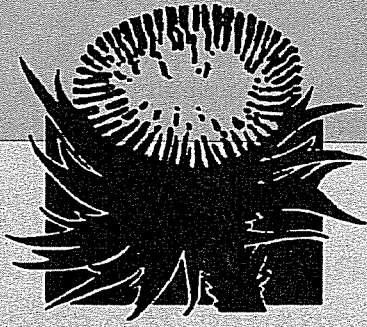


# A Good Weed



the NEWSLETTER of  
The Weed Society of New South Wales Inc  
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# 15

October 1998

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Cultivation by night  
*Preventing weed seed germination*  
Keeping weeds in the dark

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# Keeping Weeds in the **DARK**

As reported in the magazine *New Scientist*, recent research is continuing to throw light on the old subject of weed dormancy, the effects of light stimulation on germination and its possibilities for reducing weed infestations in cultivated crops. The germination of many weed species in a newly sown crop can be reduced if the final cultivation is undertaken at night.

Ordinary daylight cultivation briefly exposes weed seeds to light before they are reburied. Exposure to light breaks the dormancy of the seeds, which then germinate. Exposure periods as short as a millisecond are sufficient to break dormancy and initiate germination of many species. At night, the seeds are not exposed to light and no germination occurs.

Various trials have shown significant decreases in weed densities with night tillage. For example, Hartmann and Nezadal (1990) found that weed cover in intensively cultivated land in North Bavaria (Germany) could be reduced from 80% to 2% if cultivation was carried out during darkness. Persian speedwell, field bindweed and several other weeds were markedly reduced by night cultivation while perennial ryegrass increased.

Most recently, scientists at the University of Bonn have demonstrated that strips of land ploughed in darkness had five times fewer weeds than similar strips ploughed in daylight (Klaffke 1998). Night ploughing of wheat crops resulted in weed populations so low that herbicide treatment proved unnecessary. These German researchers have developed a shielding device which prevents exposure of seeds during daylight cultivation, but it is not as effective as night cultivation.

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There is now general recognition that 'photocontrol' warrants an increased research effort and could provide major benefits in weed management. In order to understand its potential, some background knowledge is necessary.

#### Seed Dormancy

Seeds that do not germinate when provided with adequate moisture, air and suitable temperatures are said to be dormant. Dormancy can be controlled simply or by a complex of interacting factors. Some species require light plus temperatures below a certain point to break dormancy. Day length is often an important factor. *Photodormant* seeds require exposure to light for germination. Their dormancy is generally broken only after they have imbibed water and swollen and are thus 'primed' for the light 'trigger'. Dormancy and the light response can vary seasonally, and due to other environmental variables such as levels of nitrate in soil water.

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*There is now general recognition that 'photocontrol' warrants an increased research effort and could provide major benefits in weed management.*

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Most species which germinate in response to light are not deliberately cultivated species and have small seedlings which may not emerge from the soil before their seed reserves are exhausted. A large proportion of weeds are in this category. In contrast, crop seeds in general will germinate in complete darkness. The process of domestication of crop plants and selection by crop breeders has led to the elimination of the light requirement. Germination of another, smaller, group of wild species is inhibited by light, with light of far-red wavelengths

having the greatest effect. These seeds normally germinate in darkness and become dormant after exposure to light (Salisbury and Ross 1992).

It is theorised that a mechanism which enables light to stimulate germination provides a major advantage to many species. Light exposure would normally occur when the seed is on the surface or partially uncovered, a clear indication that the seedling will be able to emerge from the ground, photosynthesise and grow. Weeds which require light for germination, such as silver grass and brome grass, are generally advantaged under reduced tillage. On the other hand, species in which germination is inhibited by light may need a guarantee that sufficient water is available for growth and this is much more likely at depth, where there is no light, than on the surface. Species inhibited by light include bifora and bedstraw.

#### Cultivation

Cultivation is a proven effective method of weed control. Depth of cultivation, timing, speed of working, soil moisture and other environmental conditions influence its effectiveness. In Europe, much cultivation is undertaken with mouldboard ploughs and other deep tillage implements. These invert the soil and tend to bury weed seeds. Disc ploughs, commonly used in Australia, do not lead to deep burial. Scarifiers and tyned implements break up the soil surface but do not invert it.

Results of research on weed control using night cultivation in Europe thus may have only marginal applicability in Australia. Applied research on photo-control methods is required to evaluate its potential benefits in specific situations.

