

## Scotch, Illyrian and stemless thistles (*Onopordum* spp.)

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### INTRODUCTION

There are four *Onopordum* species thistles present in Australia.

Three are major weeds of the winter rainfall zone of south-east Australia. They are:

- Scotch thistle (*Onopordum acanthium*)
- Illyrian thistle (*Onopordum illyricum*)
- Stemless thistle (*Onopordum acaulon*)

The fourth species, Taurian thistle (*Onopordum tauricum*), is present only in two isolated areas of Victoria.

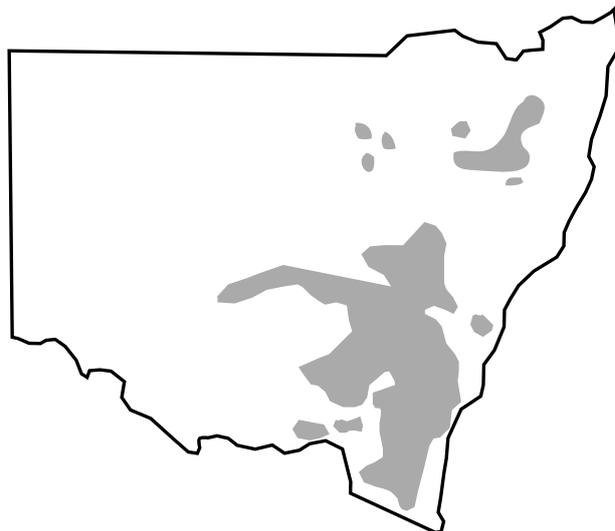
An additional species, *Onopordum nervosum*, was recently detected in New South Wales. It was promoted as an ornamental horticultural 'cottage garden' plant and was purchased by mail order via the internet. It has subsequently been destroyed.

These thistles are all members of the Asteraceae (daisy) family and originate from Europe, western and central Asia and Asia Minor.

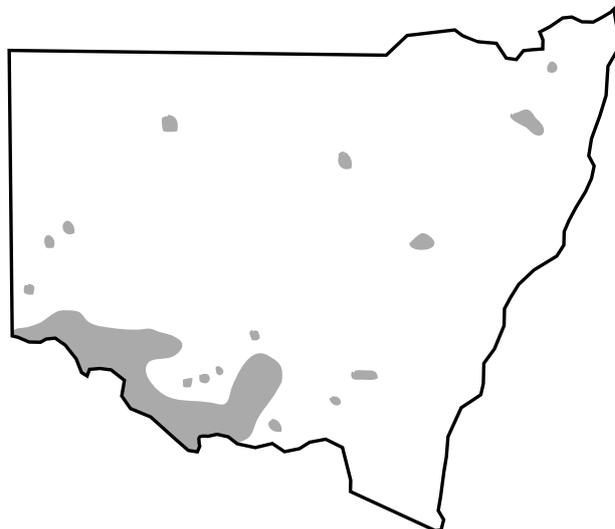
In NSW, Scotch thistle and Illyrian thistle are major weeds of pastures on the Central and Southern Tablelands and the Central and South-Western Slopes. They are also present to a much lesser extent on the coast, Northern Tablelands and North-Western Slopes. Stemless thistle is a troublesome annual weed of the dry pastoral areas of south-western NSW. It is the most widespread of the *Onopordum* species in Australia.

Scotch and Illyrian thistles are annual or biennial plants that grow from seeds. They are

**Figure 1. Distribution of Scotch and Illyrian thistle in New South Wales.**



**Figure 2. Distribution of stemless thistle in south-eastern Australia.**



extremely difficult to control with herbicides because the leaves are hairy and difficult to wet. A single plant can produce up to 40 000 seeds.

A survey of NSW in the late 1980s estimated one million hectares to be infested with Scotch and Illyrian thistles. These thistles flourish in highly fertile soils, particularly of the higher winter rainfall temperate zones. They compete with pastures and lucerne and often grow in dense thickets resulting in the exclusion of grazing livestock. They can cause severe injury to livestock.

## DESCRIPTION

### Scotch and Illyrian thistles

Both of these species are usually strongly biennial thistles and have a life cycle lasting 21 months. Seeds readily germinate at any time of the year but in order for the plant to flower it requires a winter chilling period. Consequently, a plant germinating in the spring/summer period would be required to grow through the following winter before it could go into the reproductive stage and produce a flower head.

