

St. John's wort: *Hypericum perforatum* L.

Integrated control and management

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Editors: Paul W. Jupp, David T. Briese and Richard H. Groves

St. John's wort: Introduction

R.H. Groves, CSIRO Plant Industry and Co-operative Research Centre for Weed Management Systems, GPO Box 1600, Canberra, ACT 2601, Australia.

The weed

There are more than 200 species of *Hypericum* (family Clusiaceae) distributed world-wide in temperate and sub-tropical regions. Of this large number of species, several have been and are still valued for their horticultural or herbal properties; it is species from these more economically significant groups that have been deliberately and widely transported and cultivated world-wide. Some species have subsequently become weedy, of which the most abundant in Australia are St. John's wort (*Hypericum perforatum*) and tutsan (*H. androsaemum*).

St. John's wort is a weed of grazing land (because it contains the alkaloid hypericin to varying extents which interferes with animal health) and/or on public land (because it may interfere with forest operations and form bright yellow infestations in late spring, thereby contributing an alien element to an otherwise natural landscape). Whilst there are at least five European species of the genus now naturalized in southern Australia, there are also two native *Hypericum* spp. (viz. *H. gramineum* and *H. japonicum*) that are far less obvious in the natural landscape; the distribution of *H. gramineum* is as widespread as and may overlap with that of its weedy introduced congeners.

Hypericum perforatum is widespread in western Europe, where it is native, as well as in North America, southern Australia, New Zealand, South Africa, and southern South America, to which it has been introduced over the last 100 to 200 years. The species is variable, especially in leaf width (Robson 1968, Campbell *et al.* 1992); the genetic identity of these many and separate introductions is unknown.

St. John's wort has many of the attributes of a successful invasive plant (Groves 1989), viz.:

- i. it is an early colonizer of disturbed sites in Europe,

- ii. it has been introduced deliberately and probably many times to Australia and other regions where it is perceived to have both horticultural and medicinal values,
- iii. some genetic variation occurs within the species, at least as shown by the existence of morphological variants,
- iv. its growth and flowering responses are highly plastic,
- v. plants produce large numbers of seeds which may remain dormant for *at least* 20 years,
- vi. vegetative reproduction from perennial rootstocks is common,
- vii. its leaves and flowers can be toxic to grazing animals.

The possession of these seven attributes in combination goes some way to explaining why St. John's wort is a problem in all regions to which it has been introduced and why effective control seems to have been elusive for many years.

Control methods

Aspects of the control of St. John's wort have been summarized recently (see Groves 1989, Campbell *et al.* 1995). In this brief introduction comment will be made only on some historical aspects to set the scene for what follows in this workshop.

Control methods for St. John's wort have been studied in Australia for more than 60 years. For instance, Griffith Davies (1942) wrote: '...it has been found that on pasture land St. John's wort is very easily controlled and practically eliminated.'

Pasture improvement, involving the deliberate promotion of growth of several Mediterranean species, resulted in control of the weed, although in regions such as Mudgee climatically unsuited to the growth of subterranean clover an acknowledged problem remained. In some other regions, such as in both north-eastern Victoria near Bright, and south-eastern New South Wales, near

Tumbarumba, the problem of St. John's wort was also reduced by a radical change in land use from badly invaded pastures for dairy cows to the establishment of pine plantations. Clark (1953) noted for the Ovens Valley that St. John's wort 'is generally the last plant to be excluded by the pines and the first to reappear' – a wise observation recently explained by the results of studies on seed longevity (Harris and Gill 1997).

The search in Europe for natural enemies able to exert a degree of biological control on St. John's wort populations in Australia has been going on since the 1930s (e.g. Currie and Garthside 1932). The search has continued ever since, with varying degrees of success both in Australia and elsewhere (Briese 1997). Whilst the releases of several insects have been successful locally or regionally, there remain some summer-rainfall or shaded areas where biological control is less than fully effective (Campbell *et al.* 1995).

Chemical control of St. John's wort populations has also progressed since the days of the widespread application of common salt. Modern herbicides are available which effectively control St. John's wort (e.g. Campbell *et al.* 1995), but expense can limit their use currently.

