

Noogoora burr, Californian burr, Italian cockleburr and South American burr

Weed Management Unit

Introduction

Xanthium species are common summer growing weeds of crops and pastures in New South Wales (NSW). There are 6 related *Xanthium* species in NSW.

The six species are:

- Italian cockleburr or Hunter burr (*X. italicum*) (see Figure 1)
- Noogoora burr (*X. occidentale*) (see Figure 2)
- Californian burr (*X. orientale*) (see Figure 3)
- South American burr (*X. cavanillesii*)
- Bathurst burr (*Xanthium spinosum*) and
- *X. ambrosioides*, a hairy form of Bathurst burr.

The four *Xanthium* species covered in this publication are very similar and are often confused. Hybrids of these species have been found where there are mixed populations. Some experts consider them as one species (*X. strumarium*). The biology and management of these species are similar.

Xanthium species are also commonly referred to as cockleburr or burrweed.



Figure 1. Italian cockleburr. S. Johnson.

Noogoora and Italian cockleburr are native to the southern United States of America, Mexico and West Indies. Californian burr is native to northern California. South American burr is native to Argentina, Chile and Uruguay.

Impact

These weeds compete with summer crops and pastures. They are especially a problem when they grow in dense stands. In crops such as cotton, corn and soybeans, these weeds can out-compete crops



Figure 2. Noogoora burr. S. Johnson.



Figure 3. Californian burr. S. Johnson.

for moisture and nutrients. Left untreated, infestations result in reduced yields and downgrading of grain due to contamination. In cotton and wool production, masses of the fruit or burrs can get tangled in the fibres, resulting in price penalties.

These weeds also cause problems in livestock production. Large plants can create barriers for livestock and people around watercourses and in irrigation areas. The burrs can cling to livestock, making handling difficult and causing physical injury to people and the livestock. Noogoora burr is also a host plant for various plant pathogens that affect crop plants, for example the disease of cotton crops verticillium wilt (*Verticillium dahliae*).

Burr plants can cause allergies and contact dermatitis reactions in some people.

Toxicity

Xanthium species are toxic to most livestock at the seedling stage while the cotyledon (first two) leaves are still present. Mature plants are not toxic but are unpalatable to grazing animals.

Habitat

Plants are commonly found in riparian areas, along roadsides, in wasteland and in pastures or cultivated areas that are low lying or subject to periodic flooding. They are capable of forming extensive dominant stands in wet summers.

These species grow in a variety of climates. They grow best in deep fertile soils but are found on a variety of soil types.

Distribution

The distribution and abundance of these species in NSW varies with seasonal conditions.

Noogoora burr is the most widespread. It is found in most parts of NSW, except for the southern tablelands.

Californian burr is generally confined to the south-western areas of NSW.

Italian cockleburr was first found in the Hunter Valley but has now been found on the central, south and most commonly the northwest slopes and plains.

South American burr is found around Sydney, Windsor and upper Hunter areas.

Description

Noogoora burr, California burr, Italian cockleburr and South American burr are stout, erect, single stem or many branched annual plants with large leaves similar to those on grapes. They usually grow to one metre in height but can reach four metres.

These plants are very similar and often confused. However, there is extensive variation between these species, especially in the number and length of the

burrs and the spines on the burrs. Plant height can vary, as can leaf size and shape.

Hybrids between these species can occur in mixed populations. The main features of these species are outlined in Table 1.

Stems

Plants tend to be single stemmed when growing in dense patches. Isolated plants have branched and spreading stems.

Leaves

Plants have large grapevine-like leaves that grow alternately on the stems. They are 5–15 cm in diameter and have prominent veins.

Roots

Plants have a stout taproot and a very extensive root system.

Flowers

The flowers are small, green and inconspicuous. They form in clusters containing separate male and female flowers along slender branchlets and in leaf axils. Female flowers develop to become the fruit (burr).

Fruit

The fruit or burr is hard and woody, more or less egg-shaped, densely covered with hooked spines and ending in longer terminal spines (or beaks). The burr is green when immature and brown when mature. The main way of distinguishing between burr species is by the burr shape and size (see Figure 4). The burr of the South American burr is the largest (heaviest) of these species. The burrs of the Californian, Italian and Noogoora burr decrease in size respectively (Table 1 and Figure 4).

