



Newsletter of the Weed Society of Victoria Inc.

volume 27 issue 4 2016

Weedscene



More Images from the 6th WSV Biennial Weed Conference

Invasive Species Management in Victoria: Past, Present and Future

The Weed Society of Victoria celebrated its 50th Anniversary with the 6th Biennial Weed Conference at Creswick on 7–9 June 2016. Attendees to the field trip (below) on the final day

were treated to the satisfying munch of a forestry mulcher and tractor fitted with a mulching implement (above), rapidly chewing their way through a gorse infestation.



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WSV Membership Rates 2016-17

Pay for 1, 3 or 5 years

Concession*	\$20
Ordinary	\$60
Corporate	\$140

* Students and Pensioners

WSV is not registered to collect GST

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COVER PHOTO: *Ulex europaeus* (courtesy Rob Richardson)

Joining the Weed Society of Victoria

The benefits of membership to WSV include:

- Weedscene: newsletter packed full of information
- eWeedscene: regular electronic bulletin on weed news and events
- Discounts to WSV seminars, workshops, conferences and other events
- Opportunities to network with others.

To apply for membership, download and print the membership application form from the WSV website, www.wsvic.org.au, complete the details and mail to the WSV Secretary.

Weedscene Newsletter of the Weed Society of Victoria Inc.

- Contributions to Weedscene are welcomed. Please contact the editor for further information.
- Readers are free to circulate and reproduce Weedscene material with acknowledgment of the author and source.
- The views expressed in Weedscene are those of the contributors and are not necessarily shared by the WSV Executive Committee.

Want to receive Weedscene as a PDF? Contact the Secretary.

Society Sponsorship

Annual Sponsorship \$300

- Logo displayed on 'Weedscene' – four issues per year
- Logo and sponsor name on the Society's website
- One promotional article in 'Weedscene' per year (subject to ed. control)
- One free membership per year (optional)

Advertising rates

■ One sixth page	56 mm wide × 128 mm high	\$50
■ Quarter page	180 mm wide × 64 mm high	\$75
■ Half page	180 mm wide × 128 mm high	\$150
■ Whole page	180 mm wide × 257 mm high	\$300

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www.weedinfo.com.au

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Jennifer Johnson (left) explained weed works undertaken in the Creswick-Bloomfield Rail Reserve. Jennifer was instrumental in conference field trip planning with WSV Past President Matt Stephenson. She is a project officer with the Victorian Gorse Taskforce and has been very successful in facilitating landholder uptake of gorse control, using her engaging and sensitive personal approach.



Keith Primrose (above) asked the question ‘Can managing deer in parts of the Alpine National Park using ground shooting mitigate deer impacts on alpine peatlands?’ and answered with what has been learnt so far in the adaptive, evidence-based approach to deer management undertaken by a partnership between state and federal government agencies, CMAs and deer, game and shooters groups – a cooperative exercise in ‘learning by doing’.

Tony Thake (below) of Bald Hills Creswick Landcare group gave a tour of Park Lake restoration which includes a botanical reserve designed by Kevin Tolhurst (University of Melbourne, Creswick campus).



Lunch was enjoyed at the very pleasant Mays’ Captains Creek Winery (below) in Blampied, where we heard from Ray Draper of Central Highlands Environmental Consultancy about conserving the local Growling Grass Frog.



The conference proceedings can be found at: <http://www.wsvic.org.au/node/117>. PowerPoint conference presentations, and their smaller pdf versions, have been shared on: <https://onedrive.live.com/?id=f2a2fc18671598f8%211568&cid=F2A2FC18671598F8>.

Weeds at the Early Stage of Invasion (WESI) Project

New Tools to Help with Early Invaders

by Rebecca James

A series of new publications to assist with the management of early invaders has recently been published by the Department of Environment, Land, Water and Planning (DELWP). Increasingly around the world, the benefits of preventing and ‘nipping new weeds in the bud’ before they become widespread are being appreciated.

The Weeds at the Early Stage of Invasion (WESI) Project was created to promote these benefits and enable DELWP and Parks Victoria public land managers adopt this approach. The WESI project focuses on high risk invasive species that threaten biodiversity when they are at the early stage of invasion (early invaders) on public land anywhere in Victoria.

The series of six guides provides step-by-step information to plan and undertake the following work: search and detect; name and notify; assess the risk; delimit the invasion; decide the response; and implement eradication. The series will benefit other land managers and groups.

A monthly email update about early invaders is available from rebecca.james@delwp.vic.gov.au and you can follow the WESI team activities on <https://twitter.com/weedyk8> and <https://www.facebook.com/weedyk8>



Kate Blood (left) and Rebecca James

WESI is funded through the Weeds and Pests on Public Land Program.



The guides are available at www.delwp.vic.gov.au/early-invaders

Invasive Plants PhD Research Projects

This is the sixth in our series on invasive plants research projects being undertaken by PhD candidates in Victoria.