This biennial growth habit increases the difficulty in controlling the plant as there is always a wide and mixed age population, from seedlings through to mature plants. Seed is long-lived and can remain viable in the soil for more than eight years.

Scotch and Illyrian thistles are generally confused with each other and are often identified as the same species. There is a large variation within each species due to hybridisation between Scotch and Illyrian thistles. They are considered the same in terms of weediness and control methods.

The major differences between the three *Onopordum* species present in NSW are summarised in Table 1.

### Scotch thistle

*O. acanthium* is also known as heraldic thistle, cotton thistle and woolly thistle.

#### DISCLAIMER

The information contained in this publication is based on knowledge and understanding at the time of writing (February 2005). However, because of advances in knowledge, users are reminded of the need to ensure that information upon which they rely is up to date and to check currency of the information with the appropriate officer of the NSW Department of Primary Industries or the user's independent adviser.

The plant has a whitish-grey appearance with woolly stems and leaves. The flower heads are purple and round with spiny bracts. These bracts surrounding the flowers are the main distinguishing feature. They are sharp, needle-like and less than 3 mm broad at the base, yellow in colour, and only the outer bracts are reflexed (bent sharply backwards). The plant can grow to over 2 m in height.

### Illyrian thistle

*O. illyricum* is also known as Scotch thistle and woolly thistle.

Illyrian thistle, like Scotch thistle, is particularly common on the highly fertile soils associated with pasture improvement.

It has the same whitish-grey, woolly appearance as Scotch thistle. Its main distinguishing feature is the configuration of the flower head. The flowers are purple and protrude slightly more from the head than they do with Scotch thistle. The bracts surrounding the flower are much broader than 3 mm at the base, are reddish-purple in colour and are all reflexed.

The rosette leaves are more deeply lobed and the plant (over 2 m high) looks more skeletal and angular.

### Stemless thistle

*O. acaulon* is an annual species that is very similar to the other two species during the seedling and rosette stages. The rosette leaves are woolly, but are less lobed and broader than the other two species. The mature flowering plant is readily identified as it is stemless and prostrate with a 'wreath'-like appearance. It grows up to 60 cm in diameter and has the round flower heads in the centre of the rosette.

## CURRENT STATUS

All three *Onopordum* species are still extending their range. It is of concern that the plants have recently appeared in denser infestations on the Central-Western Slopes, North-Western Slopes and Northern Tablelands.

Scotch, Illyrian and stemless thistles are declared noxious weeds in half of the local government areas of NSW. See website [www.dpi.nsw.gov.au/weeds/](http://www.dpi.nsw.gov.au/weeds/)

## BIOLOGICAL CONTROL

A number of insect species have been released for the biological control of *Onopordum* thistles.

**Table 1. Comparison of *Onopordum* spp. thistles.**

	<b>Scotch thistle <i>O. acanthium</i></b>	<b>Illyrian thistle <i>O. illyricum</i></b>	<b>Stemless thistle <i>O. acaulon</i></b>
Growth habit	annual to biennial	annual to biennial	annual
Seeds	species similar — rectangular, 4 to 5 mm long, greyish-brown		
Seedlings	cotyledons and seedlings all very similar		
Leaves and stems	whitish-grey with woolly stems and leaves	whitish-grey with woolly stems and leaves (less woolly than Scotch and stemless thistles)	whitish-grey with woolly leaves
Rosette leaves	lobed with spiny margins	deeply lobed to main rib (more deeply lobed than Scotch and stemless thistles)	lobed with spiny margins (broader than Scotch and Illyrian thistles)
Stems	erect with spiny wings extending from leaves	erect with spiny wings extending from leaves (more skeletal, angular appearance than Scotch thistle)	stemless and prostrate
Flower heads	purple, globular with long, slender bracts less than 3 mm broad with only outer bracts reflexed	purple, globular with broad bracts wider than 3 mm, bracts reddish-purple and all reflexed (flowers protrude more from head than Scotch thistle)	white to purple clusters of globular heads in centre of rosette, sharp bracts
Distribution in NSW	mainly Central and Southern Tablelands and Slopes	mainly Central and Southern Tablelands and Slopes	south-western pastoral areas

**Seed-head weevil (*Larinus latus*)**

The first of these insect species to be released was the seed-head weevil, *Larinus latus*, which was first released in spring 1992. The adult weevil is up to 25 mm long, 10 mm wide and is black with a yellow waxy coating. Adults emerge from flowerheads in late summer and feed on foliage of their host thistle.