#### Complexities of Photo-control

Milberg *et al.* (1996) tested populations of 44 species, mostly agricultural weeds, in Sweden, and found that

germination was consistently stimulated by brief (5 second) exposure to light in 24 of the species, including summer annuals, winter annuals and perennials. In 20 species there was no effect or an inconsistent response. In many cases, large differences were found in the percentage germination between populations of a species.

Knowing the weed species is therefore not enough to predict whether its seeds will germinate in response to short duration light exposure. Many weeds can potentially be 'photo-controlled' by night cultivation but detailed ecological studies may be necessary to predict the effects and determine whether they are large enough to be worthwhile.

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*...detailed ecological studies  
may be necessary...*

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In addition to limiting weed germination, night harrowing can also delay the emergence of seedlings, giving crops a further competitive advantage. Milberg (1997) found that broadleaf dock seedlings emerged quickly, in a concentrated flush, when given a light exposure treatment. Fewer seeds germinated and emergence was delayed by treatment in darkness. There is a pronounced light effect threshold in this species; at light levels below the threshold, germination does not occur at all.

An improved understanding of the dormancy requirements of weed seed can provide new approaches to weed management but needs to be coupled to improved understanding of the dynamics of soil seedbanks. What weeds appear above ground depends on the species composition and population dynamics of the soil seed bank. Any cultivation allows light to penetrate the upper surface of the soil and triggers germination of susceptible seeds which are exposed. Different cultivation practices alter seed depth in

the soil and may change the weed flora which appears in the cropping phase.

Research has demonstrated that cultivation during darkness often results in the emergence of fewer weed seedlings than daylight treatment. Research and practical experimentation are required to determine the circumstances under which night tillage might produce real benefits for Australian farmers.

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#### Acknowledgments

Unpublished materials by Kerry Harrington, Senior Lecturer in Weed Science, Massey University, New Zealand, and Wendy Bedggood, Victorian Institute for Dryland Agriculture, DNRE, were used in this article. ✍

(Adapted from *Under Control*, No. 6, July 1998)

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# Managing *Vulpia* in Permanent Pastures

Mick Duncan

**V**ulpia invasion of pastures in the high rainfall zone of NSW and Victoria has received considerable attention in recent years. Otherwise known as 'rats tail', silver grass or silky grass, *Vulpia* was rated as a major weed problem in a survey conducted by Sloane, Cook and King at least 10 years ago, and has been the subject of some valuable research work since the mid-1980's survey. Much of the research has focussed on herbicides to control seed production (spray-topping) or complete removal during winter using simazine (winter cleaning). These are both useful methods of reducing the abundance of *Vulpia* but, essentially, attack the symptom without accounting for the cause.

Management to reduce *Vulpia* from permanent pasture in the Northern Tablelands in recent years appears to complement herbicide control with the bonus of improving pasture quality as well as vigour. A good example of a management strategy to reduce *Vulpia* occurred in a Walcha pasture sown last year (1997). The paddock had been spray-topped in spring 1996 to reduce seed set, with reasonable results. However, I have long held the view that spray-topping is a useful but perhaps over-rated technique and should not be relied on to reduce much more than 70 to 80% of seed production.

Timing is vital with the 'window' of effective spray-topping

very narrow and often complicated by typically windy October/November weather. In addition, I am very confident that a small percentage of *Vulpia* seeds (perhaps 5%) is capable of remaining in the soil to germinate 15 to 18 months after flowering. Five percent of a million seeds per square metre still amounts to plenty of potential *Vulpia* seedlings. To achieve the best result from spray-topping, two consecutive sprayings should be considered.

Following spray-topping at Walcha in 1996, the paddock was kept short but excellent December/January rain produced some bulky summer grass that got away under the grazing pressure (sheep and cattle). A generally dry autumn was relieved by 50 mm of rain in May. This produced a good germination of *Vulpia* and other species that were subsequently sprayed before sowing pasture. Large areas of *Vulpia* clearly escaped the boom spray. In addition, a second germination from a very substantial seed bank occurred. By November, the newly establishing pasture was struggling against plenty of *Vulpia* plants. Suggestions to spray-top or winter-clean were not considered to be of any value. In fact, the likely damage to young pasture seedlings would have been excessive and probably lethal.