Diversity and Ecosystem Consequences of Multispecies Invasion in a Dry Forest Plant Community

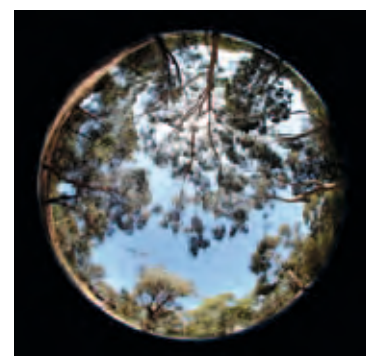
PhD candidate, Chris McGrannachan, is supervised by Melodie McGeoch and Ros Gleadow of Monash University

Successful establishment of weed species in novel environments is often associated with functional traits that promote high performance, such as plant height and leaf area. However, these traits can be strongly dependent on other factors such as the prevailing environmental conditions and on interactions with the native community they are invading.

Many of the factors that govern the trait makeup of weed species are also significant for native species because they will determine the type of impact that the weed has on the local community. Examining whether alien weed species and native plant species have traits that are functionally similar (e.g. similar flowering duration) or different (e.g. weeds taller than natives) is important in investigating how weed species affect community structure.

Not only can the structure of native communities (such as the growth forms of plant species present) be influenced by weeds and their traits, but ecosystem processes can also be affected. Dominant and abundant weed species may alter processes such as primary productivity by having trait values different to local native plant species. This could have consequences for local ecosystems such as decreased or increased productivity, or flow-on effects to other ecosystem processes.

Of particular importance is the effect that multiple weed species in the same community have jointly on ecosystem functioning, an area of research that requires more attention.



Above: hemispherical photo of a field plot canopy, used to obtain measurements of plant area index.

The aim of this research is to examine how weedy plant communities differ in their traits from native plant communities in a dry forest understorey ecosystem in south east Australia, and how invasion by multiple weed species affects the functioning of native communities. Also examined is whether ecosystem functioning is affected by weed species and their traits by examining differences in primary productivity, biomass and dispersal ability across sites of varying invasion intensity.



The work is being done in Chiltern Mt Pilot National Park and will look at how trait differences between weeds and native plants relate to other aspects of the community such as taxonomic (phylogenetic) relatedness and species richness. Trait data collected from field sites, as well as existing trait data from the literature and existing trait databases, are used.

This data is then applied to a range of spatial scales, from the whole of Chiltern-Mt Pilot National Park down to the subplot level (20 m²). Data on species abundance, environmental factors and biomass have also been collected to help answer these research questions.

The outcome of this research could have important management and policy implications by helping to determine if weed assemblages with either similar or different trait values to native species are more likely to detrimentally impact upon native communities and the functioning of these dry forest systems.

Left: field site in Chiltern-Mt Pilot National Park.



In the Media

2016 Australasian Weeds Conference

The AWC caught the attention of ABC Rural which posted a few words and photos, at: www.abc.net.au/news/2016-09-14/stephen-powles-ahri/7845382
www.abc.net.au/news/2016-09-14/dr-marco-busch/7845348

2016 AWC proceedings can be found at: http://caws.org.au/awc_contents.php?yr=2016

Revised National Pest Animal and Weeds Strategies

Public consultation commenced on the revised Australian Pest Animal Strategy 2017 to 2027 and the Australian Weeds Strategy 2017 to 2027. Submissions closed on 14 October 2016.

www.agriculture.gov.au/pests-diseases-weeds/pest-animals-and-weeds/

Critique of Draft National Pest Animal and Weeds Strategies

Former WSV committee member, Andrew Cox (who relocated to NSW), has posted a critique of the draft national pest animal and weeds strategies in the Invasive Species Council blog, the Feral Herald, titled 'Pest and Weed Strategies Let Us Down'.

Access: <https://invasives.org.au/blog/pest-weed-strategies-let-us/>

New Biosecurity Legislation

The *Quarantine Act 1908* was repealed on 16 June 2016 and replaced by the *Biosecurity Act 2015*. For more information on the new legislation, including an interactive eLearning tool for industry, visit: www.agriculture.gov.au/biosecurity/legislation/new-biosecurity-legislation.

The Act can be downloaded at the Federal Register of Legislation: www.legislation.gov.au/Details/C2015A00061

Unregulated Internet Trade of Invasive Species

The Guardian reported that Amazon and eBay have hosted listings of invasive species, and on the unregulated trade of invasive species via e-commerce. The article includes a link to an Invasive Species and E-commerce White Paper issued in 2012 by the US Department of the Interior, which discusses recommendations for reducing the risk of introductions from e-commerce.

www.theguardian.com/environment/2016/may/06/amazon-and-ebay-hosting-ads-for-banned-invasive-species

WoNS Species Can Sneak Past Quarantine

Another Guardian report on internet trading sites offering declared species for sale by overseas sellers, at: www.theguardian.com/environment/2016/may/23/australias-worst-invasive-species-available-for-import-on-amazon-and-ebay?CMP=share_btn_fb

Sagittaria Sold by Bunnings in NT

ABC News and other media reported that the NT Environment Department issued an urgent plant recall after at least 27 pots of *Sagittaria*, incorrectly labelled as melon sword by a Top End wholesaler, were mistakenly sold to Bunnings customers in Darwin and Palmerston.