Control methods for St. John's wort have thus been worked on in Australia for at least the last 60 years by several State Departments of Agriculture and CSIR/CSIRO. As a result, populations have been adequately controlled in some regions of southern Australia, especially those with a marked summer drought (Dodd and Scott 1997). But the problem of St. John's wort remains, especially on extensive areas of public land such as water catchments and National Parks in south-eastern Australia. It is thus appropriate that within the portfolio of research projects of the CRC for Weed Management Systems, research on finding more effective management systems for St. John's wort comes under both the Natural Ecosystems program as well as the Perennial Pastures program. As with many major weeds of southern Australia, the challenge is not only to continue research on the biology and ecology of St. John's wort but, more importantly, to integrate new knowledge with the large

body of previous research results. Only with such integration and increased co-operation will more effective control of St. John's wort populations in both natural ecosystems and perennial pastures be achieved. Whilst much has been learned and applied in the last 60 years, much remains to be done. It is the task of this workshop to achieve by consensus a priority list of tasks for the next six years that may be achievable by the CRC and its co-operating research agencies.

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History of the introduction and spread of St. John's wort (*Hypericum perforatum* L.) in Australia

J.A. Harris^A and A.M. Gill^B

^A Faculty of Applied Science, University of Canberra, PO Box 1, Belconnen, ACT 2616, Australia.

^B CSIRO Division of Plant Industry, GPO Box 1600, Canberra, ACT 2601, Australia.

Abstract

***Hypericum perforatum* has been introduced into Australia a number of times, the first being more than 100 years ago. It was cultivated in the Melbourne and Adelaide Botanic Gardens in 1858 and 1859, respectively, for potential use in home gardens. The earliest recorded outbreak of the wort was in 1880 at Bright, Victoria; i.e. escaped from a local garden where it was planted for medicinal purposes. Another outbreak occurred at Coromandel Valley in the Adelaide hills, possibly as early as 1881, and certainly by 1886. The earliest outbreak in New South Wales seems to have occurred at Mudgee in 1890 from either horse fodder or as a 'garden escape'. It now occurs in all States. Herbarium records suggest that its range was still increasing in the 1980s. Today it is still abundant in some localities, particularly in south-eastern Australia. For example, in 1986, 200 000ha of the Tablelands of New South Wales were heavily infested with the wort.**

The pattern of spread of St. John's wort has consisted of increasing numbers of isolated occurrences from which expansion has occurred until they coalesced. Spread rate was most rapid, perhaps through the accidental movement of seed associated with the movement of stock and their fodder, as well as through 'garden escapes' following deliberate plantings for horticultural use.

Initially an agricultural problem, it is now more of a problem along roadsides and easements and in non-agricultural land, generally. Low levels of disturbance, such as mowing-burning-scarifying increased populations whereas frequent, intensive disturbance such as repeated ploughing used in tobacco cultivation, eliminated it. Population explosions could well be attributed to a changed disturbance regime in a locality, and/or seed longevity. That seeds may lie dormant in the soil for many decades underscores the ability of the species to 'return' to a site after a prolonged absence (such as under pine plantations) and to some extent independent of the cause of that absence.

Introduction

For over a century St. John's wort, *Hypericum perforatum* L (family Clusiaceae), has

been a problem plant in Australia. In 1883, a writer to the 'Alpine Observer' (Hortus 1883) exhorted the Bright (Victoria) Shire Council to control the 'noxious ugly plant' growing so luxuriously about the racecourse, a plant which had been identified by the Victorian Department of Agriculture as the 'ordinary St. John's wort of Britain' (Martin 1883). Various methods of control were suggested. Over 100 years later, in 1986, 'St. John's Wort is still one of the most troublesome tableland weeds' heavily infesting more than 200 000 hectares in New South Wales (Freebairn 1986).

The seriousness of the problem that St. John's wort posed in 1928 (and today) to farmers is illustrated by the comments of a manager of the Manus Estate, Tumbarumba, New South Wales (NSW):

'Two hundred and forty merino sheep were drafted into a paddock where there was an infestation of about 50% St. John's wort, the rest being grass. At the end of two months, forty of the sheep died. Others were blind, and some had the skin of the face and shins peeled off, leaving raw flesh. All of the sheep had shed the whole of their wool, and went mad at the slightest touch of water' (Tillyard 1928).

Problems due to wort include loss of pasture, photosensitization, abortion and loss of milk production (Campbell and Delfosse 1984). Tainting of cow's milk is a problem in dairying areas (Muenscher 1951).

St. John's wort has had a long and mostly unwelcome presence in Australia despite persistent attempts at its control. A review of the history of its introduction and spread was undertaken to understand why this is so. Two localities receive special attention. Bright, in north-eastern Victoria, has been given as the first site of St. John's wort in Australia outside of Botanic Gardens and, together with the second locality of Tumbarumba, was the site of the first entomological research into the control of the plant. Manus, near Tumbarumba in south-eastern NSW, was the site of extensive experiments on agronomic and chemical methods of control by the NSW Department of Agriculture and the Council for the Scientific and Industrial Research (CSIR), now CSIRO Australia.