Seed

There are two seeds in each burr, one slightly larger than the other. They are brown, grey or black, boat-shaped and flat on one side.

Lifecycle

Noogoora, Californian, Italian cockle and South American burr are annual plants that reproduce by seed.

Seeds germinate when the soil is moist in late winter to summer. Flushes of germination can occur after summer storms or irrigation events. On flood prone areas large germination events are common after floods.

The seedlings (see Figure 5) have a rapid growth rate. These species are short day-length plants meaning that flowering begins as the days shorten in January to early March regardless of plant age or size. Californian burr can germinate earlier and mature one month earlier than the other species.

Plants have separate male and female flowers. The male flower is just above the female on the stem and branches. Plants can be self pollinated or wind pollinated from nearby plants.

The fruit (burrs) continue to grow and mature from March until the cool temperatures or a lack of moisture stops plant growth. These weeds can produce hundreds of burrs per plant which may result in 2000–3000 seeds produced per square metre.

Burrs are usually dispersed from the plant in autumn and winter but they may remain attached on undisturbed plants until the following spring.

Each burr contains two seeds, each with a different dormancy. Moisture is required to break the dormancy. The large lower seed usually germinates in the season



Figure 4. A comparison of the seed capsules of the main *Xanthium* species (left to right): South American burr (*X. cavanillesii*), Italian cocklebur (*X. italicum*), Californian burr (*X. orientale*), Noogoora burr (*X. occidentale*) and Bathurst burr (*Xanthium spinosum*). Auld & Medd.

following production but the smaller seed does not usually germinate until at least a year later.

Spread

The burrs of the four species, with their hooked spines, are easily spread by people and animals. The burrs can also float and are often spread in floodwater and along watercourses.

Sheep, cattle and horses spread the burrs. Populations can also be spread by seed contamination in grain and machinery.

Control and management

Integrated weed management

Prevention of seed set is the most important part of managing these plants and eliminating infestations. Trials have shown that six years prevention of seed set leads to a decline in populations to 1% of previous populations.



Figure 5: Noogoora burr seedling. S. Johnson.

Table 1. Characteristics of burr plants.

	Noogoora burr (<i>X. occidentale</i>)	Californian burr (<i>X. orientale</i>)	Italian cocklebur (<i>X. italicum</i>)	South American burr (<i>X. cavanillesii</i>)
Distribution in NSW	Widespread	Southwest regions	Hunter and north west regions	Sydney and upper Hunter regions
Common height	To 2 m	To 2 m	To 1 m	To 1 m
Stems	Purple/green mottling and hairy	Green to reddish-brown with a rough surface	Green with a rough surface	Green with a rough surface
Leaves	Green rough surface, upper darker, purplish veins	Both surfaces green and rough	Both surfaces green and rough	Both surfaces green and rough
– Shape	Broad ovate to triangular	Ovate to triangular	Broad ovate or triangular	Broad ovate or triangular
– Size	5–15 cm long 5–15 cm wide 3–5 lobed	5–14 cm long 5–15 cm wide 3 lobed	6–9 cm long 6–12 cm wide 3 lobed	5–12 cm long 5–12 cm wide Lobes barely developed
Fruit (burrs)				
– Length	16–22 mm	15–25 mm	25–30 mm	15–30 mm
– Spines	Hooked 1–3 mm	Hooked 2–4 mm, diverging	Hooked 3–4 mm	Thin, hooked 4–7 mm
– Terminal spines (beak)	Straight almost parallel (sometimes divergent) 3–5 mm	Hooked 4–6 mm long curving inward at the tips	Diverging 5–7 mm long, curving inward at the tips	Straight, hooked and diverging 6–8 mm long. Not hooked at tips.

Repeated control is often needed as many germination events can occur from late winter to summer. Early control can prevent competition with crops and pastures, and later control can prevent seed set of plants that may have been missed by earlier control efforts.

Large populations can be treated with herbicides, cultivation or slashing; follow-up control of smaller populations may include spot spraying, chipping (or hand-hoeing) or inter-row cultivation in crops.