They hibernate over winter until mid to late spring when they become active and mate. Each female is capable of laying up to 30 eggs. Eggs are laid on thistle flowerheads. Larvae hatch from the eggs and tunnel into the flowerhead where they feed on the tissue supporting developing seeds. After feeding for about 6 weeks the larvae pupate. A single larva is capable of destroying all the seed in a flowerhead of 3 cm diameter or less and more than one larva may develop in larger heads.

Because this weevil has only one generation per year it has taken a number of years for it to build up enough numbers to cause major damage. However, it is now widely established and its ability to destroy most of the seed in a flowerhead makes it a good biological control agent. At some NSW sites this insect has reduced seed production by more than 80 per cent.

**Stem-boring weevil (*Lixus cardui*)**

The second biological agent to be introduced is the stem-boring weevil, *Lixus cardui*, which was first released in November 1993 and is now widely established. Adults grow up to 15 mm long and are brown in colour. Adults emerge from stems in early spring and chew holes in the leaves of thistle rosettes. When the thistles begin to produce flowering stems, females lay eggs into them. Larvae hatch and bore into the stem where they feed on structural tissue. Adults continue to feed on leaves. Combined heavy adult and larval feeding can reduce plant growth and subsequent seed production.

*L. cardui* is not capable of killing *Onopordum* thistles, but its activity weakens the plant, makes it less competitive and reduces seed production. This action allows insects such as *Larinus latus* to have a greater impact on the plant.

**Crown moth (*Eublemma amoena*)**

Another insect that has been established on *Onopordum* thistles is the crown moth, *Eublemma amoena*, which was first released in 1998. Adult moths are mottled light brown and white and up to 15 mm in length. There are 3 adult generations per



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**Illyrian thistle seedling showing cotyledons and first two leaves. Small seedlings of Scotch, Illyrian and stemless thistles are all very similar.**



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**Illyrian thistle rosette. Rosette leaves are more deeply lobed than Scotch or stemless thistles (see comparison photo, facing page).**



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**Illyrian thistle seed head flowering. The broad backward bending spiny bracts are characteristic.**



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**Illyrian thistle has an angular and skeletal form.**



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**Right: Illyrian thistle infestation.**



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**Stemless thistle rosette leaves are broad and are thickly covered with whitish-grey leaves giving a woolly appearance.**



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**Mature stemless thistle is prostrate, giving a wreath appearance. The flower head forms in the middle of the rosette.**



Scotch thistle rosettes have shallow lobes.



Rosette leaves of the three thistles. Left to right, scotch, stemless and Illyrian thistle.



Scotch thistle seed head. The bracts are slender and only the lower ones backward bending.



Spear/black thistle (*Cirsium vulgare*) is often misnamed Scotch thistle.



Scotch thistle infestation can grow to 3 metres in height.



The seed-head weevil attacking Illyrian thistle.



Seed-head weevil *Larinus latus*.



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**Stem-boring weevil *Lixus cardui*.**

year, commencing in spring when adults emerge from pupal cells in thistle rosettes. Females lay eggs on leaves and newly hatched larvae feed in the leaf petioles, causing leaves to shrivel and die. Larvae can also bore into the crown and root of the plant. This may lead to the death of smaller plants. Larvae of subsequent generations feed in the leaves of bolting stems, causing similar leaf shrivelling and death.

The rosette weevil, *Trichosiromachus briesei*, was first released in 1997 but at present there is little evidence of establishment. This insect has the potential to severely damage rosettes and reduce seed production and releases are continuing.

Several other insects have been released but have failed to establish. These are the seed-head fly, *Tephritis postica*, the rosette fly, *Botanophila spinosa*, and the seed-head gall fly, *Urophora terebrans*. Work on *T. postica* and *B. spinosa* has now ceased while the result of a release of *U. terebrans* in early 2003 was pending at the time of writing.

Overseas exploration and quarantine studies on *Onopordum* thistle biological control agents was carried out by CSIRO Entomology. An ongoing collaborative project between CSIRO Entomology and the NSW Department of Primary Industries to breed and redistribute these agents is being partially funded by Meat & Livestock Australia and Australian Wool Innovation Ltd.

## **FURTHER INFORMATION**

### **Weed biology, ecology and identification**

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**Crown moth *Eublemma amoena*.**



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**Rosette weevil *Trichosiromachus briesei*.**

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