Access: www.abc.net.au/news/2016-09-22/bunnings-caught-selling-declared-weed-sagittaria-to-customers/7869226

Sagittaria Plants Still Missing

Half the *Sagittaria* plants mistakenly sold to Bunnings customers in the NT have not been recovered. ABC Rural reported on the Northern Territory Weeds Management Branch appeal to the public to help find 14 *Sagittaria* plants: www.abc.net.au/news/2016-10-20/ntch-sagittaria-update/7950204

New Weeds Research Partnership

The Herbicide Innovation Partnership between the GRDC and Bayer has commenced at Bayer's global Weed Resistance Competence Centre in Frankfurt, Germany. Bayer is providing newly-renovated research facilities and the GRDC is contributing \$45 million over five years to the project which will employ 39 scientists, including 11 postdoctoral researchers from Australia and New Zealand, to work on next-generation weed-control solutions. GRDC chair Richard Clark said that growers have directly influenced the research focus of the GRDC through regional panels and cropping solution groups, with a consistent message that the biggest problem they face is managing herbicide resistant and poorly controlled weeds. Global weed resistance has increased by 60 per cent in the past 15 years, whilst no new herbicide mode of action has been discovered. A new GRDC-CSIRO report titled Impact of Weeds on Australian Grain Production shows weeds cost Australian grain growers more than \$3 billion annually. <https://grdc.com.au/GC122-WeedsResearch>

New Method for Testing Herbicide Resistance

A new method for testing herbicide resistance in a dicot weed has been developed at the University of Illinois. The method measures metabolism rate and does not require genetic information. The rate of herbicide metabolism is an indication of herbicide resistance, and can be measured

using radioactively-labelled herbicide applied to excised leaves. Herbicide metabolism rate can be more effectively quantified in leaves which have been removed from the plant because they are unaffected by whole-plant processes such as translocation.

Link to media release and journal reference at: www.sciencedaily.com/releases/2016/04/160407150821.htm

How Soil Biota Drive and Respond to Plant Invasions

The latest special feature in British publication, Journal of Ecology, is titled 'Digging Deeper – How Soil Biota Drive and Respond to Plant Invasions'.

Link to webpage with free access to articles: <http://onlinelibrary.wiley.com/doi/10.1111/jec.2016.104.issue-5/isuetoc?hootPostID=6c489139fba8b7ef6ca8260617973929#group1>

Standards for Ecological Restoration in Australia

The journal Restoration Ecology has published the free access policy article 'National Standards for the Practice of Ecological Restoration in Australia'. Access: <http://onlinelibrary.wiley.com/doi/10.1111/rec.12359/full>

Calicivirus Release

ABC's Landline reported that the Federal Government has announced the approval to release a Korean strain of the calicivirus next autumn when adult rabbit numbers peak. Video and transcript of interviews with, *inter alia*, Tarnya Cox (RHD Project Leader), John Matthews (Vic. Biosecurity Manager), Andreas Glanznig (CEO Invasive Animals CRC), Di Evans (RSPCA), Barnaby Joyce (Agriculture Minister), Michael Reid (National Rabbit Facilitator) and Mark White (vaccine manufacturer): www.abc.net.au/landline/content/2016/s4453354.htm

ABC Rural also reported on the national release of the new strain of calicivirus using carrot baits, at: www.abc.net.au/news/2016-11-04/sites-selected-rabbit-virus-release/7997156

Serrated Tussock Projects Renewed for 2016/2017

The Victorian Serrated Tussock Working Party (VSTWP) announced three new extension projects for the Inverleigh, Ballan and Gisborne South regions, covering nearly 15,000 ha. VSTWP Extension Officers are offering free inspections and providing expert advice to over 500 landowners, with the aim of building the capacity of landowners to identify and control this weed. Info at: www.serratedtussock.com

Keep Up-To-Date on Weeds

Wonderful 'Weed Woman', Kate Blood, sends instant info from weed conferences, etc., via twitter at: <https://twitter.com/weedyk8>

More weed info can be found on the Tasmanian Weeds Facebook page at: www.facebook.com/groups/935310869879238/



Follow progress on gorse control at the Facebook page of Jennifer Johnson ('tour-guide' for the 2016 WSV conference field trip), Gorse Project Officer - Ballarat region, at: www.facebook.com/GorseProjectOfficerBallarat/

And here is the WSV Facebook page, which has logged a lot of activity since initiation in November 2015: www.facebook.com/groups/WeedSocietyofVictoriaInc/

Weeds of National Significance

Weeds of National Significance (WoNS) webpages are now located on the Atlas of Living Australia website (having moved from the redundant www.weeds.org.au/). Access: <http://weeds.ala.org.au/WoNS/>

Victorian Biodiversity Atlas Updated

The Department of Environment, Land, Water & Planning (DELWP) has recently updated the Victorian Biodiversity Atlas, which is DELWP's main source of data for indigenous and introduced flora and fauna species, across terrestrial, marine and freshwater environments. Over 1.1 million records have been added to the Atlas, taking the total to 6.5 million records, and the Atlas's accessibility has also been improved. Access: <http://delwp.vic.gov.au/environment-and-wildlife/biodiversity/victorian-biodiversity-atlas>