Grazing management was considered to be the best approach. This consisted of heavy (crash) grazing from November to enable the introduced species to produce bulky

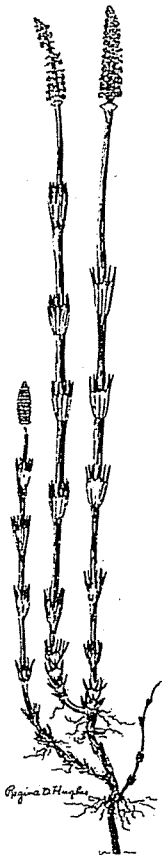
growth. This tall bulky growth put a lot of pressure on *Vulpia* seedlings and appears to have significantly reduced the potential *Vulpia* population. The other important component of the strategy was the application of fertiliser to supply 15 kg P and 10 kg S with a high analysis product (i.e. the equivalent of 1.3 cwt/ac of single super). In this way, pasture vigour was boosted and the usual summer rainfall was exploited more fully. By mid-May, the pasture ground cover was very good, *Vulpia* invasion minimal and barely 12 months after the initial sowing, establishment could be given 8 out of 10.

There does not appear to be any justification for winter-cleaning to be used this year, with funds more

efficiently directed to lifting soil fertility. If necessary, a repeat of the grazing management technique in 1998/99 would also be employed.

This technique requires careful planning and attention to grazing management details. In attempts to treat the cause of *Vulpia* invasion, i.e. poor pasture vigour and low soil fertility, attack the *Vulpia* at its most susceptible stage, rather than rely too heavily on herbicide control. ✍

(Reprinted from the Newsletter of the Grassland Society of NSW Inc, Vol. 13, No. 2, 1998. Mick Duncan is with NSW Agriculture at Armidale.)



## Weed Watch Warning

### Horsetails (*Equisetum* spp.)

By Ian Faithfull

**E**quisetum is the single genus in the Equisetaceae, a family of primitive, non-flowering plants. Members of the genus are known as horsetails or scouring rushes and there are about 35 species worldwide, at least 12 of which are considered weedy. They are herbs with erect, hollow, jointed and grooved stems, solid branches arranged in whorls below sheathed nodes, and underground stems (rhizomes), which divide frequently, spread many metres horizontally and may descend to depths well over one metre. The leaves are modified into toothed sheaths that encircle the stems at the joints. The shoots have a high silica content, giving them a rough texture. The different species range in height from a few cm up to 10 m. The family is allied with

clubmosses, quillworts and ferns - all of which lack flowers and fruit and produce large numbers of spores, rather than seeds. Horsetails bear their spores in cones at the ends of the main stems. The spores require prolonged periods of moist conditions for germination and development.

Horsetails reproduce mainly from rhizome fragments. They are persistent perennials which are very hard to control because of their extensive, inaccessible, underground organs. Chemical control of horsetails is difficult and may require soil sterilisation, while control by cultivation is often ineffective. All species are thought to contain alkaloids toxic to livestock. At least four species appear to be occasionally grown as ornamentals or medicinal herbs in

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Australia. The key in Tutin (1964) is useful in identification.

Common or field horsetail, *Equisetum arvense*, is native throughout the northern hemisphere and is considered one of the world's worst weeds. Parsons and Cuthbertson (1992) provide a good description of the plant and its properties. It is a weed in its native range and has spread to New Zealand, Madagascar and South America. It grows mainly on gravels or sands, porous soils with high water tables and poorly-drained wetlands, often in dense patches which reduce crop yields and suppress the growth of neighbouring plants. In Canada, it interferes with grain harvesting by delaying drying of crops and by equipment blockage. It has been reported in over 25 types of crops, in orchards and pastures. Horses and sheep can die within a few hours of ingesting large quantities of the plant. Milk is tainted, making it unsaleable. Dry material of *E. arvense* is more harmful than the live plant and can be a dangerous contaminant of hay, causing the disease equisetosis in horses and cattle when eaten in large amounts. Up until 1996, common horsetail had been recorded from only two areas of Australia, Barrington Tops (1927, possibly as a pot plant) and Sydney (first definite record of naturalisation in 1989) (Hosking 1998) but it has the potential to develop into a persistent weed of cultivated land, pastures, wetlands and areas near watercourses in temperate regions with over 750 mm annual rainfall.

*E. debile* has a tropical and subtropical distribution and occurs from India and Sri Lanka to Taiwan, the Philippines, Indonesia, Malaysia, New Guinea, New Caledonia, Vanuatu and Fiji. It is often found along mountain streams and paths from sea level to 2000 m, and has become a weed of rice in the Philippines and of tea plantations in Sumatra. It is persistent and certainly toxic to sheep, and could

readily invade watercourses and wetlands in tropical Australia (AQIS 1996). *E. debile* is regarded as a potential threat to Australia. It is on the Northern Australia Quarantine Strategy target list of weeds and the Commonwealth Prohibited List. *E. debile* has been identified as *E. ramosissimum* subsp. *debile* in the past. However, there is one known Australian infestation of *E. ramosissimum* at Jiggi in northern NSW (Bob Trounce, NSW Agriculture).

