
Australian contribution (%)	6	58	100	100
Value to Australia ($m)	239	2,344	4,034	4,034

Source: Mark Goodwin and Associates 2011, Deloitte Access Economics. Note: sum may not equal to total due to rounding and weighting.

Other crops

This category of crops is mainly comprised of forage crops; those grown specifically to be grazed by livestock or conserved as hay or silage. The contribution of CPP to value of production for these crops is assumed to be the same as for broadacre crops. Adjusting by the 'island' factor suggests a contribution of 51% of the value of production. In dollar terms, this is estimated at $865 million.

Table 3.6: CPP contribution to value of other crops

	Herbicide	Insecticide	Fungicide	Total CPP
Weighted average contribution (%)	24	8	8	40
Australian contribution (%)	31	10	10	51
Value to Australia ($m)	524	176	174	865

Source: Mark Goodwin and Associates 2011, Deloitte Access Economics. Note: sum may not equal to total due to rounding and weighting.

3.4 Value of CPP to Australian crop production

The total value of CPP to Australian crop production is estimated as the sum of the four categories of crops above.

In aggregate, it is estimated that $17.6 billion of Australian agriculture output is attributable to the use of CPP, or 68% of the total value of crop production. Over half of this contribution is from fungicides, reflecting their significant contribution to the value of production of vegetables, fruits and nuts. This estimate includes the contribution to organic crop production, which uses CPP derived from natural substances.

A summary of the estimates in this chapter are presented in the table below.

Table 3.7: CPP contribution to Australian crop production

	Herbicide	Insecticide	Fungicide	Total CPP
Field crops (broadacre) ($m)	4,480	2,174	1,384	7,736
Vegetables ($m)	1,284	2,107	3,358	4,944
Fruits and nuts ($m)	239	2,344	4,034	4,034
Other crops ($m)	524	176	174	865
Total ($m)	**6,527**	**6,801**	**8,950**	**17,579**

Source: Deloitte Access Economics. Note: sum may not equal to total due to rounding and weighting.

The agricultural output attributable to CPP is different to the contribution to value added (ie the contribution to GDP) of CPP. For each dollar of agricultural output, the direct plus indirect economic value added associated with that output is approximately $0.84.[5]

Therefore, $17.6 billion of agricultural *output* equates to direct plus indirect *value added* of $14.8 billion.

5 Derived from ABS 2008-09 input output tables, catalogue 5209.0.55.001

Conclusion

This report presents an economic contribution of CPP and an estimate of its value based on the share of yield attributable to use of CPP.

The CPP industry has a number of linkages to other sectors. These include sectors that provide inputs into production and those that provide services to the users of CPP products, such as spray contractors and agronomists. The users of CPP include the agriculture, government and household sectors.

The Australian CPP sector produced almost $2.5 billion in output in 2011-12, as measured at the factory gate. Its total economic contribution was $1.8 billion to value added and over 9,250 full time equivalent employees.

In terms of contribution to the value of crop production, it is estimated that up to $17.6 billion of Australian agricultural production is attributable to CPP, or 68% of the total value of crop production (where CPP includes synthetic chemicals widely used in traditional agricultural production and naturally-occurring chemicals used in organic production). This production involves up to $14.8 billion in direct plus indirect value added.

While this study is not a cost-benefit analysis and does not consider or compare the relative magnitudes of costs in relation to the benefits, nor does this study estimate the economic impact if CPP became unavailable and different farming practices were adopted, it can be seen that there is significant economic activity relating to the use of CPP.

In dollar terms, fungicide has the largest contribution to agricultural production, related to their use on vegetable and fruit and nut crops. For broadacre however, which makes up more than half of total value of agricultural production in Australia, herbicide is the largest contributor to the value of production. CPP have a major role in crop production, which would be greatly diminished in value in the absence of their use.

References

AEC Group, 2002. "Economic Impact of State and Local Government Expenditure on Weed and Pest Animal Management in Queensland". Local Government Association of Queensland Inc.

Australian Bureau of Statistics (ABS) 2012, Australian National Accounts: Input-Ouput Tables, 2008–09, http://www.abs.gov.au/AUSSTATS/abs@.nsf/Lookup/5209.0.55.001Main+Features12008-09?OpenDocument.

Australian Bureau of Agricultural and Resource Economics and Sciences (ABARES) 2013, Agricultural commodities: March quarter 2013, http://www.daff.gov.au/abares/publi cations_remote_content/publication_topics/commodities?sq_content_src=%2BdXJs PWh0dHAlM0ElMkYlMkYxNDMuMTg4LjE3LjIwJTJGYW5yZGwlMkZEQUZGU2VydmljZS UyRmRpc3BsYXkucGhwJTNGZmlkJTNEcGJfYWdjb21kOWFiY2MwMDQyMDEzMDNfM TFhLnhtbCZhbGw9MQ%3D%3D.

Australian Farm Institute 2012, US and Australian Agriculture—many similarities and some critical differences, http://www.farminstitute.org.au/_blog/Ag_Forum/post/US_and_ Australian_agriculture_-_many_similarities_and_some_critical_differences/.