Latest Version of VicFlora Released

Royal Botanic Gardens Victoria has released a new version of VicFlora, an online guide to plants of Victoria which includes species descriptions, keys, distribution maps and over 10,000 images. Access: <https://vicflora.rbg.vic.gov.au/>

MyWeedWatcher

Western Australia's Dept. of Agriculture and Food has developed the new MyWeedWatcher app for community use to identify, survey and report weeds, and view results online, using smartphone and tablet devices. Information gathered through MyWeedWatcher will be used to help community groups, local biosecurity groups, and the Dept. make more informed management decisions on weeds within WA. More info at: www.agric.wa.gov.au/weed-surveillance

If You Can't Beat Them, Eat Them

The ABC has provided a useful guide to the safe foraging and nutritional benefits of weeds. Ten edible weeds are featured, with advice and recommendations for their use.

Access: www.abc.net.au/news/health/edible-weeds-and-how-you-can-use-them/7406004?section=health

Continued on page 8/...

Weed-Killing Robot

ABC Rural reported on a weed-killing robot developed by the Queensland University of Technology. About the size of a golf buggy, AG BOT II is equipped with a rig for spraying chemicals and distributing fertiliser. There is also potential for mechanical treatment of herbicide resistant weeds. The solar-powered robot identifies weeds from camera images using trained artificial intelligence. The technology could reduce the cost of weed control by 90 per cent, potentially saving the farm sector \$1.3 billion a year.

Access: www.abc.net.au/news/2016-10-21/weed-killing-robot-could-save-billions/7954680

Reduced Property Inspections for Invasive Weeds and Pests in Victoria

The Weekly Times reported on the halving of property inspections for invasive weeds and pests since 2011. Victorian Government performance reporting indicated a reduction in the number of properties inspected from 4971 in 2011–12, to 3300 in 2014–15 and 2300 last financial year. The Victorian Government has committed an extra \$20.6 million in this year's State Budget, to return the state's biosecurity budget to \$80 million a year. However, only one year's funding has been allocated, causing concern within the farming sector. www.weeklytimesnow.com.au/news/national/weed-and-pest-control-victoria-slashes-fight/news-story/a9d1f74f870f979e8c576f13e407190e

Replacing Weeds with Suitable Species

Bushland manager and blogger, John Loschiavo, discusses not just removing weeds but replacing them with suitable species to re-create habitat recently provided by weeds, at: <https://thebushlander.wordpress.com/2016/07/10/of-weeds-and-habitat/>

Inquiry Launched into Management and Impact of Invasive Weeds in Queensland

ABC Rural reported on the Queensland Government's inquiry into the effectiveness of government weed-control programs. The inquiry will focus on funding adequacy and coordination between local, state and federal government programs. Three weeds have been nominated as case studies to help inform the Agriculture and Environment Committee and the inquiry terms of reference.

Access: www.abc.net.au/news/2016-11-15/queensland-launches-weed-inquiry/8027440

Biocontrol of *Mimosa pigra* in NT

Trainees from the Australian Defence Force's Indigenous Development Program have joined Territory Natural Resource Management in a collaborative program releasing flea beetles to suppress *Mimosa pigra*: www.abc.net.au/news/2016-11-10/flea-beetle-versus-mimosa/8005686

Dates for your Diary

January 2017

28th USDA Interagency Research Forum on Invasive Species
Annapolis, Maryland USA. 10–13 January 2017
www.nrs.fs.fed.us/disturbance/invasive_species/interagency_forum/

February 2017

Weed Science Society of America Annual Meeting
Tucson, Arizona USA. 6–9 February 2017
<http://wssa.net/meeting/2017-meeting/>

May 2017

North American Invasive Species Forum
Savannah, Georgia USA. 9–11 May 2017
www.invasivespecies2017.org/

Challenge Accepted

2nd Global Herbicide Resistance Conference
Denver, Colorado USA. 14–18 May 2017
www.ghrc2017.org/

July 2017

IBC 2017 – XIX International Botanical Congress
Shenzhen, China. 23–29 July 2017
www.ibc2017.cn/

August 2017

Linking Biodiversity, Material Cycling and Ecosystem Services in a Changing World
102nd Ecological Society of America Annual Meeting
Portland, Oregon USA. 6–11 August 2017
www.esa.org/portland/#.WCbLsS197IU

New Zealand Plant Protection Society Conference
Tauranga, New Zealand. 8–10 August 2017
www.nzpps.org/conference.php

September 2017

Weed Science for People, Agriculture, and Nature
26th Asian-Pacific Weed Science Society Conference
Kyoto, Japan. 19–22 September 2017
www.c-linkage.co.jp/apwss2017/



CAWS Reports

by Ingrid Krockenberger

10 March 2016 meeting

CAWS is now a paid-up associate member of the Asian-Pacific Weed Science Society.

Alex Douglas will be stepping down as Treasurer at the next AGM in September. She is allowing plenty of time for a smooth hand-over to her as-yet unknown successor. She was thanked for all her work for CAWS over the years.