Another species recently found in Australia is scouring-rush, *E. hyemale*, a native of most of Europe and widespread from Canada to Mexico. Material from herb growers in Western Australia has been identified by Dr Bob Chinnock from the SA Herbarium, but it is not known to be naturalised in WA. This species was recorded as spreading from plantings in NSW in 1995 - at a Taree Park it spread into lawns before being controlled - and has been recorded from a home garden in Tasmania (Hosking 1998) and probably South Australia.

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*It may be appropriate to  
remove all the invasive  
horsetails from sale and  
distribution in Australia.*

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According to Whitten (1997), *E. hyemale* is often confused with *E. arvense*, is very hard to get rid of and tolerates hot sun. Chinnock has noted that the rhizome system of this species appears to be more compact, so it probably spreads much more slowly than the more weedy *E. arvense*. However, if a plant starts producing spores, the gametophyte, unlike other pteridophytes (ferns, clubmosses, etc.), can produce more than one sporeling at a time, so it could possibly spread rapidly under suitable conditions.

All *Equisetum* spp. are declared noxious in NSW. AQIS regulations

prohibit the importation of *E. ramosissimum* and *E. palustre*.

A number of weed experts are concerned that horsetails are being sold as herbs, which the proponents claim possess all sorts of 'magical' medicinal properties, and as ornamental plants for garden use. At the recent Melbourne International Flower and Garden Show, common horsetail was being sold by a nursery operator while *E. hyemale* and a further species, *E. scirpoides*, a native to northern Europe, were displayed by another Melbourne nursery. An information sheet accompanying the display listed all the plants used, including the horsetails, and stated: 'Equisetum species are declared noxious weeds in some states of Australia. These should not be used where there is a danger of them escaping into waterways'. They tried to inform the public and be responsible, but not everyone reads brochures!

Rod Randall of Agriculture Western Australia has recently undertaken a weed risk assessment for horsetails (the genus *Equisetum* as a whole) and found it to be unacceptably weedy. It may be appropriate to remove all the invasive horsetails from sale and distribution in Australia and, in order to avoid confusion, it may be easier to ban the whole genus because of the complicated taxonomy and nomenclature of the group and the difficulties with identification. Action now could prevent significant problems in the future. The Australian Quarantine and Inspection Service is currently considering prohibiting the importation of all *Equisetum* species.

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#### Acknowledgements

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(Reprinted from *Under Control*, No. 6, July 1998. Ian Faithfull is an Extension Officer with the Keith Turnbull Research Institute. WeedWatch is a program of the CRC for Weed Management Systems in cooperation with all the States and Territories of Australia to improve prevention and early intervention activity with new and expanding weeds. By reporting and recording these weeds quickly, we can prevent them becoming widespread, help to conserve indigenous biodiversity, protect industries and save the Australian community millions of dollars.)



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## A Big Paterson's Curse and Subclover Season?

By Jim Dellow

The excellent autumn break has predisposed much of the southern cropping and pastoral areas to excellent germinations of subclover and, unfortunately, Paterson's curse and thistles.

The conditions considered favourable for this likelihood of a bad 'Paterson's curse year' are the conditions preceding the autumn break and the timing of the break. Both Paterson's curse and subclover prefer bare soil conditions and high light intensity for germination.

Graziers need to be prepared to control pastoral area weeds such as Paterson's curse during the early seedling/rosette stage while the plants are not bigger than saucer size.

Pasture competition is the only long-term control strategy linked with fertiliser, livestock and herbicide management.

An effective strategy, which adequately controls Paterson's Curse and provides minimum damage to the subclover pasture component, is to use the 'spray-graze' technique. However, it has a few disadvantages as it relies on using what are considered sub-lethal herbicide rates coupled with grazing livestock (sheep).

### *Disadvantages*

- Only sheep can be used - cattle unsatisfactory.
- Exposes grazing livestock to plant poisoning (alkaloid and nitrate poisoning).
- A need for small paddocks - extensive areas cannot be adequately stocked.
- High stocking rates needed to quickly graze area without prolonged pressure on pasture component.

Remember, the basis of long-term control is to replace the weed with productive pasture that is adequately fertilised. ✍

*(Reprinted from the Newsletter of the Grassland Society of NSW Inc, Vol. 13, No. 2, 1998. Jim Dellow is a Special Weeds Agronomist with NSW Agriculture.)*

## National Ag-Vet Chemicals Strategy Unveiled

As a major global producer and exporter of primary produce, and to ensure protection of human health and the environment, Australia has developed and recently made public a forward-looking national strategy for managing agricultural and veterinary (ag-vet) chemicals so as to: ensure long-term sustainability of agricultural productivity; minimise risks to health, the environment, and trade; and, best contribute to national prosperity.