Herbicides

These plants are susceptible to a range of foliar and residual herbicides. For a full list of registered herbicides see the Industry & Investment NSW publications *Noxious and environmental weed control handbook* and *Weed control in summer crops*.

Foliar herbicides are most effective if the plants are young and actively growing. Plants suffering from moisture stress are difficult to kill. Older plants may require repeat applications. Late control with some herbicides, when the burrs are green, can result in seed sterility – however this is not recommended as the primary form of control.

In crops, residual pre-emergent herbicides are useful, although there are sometimes problems as the burr can germinate and emerge from relatively deep in the soil, below the residual herbicide band. Follow-up control in the form of chipping or inter-row cultivation may be required. Spot spraying is an important tool for areas that are difficult to access and for scattered plants.

Cultivation

Cultivation is an effective method of controlling the seedlings of these weeds. Successive flushes of seedlings during the summer may require follow up control.

Inter-row cultivation is commonly used in row cropping such as sorghum, corn and cotton to control seedlings that have germinated after irrigation events.

Slashing

Slashing or mowing are useful in clean-up operations after spraying with herbicide or if infestations are small and scattered. Any burrs from the plant should be removed from the equipment to prevent spread.

Chipping

Chipping or hand hoeing is only economical for small areas, individual plants or isolated populations. It is an effective follow up control method for plants not controlled by other methods to prevent seed set.

Surveillance

After controlling burr plants it is important to monitor these sites for further germination events. High risk areas for new infestations include flood prone areas or areas where stock from burr infested areas have been.

Pasture management

Maintaining ground cover in pastures is vital. Pasture gaps result in an increase in burr germination and seedling survival. It is important to ensure that pastures are not overgrazed in spring and summer to reduce the potential for the establishment of burrs and other weeds.

Grazing

Adult plants are not easily eaten by livestock, due to the roughness of the leaves and stems. Care needs to be taken when grazing to ensure there are no seedling plants, which are toxic to animals and could result in death.

Biological control

Four species of insects and one rust fungus have been released in Australia for the biological control of Noogoora burr. These agents have had little or no effect in NSW, mainly due to the agents' inability to tolerate the uncertain climatic conditions where Noogoora burr is found.

Legislation

Xanthium species are class 4 noxious weeds under the *NSW Noxious Weeds Act 1993* in many areas of NSW (see Figure 6).

Class 4 control requirements are that 'the growth and spread of the plant must be controlled according to the measures specified in a management plan published by the Local Control Authority.'

The responsibility for the control of noxious weeds on private land rests with the land owner or occupier of the land. This responsibility extends to the middle line of any adjacent watercourse, river or inland water (tidal or non-tidal).

A full list of noxious weeds and requirements under the Act can be found at www.dpi.nsw.gov.au/weeds

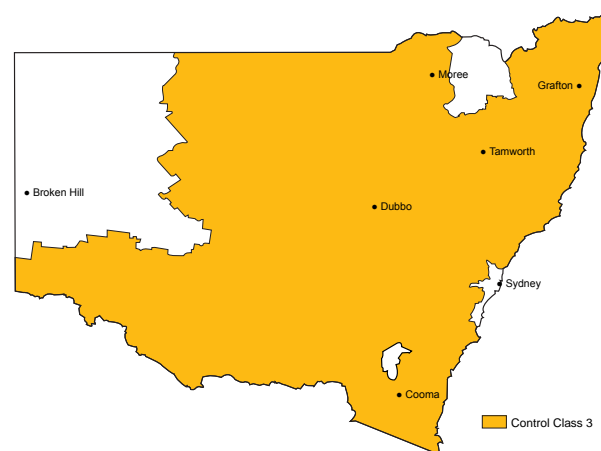


Figure 6. Declaration of *Xanthium* species in NSW. A. Maguire.

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Publications available

A complete list of Industry & Investment NSW weed publications can be found at www.dpi.nsw.gov.au/weeds. Printed copies are available – contact the Industry & Investment NSW bookshop on 1800 028 374 or visit www.dpi.nsw.gov.au/bookshop

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