Sandy Lloyd of the Weeds Society of Western Australia reported on further progress organising the Australasian Weeds Conference, to be held in September 2016 in Perth. The CAWS oration will be delivered by Steve Powles and GRDC researchers will be presenting reports as part of the conference. Possible group sessions and training sessions that CAWS could help organise were discussed, with a reminder that staff development sessions were included in the Tasmania conference to encourage employers allowing their workers to attend.

Sue Hinton is valiantly trying to activate the Tasmanian Weed Society again, following attrition due to redundancies a while ago. They are currently considering merging with the WSV or other invasive species societies in Tasmania as most weed officers now must cover all pests as part of their jobs.

Applications for Travel Awards closed on 1 March, with 11 applications received (3 for conference travel award, 1 for young scientist travel award and 7 for student awards). A selection sub-committee was formed to decide how the available funds would be distributed.

There was some discussion of payment of fees (overpayment or in arrears) resulting from earlier confusion and complaint to the WA Dept of Commerce. Some societies did not want to pursue this further and were happy for possible overpayment to be considered a donation to CAWS and it was decided that CAWS should not audit their past invoices until a formal auditor's report has been received from NSW showing that errors have been made.

It was decided that CAWS provide an interest-free loan of \$5000 for three years to Rob and Fiona Richardson to support the publication of the 3rd edition of 'Weeds of the South-East', contingent on sufficient funds being available. CAWS has provided financial support in the past. Other weed societies have been approached, with NSW offering an interest-free loan of \$5000 for three years.

16 June 2016 meeting

Much of the June meeting was taken up by reporting on preparations for the upcoming Australasian Weeds Conference (AWC) in Perth. This included discussion of possible sponsors, and the publication of conference proceedings (in addition to the CAWS website) for the benefit of authors – CABI and Scopus databases will be scoped after the conference.

An out-of-session vote at the end of March ratified the selections of the travel awards sub-committee, with the following results: \$1000 Australasian Weeds Conference Travel Awards to Adam Muyt and Henry Rutherford; \$2000 Student Travel Awards to Monique Smith and Ali Bajwa; \$400 conference fee for Robert Cirocco. The profiles of the travel award recipients can be found under the Awards tab on the CAWS website (<http://caws.org.au/>).

Changes to the CAWS constitution will be required in order to align with changes in the *WA Associations Incorporation Act 2015*, but it was decided to postpone this until after the AWC. Updating of Annual Action Plans will be required over the coming months.

11 September 2016 meeting

This meeting was held in Perth on the Sunday prior to the Australasian Weeds Conference (AWC), and was followed by the AGM. Sandy Lloyd of the conference organising committee reported that \$26,000 in sponsorship had been achieved, with the substantial contribution of \$19,000 from the Grains Research & Development Corporation (GRDC). The number of delegates attending was about 260.

Publishing options for the conference proceedings were discussed (such as providing abstract only, rather than a full paper), with the aim of flexibility to allow authors to publish findings elsewhere as well and therefore potentially encourage more presenters. This will be considered for future AWCs.

Journalists from ABC Rural were attending 3 days of the AWC, and GRDC Groundcover was also reporting. (See 'In the Media' for links to two ABC Rural reports. GRDC Groundcover has not published on AWC at the time of writing.)

The only change to the CAWS committee is Michael Widderick as Treasurer following the resignation of Alex Douglas. Alex was thanked for her long service in the role.

The next ordinary meeting will be held on 8 December 2016, and the next AGM in September 2017 (TBA).

Weeds of the South-East

Third edition now available

The third edition of popular *Weeds of the South-East – an identification guide for Australia* by Rob & Fiona Richardson and Ros Shepherd is now available. Once again, this new edition has been fully updated and reorganised to recognise recent taxonomic changes and includes additional species, many new photographs and the latest distribution information.

Other features include:

- an illustrated glossary
- a section using flower colour and shape as an aid to plant identification
- species include weeds of agriculture, bushland, waterways, gardens, roadsides, wasteland and amenity areas, as well as new and emerging problem species
- illustrated with more than 3000 photographs including spectacular close-up shots
- key features are described with relevant measurements for easier identification
- comparisons are made to similar species and easily confused natives
- situations where the species are likely to be found
- distribution by State using the latest herbaria records



Written in easy-to-understand language and beautifully illustrated, this is a field guide for anyone interested in the identification of pest plants and the preservation of our native flora.

An essential tool for community land and bush care organisations, local and state government weed officers and advisers, rangers, agronomists, agriculturists, survey and identification botanists, horticulturists, landscapers and gardeners.

Supported by: Council of Australasian Weed Societies, Weed Society of New South Wales, Weed Management Society of South Australia, Tasmanian Weed Society and Weed Society of Victoria.