The comprehensive national strategy is built on a foundation of nine action points covering a variety of issues and including a clear call for reducing reliance on chemicals through development and adoption of IPM involving integration of various pest management tactics. Another key point promotes the 'development and adoption of integrated farm, forest, and natural resource planning and management systems (including catchment management) that minimise adverse impacts and use chemicals only as needed.'

The points, as well as the extensive process followed to gather stakeholder opinions prior to preparing the strategy, are fully set out in the publication, *Management of Agricultural and Veterinary Chemicals: a National Strategy*. The 60-page, softbound, 1998

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work explains the vision, goals, and need for the strategy. The publication is intended as a bridge to implement the strategy and a road map so all involved can contribute to an ag-vet chemical use focused on a modern national consensus. The strategy document (in electronic form) is available on the web at: <[www.dpie.gov.au/dpie/armcanz/mavc/agvet.pdf](http://www.dpie.gov.au/dpie/armcanz/mavc/agvet.pdf)>.

For hard copies, or more information, contact: P.C. Rowland, Bureau of Resource Sciences, PO Box E11, Kingston, ACT 2604. E-mail: <[pcr@brs.gov.au](mailto:pcr@brs.gov.au)>. Fax: 02 6272 4896. Phone: 02 6272 3443.

(IPMnet NEWS September 1998 no. 57)

## Members Matter

We welcome the following new members and encourage all members to attend the AGM and Annual Dinner.

*Hilary Heffernan*, Killara  
*David O'Brien*, Wagga Wagga  
*David Scaife*, Camden Lakeside  
Country Club, Narrellan

## Southern Perspective

It's been a while coming but I'm finally putting pen to paper. Some of you may not be aware that our Society has a Riverina Branch. This sub-branch was formed some 16 months ago (May 97) in an effort to generate interaction between the many people working on weeds in South Western NSW. We currently have a 14 member committee who continue to arrange a variety of weed related activities. Activities include:

- a Weed Expo run in October last year in conjunction with Charles Sturt University and the Wagga Wagga Agricultural Research Institute;

- a series of dinner speakers, conducted approximately every 3 months; and

- an environmental and urban weed walk to be run in Wagga Wagga in October.

Dinner speakers are likely to become our major activity as they provide a great opportunity to spread ideas and information, whilst also providing a forum for interaction between weed practitioners. Our last dinner, held at the Culcairn Hotel, attracted approximately 40 people who heard a most interesting talk from visiting Canadian Weed Scientist Bob Blackshaw.

Being country based doesn't restrict our activities to agricultural weeds. Many rural people are very environmentally conscious and thus we aim to accommodate their interests by running activities with an environmental and urban weed focus. Sue Brunskill (TAFE) delivered a very stimulating talk on environmental weeds at our first AGM earlier this year in Albury.

Our Riverina base hasn't stopped us having input into the running of the general Society activities. We aim to have at least one of our committee present, either in person or via teleconferencing, at each meeting of the Society Executive. We are currently working with the Executive Committee to develop their new WEB site (hopefully with a hyperlink to the Riverina Branch) and are examining the feasibility of a membership certificate for all Society members.

Should anyone be interested in our activities, Toni Nugent, our Publicity Officer, will be only too happy to take your inquiry on (02) 6933 2178 or email [tnugent@csu.edu.au](mailto:tnugent@csu.edu.au)

Richard Graham, President, Riverina Branch of the Weed Society of NSW  
Email [grahamr@wagga.nsw.gov.au](mailto:grahamr@wagga.nsw.gov.au)

**WEED SOCIETY OF NSW**  
**ANNUAL GENERAL MEETING AND SEMINAR**  
**ORANGE AGRICULTURAL INSTITUTE**  
**29 OCTOBER 1998**

The 33<sup>rd</sup> Annual General Meeting of The Weed Society of New South Wales Incorporated will be held on Thursday, October 29, 1998 at the Orange Agricultural Institute, Forest Road, Orange commencing at 4.30 p.m. The meeting will be preceded by a visit of the facilities of the Institute 1.30 p.m. to 2.30 p.m. and a seminar on 'Weeds and Human Health' at which the Society poster on Weeds Affecting Human Health will be displayed. The AGM will be followed by the Annual Dinner at Duntry League.