Australian Pesticides and Veterinary Medicines Authority (APVMA) 2013, Notice—Final Pesticide and Veterinary Medicines Product Sales 2011-12 Financial Year, http://www.apvma.gov.au/publications/gazette/2013/03/gazette_20130211_p18.pdf.

CropLife Australia 2012, Crop Protection, http://www.croplifeaustralia.org.au/default.asp?V_DOC_ID=1901.

CropLife Canada 2011, Cultivating a vibrant Canadian economy - the contributions of crop protection products and plant biotechnology, http://www.croplife.ca/wp- content/uploads/2012/02/Cultivating-a-vibrant-Canada-full-report_August-2011_FINAL.pdf.

Gianessi, L., 2009. "The Value of Insecticides in US Crop Production." Croplife Foundation Crop Protection Research Institute.

Gianessi, L., and Regier, N., 2006. "The Value of Herbicides in U.S. Crop Production—2005 Update". Croplife Foundation Crop Protection Research Institute. 2005. "The Value of Fungicides in U.S. Crop Production." Croplife Foundation Crop Protection Research Institute.

IBISWorld 2013, Pesticide manufacturing in Australia, IBISWorld industry report C1832. Mark Goodwin and Associates Ltd 2011, The contribution of crop protection products to the United States economy, http://www.croplifeamerica.org/economic-impact.

University of Florida 2012, Pesticide use trends in the U.S.: Agricultural Pesticides, http://edis.ifas.ufl.edu/pi176.

U.S. Census Bureau 2012, Statistical Abstract of the United States: 2012—Section 17 Agriculture, http://www.census.gov/prod/2011pubs/12statab/agricult.pdf.

USDA, National Agricultural Statistics Service 2007, 2007 Census of Agriculture—United States Data, Table 1 Historical Highlights: 2007 and earlier Census years, http://www.agcensus.usda.gov/Publications/2007/Full_Report/Volume_1,_Chapter_1_US/st99_1_001_001.pdf.

Appendix A—Gianessi data

Table A.1: Share of yield attributable to CPP (%)

Crop	Herbicide	Insecticide	Fungicide	Total CPP	Category
Alfalfa		5		5	V
Almond	5	43	70	100	FN
Apple	15	93	86	100	FN
Artichoke	16	60	35	100	V
Asparagus	55	67	22	100	V
Avocado		48		48	FN
Banana			75	75	FN
Barley			9	9	FC
Blueberry	67	69	75	100	FN
Broccoli	14	75		89	V
Cabbage		64	65	100	V
Canola	45			45	FC
Cantaloupe			60	60	FN
Carrot	48	10	95	100	V
Celery	0	48	92	100	V
Cherries		84	92	100	FN
Citrus	0		88	88	FN
Collard			78	78	V
Corn	20	3		23	FC
Cotton	27	30	12	69	FC
Cranberry	50	50	87	100	FN
Cucumber	66	34	77	100	V
Date		85		85	FN
Dry bean	25			25	FC
Eggplant		25		25	V
Garlic			61	61	V
Grape	1	35	100	100	FN
Green bean	20	58	65	100	V
Green pea	20	22		42	FC
Hazelnut		45	60	100	FN
Hop	25	100	100	100	FC
Hot pepper	0		44	44	V
Kiwi			33	33	FN
Lettuce	13	50	85	100	V
Mint	58	54	16	100	V
Nectarine		64	89	100	FN
Olive		90	84	100	FN
Onion	43	22	100	100	V
Orange		77		77	FN
Papaya			100	100	FN
Parsley			66	66	V
Peach	11	51	91	100	FN
Peanut	52	55	92	100	FN
Pears		85	89	100	FN
Pecan		56	72	100	FN
Pistachio		64	39	100	FN
Plums & prunes			66	66	FN
Potato	32	29	94	100	FC
Raspberry	0	55	97	100	FN
Rice	53	13	54	100	FC
Sorghum	26	8		34	FC
Soybean	26	5	3	34	FC
Spinach	50	16	71	100	V
Strawberry	30	56	97	100	FN
Sugar beet	29	23	78	100	V
Sugarcane	25	22		47	FC
Sunflower	16	50		66	FC
Sweet corn	25	28	36	89	FC
Sweet peppers		53	80	100	V
Sweet potato	20	45		65	V
Tomato	23	53	77	100	FN
Walnut		36	54	90	FN
Wheat	25	3	9	37	FC
Wild Rice	50		20	70	FC

Sources: Gianessi 2005, 2006 and 2009. *Note: categories FC=field crop (broadacre), V = vegetables (includes herbs), FN = fruits and nuts. Blanks indicate no data was available.

Limitation of our work

General use restriction

This report is prepared solely for the use of CropLife Australia. This report is not intended to and should not be used or relied upon by anyone else and we accept no duty of care to any other person or entity. The report has been prepared for the purpose of estimating the economic activity in Australia that is attributable to crop protection products. You should not refer to or use our name or the advice for any other purpose.

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