ISBN 9780980388541, 576 pages

Published by R.G. and F.J. Richardson

RRP \$79.95 (includes GST) + p&p

For more information visit <http://www.weedinfo.com.au/>

Sample page – Glossary:

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Special offer price \$64.00 + \$13.50 p&p per order

Please order by:

- Email richardson@weedinfo.com.au
- Fax 03 5286 1533














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**Offer valid until
31 December 2016**



Sample pages – Identification using flower colour and shape:

xivi		IDENTIFICATION USING FLOWER COLOUR AND SHAPE		IDENTIFICATION USING FLOWER COLOUR AND SHAPE		xlvii	
PINK FLOWERS							
SHAPE	NARROW-LEAF HERBS	BROAD-LEAF HERBS		TREES / SHRUBS	CLIMBERS/SCRAMBLERS	AQUATIC / WETLAND	
3 'PETALS'		<i>Impatiens bifurcata</i> 186				<i>Alisma lanceolatum</i> 8	
4 'PETALS'	 Papaver	<i>Cakile</i> spp. 206	some <i>Oenothera</i> spp. 372	<i>Fuchsia magellanica</i> 370	<i>Clematis montana</i> 418	<i>Galium palustre</i> 443	
		<i>Choripora tenella</i> 209	<i>Papaver somniferum</i> 384		some <i>Galium</i> spp. 442	<i>Rotala rotundifolia</i> 348	
		<i>Epilobium</i> spp. 369	<i>Raphanus sativus</i> 219		most <i>Fumaria</i> spp. 382	<i>Veronica catenata</i> 399	
		some <i>Galium</i> spp. 442	<i>Sherardia atrensis</i> 445				
		<i>Matthiola</i> spp. 217	some <i>Veronica</i> spp. 398				
5 'PETALS'	 Spergularia	<i>Agrostemma githago</i> 238	some <i>Malva</i> spp. 351	<i>Astartea heterantha</i> 360	<i>Araujia sericifera</i> 123		
	 Ceratium	<i>Alcea rosea</i> 350	some <i>Oxalis</i> spp. 377	<i>Chenopodium speciosum</i> 426	<i>Passiflora carulea</i> 385		
		some <i>Centaurium</i> spp. 325	<i>Paronia hastata</i> 354	<i>Cistus creticus</i> 258	<i>Passiflora tarminiana</i> 387		
	 Coriandrum	<i>Centella</i> spp. 117	<i>Polygonum</i> spp. 329	<i>Colomena pulchellum</i> 445			
		<i>Centranthus</i> spp. 235	<i>Petrohagia</i> spp. 243	some <i>Cotoneaster</i> spp. 426			
	 Nerium	<i>Claytonia perfoliata</i> 413	<i>Phyllopodium cordatum</i> 455	some <i>Crataegus</i> spp. 428			
		<i>Collomia grandiflora</i> 402	<i>Portulaca grandiflora</i> 413	<i>Cydonia oblonga</i> 429			
	 Mibura	<i>Coriandrum sativum</i> 118	<i>Saponaria officinalis</i> 244	<i>Hibiscus pedunculatus</i> 350			
		some <i>Crassula</i> spp. 265	<i>Scabiosa atropurpurea</i> 237	<i>Lagunaria patersonia</i> 351			
	 Galenia	<i>Cynoglossum creticum</i> 195	<i>Sedum caespitosum</i> 268	<i>Malus pumila</i> 429			
		<i>Dianthus armeria</i> 240	some <i>Silene</i> spp. 245	<i>Nerium oleander</i> 125			
		<i>Erodium</i> spp. 326	<i>Solanum elaeagnifolium</i> 468	some <i>Prunus</i> spp. 431			
		<i>Fagopyrum esculentum</i> 406	<i>Spergularia</i> spp. 247	<i>Pyra communis</i> 435			
		<i>Galenia pubescens</i> 104	<i>Talinum paniculatum</i> 414	<i>Rhaphidopsis indica</i> 435			
		<i>Geranium</i> spp. 328	<i>Vaccaria hispanica</i> 249	<i>Ribes sanguineum</i> 331			
		<i>Gypsophila tubulosa</i> 241	<i>Valerianella ericarpa</i> 237	some <i>Rosa</i> spp. 436			
		<i>Hedistropium curassavicum</i> 198	<i>Verbascum blattaria</i> 456	some <i>Rubus</i> spp. 437			
		some <i>Impatiens</i> spp. 186	some <i>Verbena</i> spp. 479	<i>Solanum betaceum</i> 467			
		some <i>Limnium</i> spp. 401	<i>Zaleya galeculata</i> 108	some <i>Spiraea</i> spp. 441			
		<i>Lysimachia minima</i> 415		<i>Vernicia fordii</i> 280			
				<i>Viburnum</i> spp. 102			
6+ 'PETALS'	 Romulea	<i>Allium ampeloprasum</i> 10	<i>Canna x generalis</i> 26	<i>Aconium haworthii</i> 263	<i>Passiflora carulea</i> (petal-like sepals included) 385	<i>Lythrum junceum</i> 348	
	 Asphodelus	<i>Allium paniculatum</i> 10		<i>Austrocylindropuntia subulata</i> 225	<i>Passiflora tarminiana</i> (petal-like sepals included) 387		
		<i>Allium vineale</i> 11		some <i>Cylindropuntia</i> spp. 225	<i>Pereskia aculeata</i> 231		
	 Freesia	<i>Asphodelus fistulosus</i> 25					
		<i>Freesia laxa</i> 41					
	 Moraea	some <i>Lila</i> spp. 44					
		some <i>Moraea</i> spp. 45					
	 Sisyrinchium	some <i>Romulea</i> spp. 46					
		<i>Sisyrinchium rosulatum</i> 47					
IRIS-LIKE	<i>Moraea vegeta</i> 46						
PEA FLOWERS	 Lathyrus	<i>Desmodium uncinatum</i> 288	<i>Pisum sativum</i> 303	<i>Alhagi maurorum</i> 285	<i>Dipogon lignosus</i> 289		
		<i>Lupinus polyphyllus</i> 297	<i>Polygala paniculata</i> 404	<i>Indigofera decora</i> 292	some <i>Lathyrus</i> spp. 292		
		<i>Macroptilium lathyroides</i> 298	<i>Scarrigera curia</i> 306	<i>Marrubium heisteria</i> 403	<i>Macroptilium lathyroides</i> 298		
		some <i>Trifolium</i> spp. xii	some <i>Trifolium</i> spp. 307	<i>Ononis</i> spp. 302	<i>Puraria lobata</i> 304		
		<i>Oenothera vicifolia</i> 302		<i>Polydora sericea</i> 304	<i>Vicia disperma</i> 313		
		some <i>Oenothera</i> spp. 303		<i>Robinia pseudacacia</i> 305	<i>Vicia hirsuta</i> 314		
				<i>Tephrosia glomeruliflora</i> 307	<i>Vicia sativa</i> 314		
				<i>Tephrosia grandiflora</i> 307			