**AFTERNOON PROGRAM**

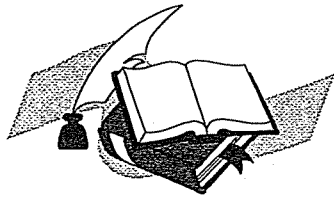
12-00 noon	Lunch
1-30pm	Inspection of scientific collections
2-30pm	Seminar
	Dr Graham Pulley: <i>Effects of Allergenic Plants on the Human Body</i>
	Dr Chris Bourke: <i>Plants Detrimental to Animal Health</i>
3-30pm	Afternoon tea
4-30pm	Annual General Meeting
7-00pm	Drinks Duntry League
7-30pm	Dinner

**AGENDA FOR AGM**

1. Apologies
2. Minutes of Previous Annual General Meeting
3. Business Arising from the Minutes
4. 1997 Annual Report
5. Treasurer's Report
6. Election of Office Bearers
7. CAWSS Report
8. Presidential Address
9. Other Business - Notice of Motion from the Executive

"That the annual membership subscription of the Society be increased to \$30 and student membership to \$15. However, the Society offers members the opportunity to pay three (3) years subscription for \$80 covering the years 1999, 2000 and 2001 provided they are a current financial member (no arrears due). The following conditions will apply: i) a member must have paid the preceding year and be considered financial, ii) no refunds are intended and prepayment will be accounted for in the nominated financial year."

Leon W Smith  
Hon Secretary - August 16, 1998



## Other 'Good Reads'

### Impact of Environmental Weeds on Biodiversity: a Review and Development of a Methodology

R.J. Adair and R.H. Groves, 1998, National Weeds Program, Biodiversity Group, Environment Australia, 51 pp. ISBN 0 642 214123

Quantitative studies of the degrading impact of weeds on natural ecosystems are relatively rare but such information is needed to prioritise control operations. This report reviews the impact of environmental weeds on genetic, species and ecosystem biodiversity and assesses the techniques used in previous studies.

Five main factors are considered in impact assessment: range of susceptible habitats; rate of spread of the weed; prospects for containment of spread; relationship between the weed and habitat disturbance; and impact on biodiversity. Sixty quantitative studies from Australia and overseas are tabulated.

Four broad methods for assessing impact are examined: multi-site comparisons (similar sites with and without the weed); weed removal (weed is controlled and subsequent site changes are monitored); weed addition (weed is introduced into a previously uninvaded site); and time sequence studies (usually requiring many years). The report enables selection of the appropriate methodology for particular studies, incorporating various experimental design and data analysis options. It includes nine pages of references, an appendix table of plant

species and communities listed under the Victorian Flora and Fauna Guarantee Act 1988 which are threatened by environmental weeds, and a glossary of terms.

### Potential Environmental Weeds in Australia. Candidate Species for Preventative Control

S. Csurhes and R. Edwards, 1998, National Weeds Program, Biodiversity Group, Environment Australia, 208 pp. ISBN 0 642 21409 3

A prerequisite for successful preventative control of environmental weeds is the delineation of target species for which eradication is feasible. This report lists non-indigenous terrestrial and aquatic plant species that are considered to represent a threat to Australian native plant communities, and which currently have a localised distribution and can potentially be eradicated.

A weed's history as a pest elsewhere in the world was chosen as the most reliable basis for predicting weediness in Australia. Over sixty weed experts nominated 294 potential environmental weed species or genera which they considered to be in the early stages of naturalisation.

This list was screened to remove Australian native plants (ca. 15 spp. listed in an appendix) and species with no history as weeds outside Australia (one paragraph per species in a second appendix). Those remaining were screened again to determine the

feasibility of eradication - high, moderate or low, with low probability indicating existing naturalised populations and a significant expense requirement. Thirty species or genera are considered vulnerable to eradication.

Information, including a description of the plant, weed status, distribution and potential impact, is provided on each of them. They include Scotch heather (*Calluna vulgaris*), horsetails (*Equisetum* spp.) and Lindheimer prickly pear (naturalised in Victoria and one of eight *Opuntia* spp. introduced to Australia since 1970).

Other sections cover the definitions of environmental weeds, impacts on ecosystem function, number of spp., sources, early detection and eradication, and predicting weed potential. A list of references is included along with species and common names indexes.

Copies of these two publications are available from Environment Australia: phone: (02) 6250 0200, fax: (02) 6250 0242, email: [invasive@ea.gov.au](mailto:invasive@ea.gov.au)

## Attack of the Killer Weeds

S. Williams and M. Fiedler, 1998, Coastcare, Department of Land and Water Conservation, Parramatta, NSW, ISBN 0 7313 0356 3

A narrow and pocket-friendly (DL size) field guide for the coastal weeds of New South Wales. It covers 59 environmental weeds of various lifeforms - woody weeds, vines and scramblers, herbs and grasses.