Sample pages – Identification guide:

228		DICOTYLEDONS • CACTACEAE	229		DICOTYLEDONS • CACTACEAE
		1-7 sharp, rigid spines (1-4 cm long), light brown woolly hairs and brown glochids. Flowers (2.5-5 cm across) are pale to bright yellow. Fruit is smooth, spiny, pear-shaped, matures to red-purple, but does not produce viable seed. Often found along waterways. [NSW, Vic, SA, Qld]			off. The upper stem segments (25-50 cm long) are dull grey-green to blue-green, oval to broadly oblong and often fairly thick. Small, widely spaced, usually spineless areoles contain numerous deciduous brown woolly hairs and yellow-brown glochids. Flowers are yellow with a reddish or green stripe. Fruit is barrel-shaped with a few short deciduous spines, a depressed top and matures to yellow, orange or red. Cultivated for its edible fruit. [All mainland states]
		Opuntia elata (Riverina pear), sometimes mistakenly called <i>Opuntia paraguayensis</i> , native to South America, is an erect much-branched shrub to about 2.5 m high. The upper stem segments (9-30 cm long x 4-14 cm wide) are glossy green, elongated oblong and fairly thick, often with scattered spines. Stem segments, unless shaded, are purplish at the margins and also around the areoles. Flowers (6-9.5 cm across) are orange, sometimes reddish-tinged. Fruit is smooth, dull, spineless, elongated pear-shaped with a shallow depressed top and matures to purple. [NSW, Vic, SA, WA, Qld]			Opuntia microdasys (yellow bunny-ears, teddy bear cactus), native to central and northern Mexico, is a low and creeping shrub to 60 cm high. Stem segments (to 25 cm long) are velvety, oblong to round and deciduous. Areoles are small and numerous (about 5-10 mm apart) with conspicuous tufts of hairs, densely packed yellowish glochids and usually no spines. Flowers are yellow, sometimes tinged reddish. Fruit (about 3 cm across) is pear-shaped to spherical and matures to red. An occasional garden escape. [NSW, SA, WA]
		Opuntia elatior , native to South America, is an erect, densely-branched shrub to 4 m high. The upper stem segments are olive-green and oblong to oval. Widely spaced areoles contain 2-8 spines (rarely one), usually 2-4 cm long (sometimes to 7 cm long), and small glochids. Flowers are yellow-orange with red stripes or totally orange-red, with pink to red anthers. Fruit is spiny, pear-shaped and matures to red or reddish-pink. Found in some isolated areas but not widespread. [NSW, Vic (possibly), SA, WA, NT, Qld]			Opuntia monacantha (drooping/smooth tree pear), previously named <i>Opuntia vulgaris</i> , native to South America, is a shrub or small trees usually to 3.5 m high, sometimes to 8 m, often with drooping upper segments. Stem segments (to 45 cm long) are glossy green and distinctively waxy, elongated oblong and fairly thin, with wavy-depressed margins. Upper areoles usually contain 1-2 long spines (to 5 cm long), whitish woolly hairs and yellow to red-brown glochids, but there can be up to 12 spines (to 10 cm long) on the trunk. Flowers are yellow, often tinged reddish outside. Edible fruit is egg-shaped with a shallow depressed top, spineless and matures to reddish-purple. Widespread. [NSW, Vic, SA, WA, Qld]
		Opuntia engelmannii , native to north-east Mexico and adjacent areas in the USA, is a variable shrub to 2 m high, but often low-growing with laterally spreading branches. The upper stem segments (9-26 cm long) are dull to grey-green, oval to circular. Areoles contain 1-12 spines (rarely none), brown woolly hairs and yellow-brown glochids. Flowers are yellow. Fruit is smooth or lumpy, spiny, barrel- to pear-shaped with a depressed top and matures to reddish-purple. [Vic, SA]			Opuntia puberula (prickly pear), native to Mexico, is a spreading to erect shrub to 2 m high, often with a well-developed trunk in older plants. The upper stem segments (9-22 cm long) are dull light to mid-green and elongated oblong. Areoles contain 1-3 (rarely none) spines less than 2 cm long, pale brown woolly hairs and yellowish glochids.
		Opuntia ficus-indica (Indian fig), probably native to Mexico, is an erect shrub to 5 m high, often with a well-developed trunk. Young developing pads of this species often have very small weak whitish spines that drop			Opuntia monacantha fruit (bottom left)

New Publications

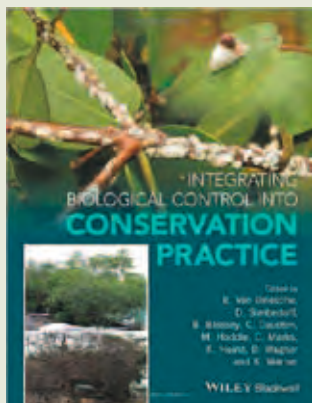
For those interested in biological control:

Integrating Biological Control into Conservation Practice

Editors: Driesche *et al.*

Hardback ISBN: 978-111839259-1

Published by Wiley-Blackwell, August 2016



Biological control can be an effective tool against many invasive insects and plants but it has rarely been successfully employed against other groups. Safety is of paramount concern and requires that the natural enemies used be specialised and that targeted pests be drivers of ecological degradation. While modern approaches allow species to be selected with a high level of security, some risks do remain. However these should be viewed in the context of the risk of failing to reduce the impact of the invasive species.

This unique book identifies the balance among these factors to show how biological control can be integrated into ecosystem restoration as practiced by conservation biologists. Jointly developed by conservation biologists and biological control scientists, it contains chapters on matching tools to management goals; tools in action; measuring and evaluating ecological outcomes of biological control introductions; managing conflict over biological control; and includes case studies as well as an ethical framework for integrating biological control and conservation practice.

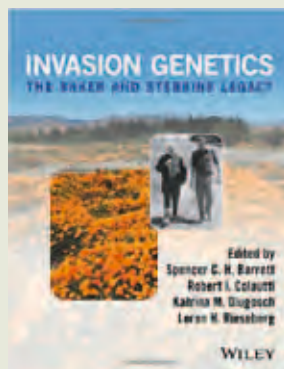
For those interested in evolutionary biology of invasive species:

Invasion Genetics: The Baker and Stebbins Legacy

Editors: Barrett, Colautti, Diugosch, Rieseberg

Hardback ISBN: 978-111892216-3

Published by Wiley, September 2016



This volume covers a range of topics concerned with the evolutionary biology of invasion including: phylogeography and the reconstruction of invasion history; demographic genetics; the role of stochastic forces in the invasion process; the contemporary evolution of local adaptation; the significance of epigenetics and transgenerational plasticity for invasive species; the genomic consequences of colonization; the search for invasion genes; and the comparative biology of invasive species. A wide diversity of invasive organisms are discussed including plants, animals, fungi and microbes.

For those interested in the cost of weeds in agriculture:

Impact of Weeds on Australian Grain Production

GRDC

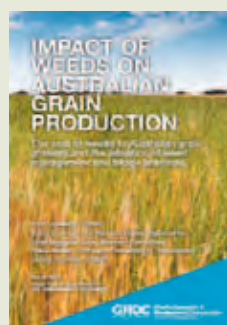
Project Code

CSA00043

Available

at: www.grdc.com.au/

ImpactOfWeeds



The Grains Research and Development Corporation has commissioned a comprehensive study into the cost of weeds, including yield loss and the costs of weed management practices. With input from grain growers, agronomists, consultants, agribusiness data experts and weed researchers, the report is the most comprehensive review to date and will help guide future decisions on cropping systems research, development and extension.

For those interested in investment in biodiversity protection:

Learning from Agri-Environment Schemes in Australia

Editors: Ansell, Gibson, Salt

Published by ANU Press, May 2016

Print ISBN: 978-176046015-0

Online ISBN (free): 978-176046016-7

<https://press.anu.edu.au/publications/learning-agri-environment-schemes-australia>



Learning from agri-environment schemes in Australia is a book about the birds and the beef — more specifically it is about the billions of dollars that governments pay farmers around the world each year to protect and restore biodiversity. After more than two decades of these schemes in Australia, what have we learnt? Are we getting the most out of these investments, and how should we do things differently in the future? Involving contributions from ecologists, economists, social scientists, restoration practitioners and policymakers, this book provides short, engaging chapters that cover a wide spectrum of environmental, agricultural and social issues involved in agri-environment schemes.