There is a colour photograph for each plant with information on its lifeform, flowers, seeds/fruit and treatment techniques. Notes on other confusing plants and distribution are also included for some species.

Illustrations of different treatment techniques are easy to understand.

Available from DLWC, Parramatta; phone: (02) 9895 5046, fax: (02) 9895 5079; email: [coastcare@dlwc.nsw.gov.au](mailto:coastcare@dlwc.nsw.gov.au)

## Alps Invaders. Weeds of the Australian High Country

Edited by Geoff Sainty, John Hosking and Surrey Jacobs, 1998, Australian Alps Liaison Committee, 62 pp, 59 colour plates, 10 x 21 cm, spiral bound, ISBN 0 64633 0373, \$7 including postage from Australian Alps National Parks, c/- Post Office, Tharwa, ACT 2620.

The Australia Alps are relatively weed-free compared with other ecosystems of south-eastern Australia. This pocket-sized field guide is intended to assist in keeping them that way, by enabling users to identify invasive plants and to assist park staff locate infestations requiring control.

The book has colour photographs and text for 51 existing and potentially invasive species, arranged in colour-coded sections for grasses (7 species), rushes (2 species), herbs (including 4 thistle species), shrubs and trees (8 species). The text for each species provides the plant family, the geographical origin of the weed, descriptions of the flowers, form and other notable features, brief details of dispersal mechanisms, notes on distribution, weed potential and similar species, and one or two key references (often *Flora of NSW*, *Flora of Victoria* or *Noxious Weeds of Australia*).

The book has an index of common and botanical names. A 'Weed Reporting Form' is included on the last page to enable park visitors to report the occurrence of particular species.

Bulk orders can be made at \$5 per book, 85 books per box - contact

Brett McNamara, Australian Alps Program Coordinator, phone: (02) 6207 1694, fax: (02) 6207 2901.

## An Illustrated Guide to Common Weeds of New Zealand

B. Roy, I. Popay, P. Champion, T. James and A. Rahman, New Zealand Plant Protection Society, 1998, 282 pp. ISBN 0-473-05296-2. Available from RG and FJ Richardson, ph/fx (03) 5286 1533 PO Box 42, Meredith, Vic 3333 Australia. Cost has yet to be finalised but approximately \$60.

The book is organised by species in alphabetical order within families. Each plant has a general description, details of flowers, fruit, leaves, stems, roots, habitat, distribution, comments and derivation of botanical name. It covers about 330 taxa. Many are weeds (both agricultural and environmental) in Australia or will probably become future weeds. Book size is 17 x 24.5 cm, 1.1 cm thick, soft cover.

## Bitou Bush Workshop

Edited and produced by R. Holtkamp, R. Groves and S. Corey, CRC for Weed Management Systems, 1998, 33 pp.

Abstracts of a workshop held at NSW National Parks and Wildlife Service, North Head Conference Centre, Sydney on 3-4 September 1997. Organised by Andrew Leys and Royce Holtkamp and jointly sponsored by NSW National Parks and Wildlife Service and the Cooperative Research Centre for Weed Management Systems.

The main focus of the workshop was on control and the abstracts include items on biological control, including new and prospective agents, herbicide strategies and current control practices. Sections are also included on

the significance of bitou bush and control undertaken in different coastal regions of NSW and where bitou bush fits into the National and NSW Weeds Strategies.

Available from Sharon Corey, CSIRO Entomology Phone: (02) 6246 4001 email: sharon.corey@ento.csiro.au



## Upcoming Events

### In 1999

25-28 January WORKSHOP OF THE SEARS/IOBC WORKING GROUP ON GREEN HOUSE/PROTECTED CROPS IPM

"Natural Enemy to Biological Control Agent: Evaluating the Process" Sydney. The event is primarily for researchers and IPM practitioners concerned with protected crops. Contact: S. Goodwin, Horticultural Research and Advisory Station, NSW Agriculture, PO Box 581, Gosford NSW 2250. Fax: (02) 4348 1910. Phone: (02) 43481929. Email: <stephen.goodwin@agric.nsw.gov.au>

8-10 February WEED SCIENCE SOCIETY OF AMERICA ANNUAL MEETING

San Diego, CA, USA. Contact: WSSA, J. Breithaupt, PO Box 1897, Lawrence, KS 66044, USA. Fax: 1-913-843-1274. Phone: 1-913-843-1235 Email: <jbreith@allenpress.com>

15-18 February 1ST INTERNATIONAL WORKSHOP ON WEED RISK ASSESSMENT

Adelaide SA, Contact: J. Virtue, GPO Box 1671, Adelaide SA 5001. Fax: (08) 8303 9559. Phone: (08) 83039502. Email:

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<virtue.john@pi.sa.gov.au>. Website:  
<www.pir.sa.gov.au/about\_pisa/weed  
watchPR.shtml>.

8-10 March INTERNATIONAL  
CONFERENCE, EMERGING  
TECHNOLOGIES IN IPM: CONCEPTS,  
RESEARCH, AND  
IMPLEMENTATION  
Raleigh, NC, USA. Aim: to provide a  
forum for examining emerging  
technologies and discussing constraints  
to their development, implementation,  
and integration into IPM programs.  
Contact: T. Sutton, Dept. of Plant  
Pathology, Box 7616, NCSU, Raleigh,  
NC 27695, USA. Website:  
<ipmwww.ncsu.edu/ipmconference/>  
Email: <turner\_sutton@ncsu.edu>  
Phone: 1-919-515-6823.

18-19 March SYMPOSIUM ON  
BIOLOGICAL CONTROL IN THE  
TROPICS  
Serdang, Selangor, MALAYSIA  
Organized by the National Council for  
Biological Control Malaysia, in  
collaboration with CAB International.  
Contact: Symposium Organizing  
Committee, MARDI, PO Box 12301,  
50774 Kuala Lumpur, MALAYSIA.  
Email: <anwar@mardi.my> Fax: 60-03-  
948-7639 Phone: 60-03-943-7432 Web:  
<www.mardi.my>

21 March-3 July 28TH  
INTERNATIONAL COURSE ON  
INTEGRATED PEST MANAGEMENT  
Wageningen, THE NETHERLANDS.  
Contact: International Agricultural  
Centre, PO Box 88, 6700AB  
Wageningen, THE NETHERLANDS.  
Fax: 31-317-418552 Phone: 31-317-  
490353 Website: <www.iac-agro.nl>

28 June-1 July 11TH EUROPEAN  
WEED RESEARCH SOCIETY  
SYMPOSIUM  
Basel, SWITZERLAND. Contact: EWRS  
Symposium 1999, C/- FAW, CH-8820,  
Waedenswil, SWITZERLAND. Fax: 41-  
62-868-6341. Phone: 41-1-763-6111.


Email: Daniel.Gut@wae.faw.admin.ch  
Website:  
<www.res.bbsrc.ac.uk/ewrs/ewrs\_sym  
p.html>

5-9 July 10TH BIOLOGICAL  
CONTROL OF WEEDS  
INTERNATIONAL SYMPOSIUM  
Bozeman, MT, USA. Contact: N.R.  
Spencer, USDA/ARS, 1500 North  
Central, Sidney, MT 59270, USA. Fax:  
1-406-482-5038 Phone: 1-406-482-9407  
E-mail: nspencer@sidney.ars.usda.gov  
Website  
<www.symposium.ars.usda.gov/>

25-30 July 14TH INTERNATIONAL  
CONGRESS ON PLANT PROTECTION  
Jerusalem, ISRAEL. Theme: 'Plant  
Protection Towards the Third  
Millennium - Where Chemistry Meets  
Ecology'. Contact: S. Barnett, Congress  
Coordinator, PO Box 50006, Tel Aviv  
61500, ISRAEL. Fax: 972-3-514-0077.  
Phone: 972-3-514-0014 Email:  
<ippc@kenes.com>

12-16 September 12TH AUSTRALIAN  
WEEDS CONFERENCE  
Hobart, Tasmania, Contact: Conference  
Design, PO Box 342, Sandy Bay,  
Tasmania 7006, E-mail:  
<mail@cdesign.com.au> Fax: (03) 6224  
3774.

15-18 November BRIGHTON CROP  
PROTECTION CONFERENCE 1999  
Brighton, UK. Contact: The Event  
Organization, 8 Cotswold Mews,  
Battersea Square, London SW11 3RA,  
UK. Email: <eventorg@event-org.com>  
Fax: 44-171-924-1790 Phone: 44-171-228-  
8034 Website: <www.BCPC.org>

November 17TH ASIAN-PACIFIC  
WEED SCIENCE SOCIETY  
CONFERENCE  
Bangkok, THAILAND. Contact: R.  
Suwanketnkorn, Dept. of Agronomy,  
Kasetsart Univ., Bangkok 10903,  
THAILAND. 

# *A Good Weed*

the NEWSLETTER of  
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