
Parthenium weed: ecology and threat



Section 1

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Description

Parthenium weed (*Parthenium hysterophorus* L.) is a branching, annual herb with pale-green lobed leaves, a deep taproot, and an erect stem with several branches. It can grow to more than two metres high.

Seedling leaves are oval while the first two true leaves are egg-shaped and hairy. Later leaves are deeply lobed (with the lobes also deeply lobed) and hairy, initially forming a rosette. Mature plants are erect.

Flower heads, each containing five black seeds, are creamy-white and about 4 mm across. They are clustered on large branched stalks that arise from the leaf forks.

Habitat

Parthenium weed is native to sub-tropical North and South America. It grows best on alkaline, clay-loam to heavy clay soils in areas where rainfall is greater than 500 mm per year and falls dominantly in summer.

Distribution

Parthenium weed is currently found widely across the central highlands of Queensland, with smaller populations in southern and western Queensland and sporadic occurrences in New South Wales and the Northern Territory.

The following figures indicate, respectively, the potential distribution of parthenium weed using climate-based data; the 2003 distribution and density of parthenium weed across Queensland; and locations in New South Wales where parthenium weed has



▲ Plants germinate with rounded leaves. Lobed leaves quickly develop after germination.



▲ Mature plant.

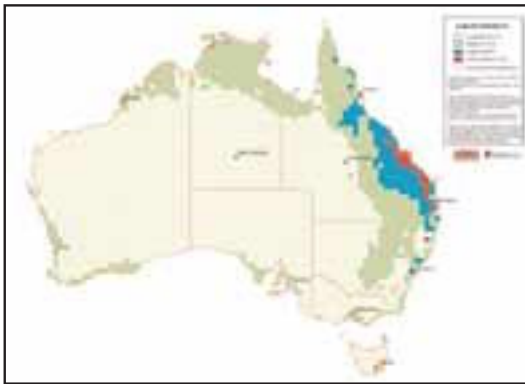


▶ Young plants form a rosette.

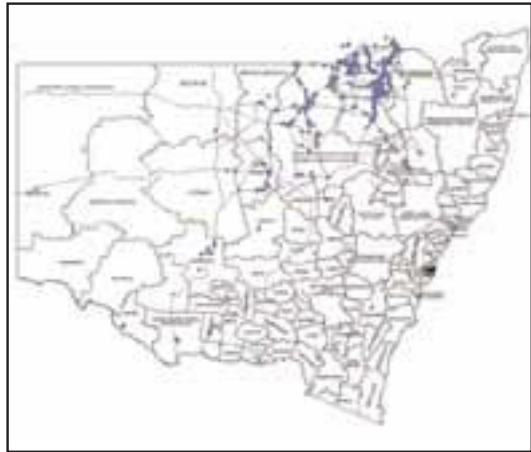


been found and eradicated since 1982. New South Wales currently has no known self-regenerating populations of parthenium weed.

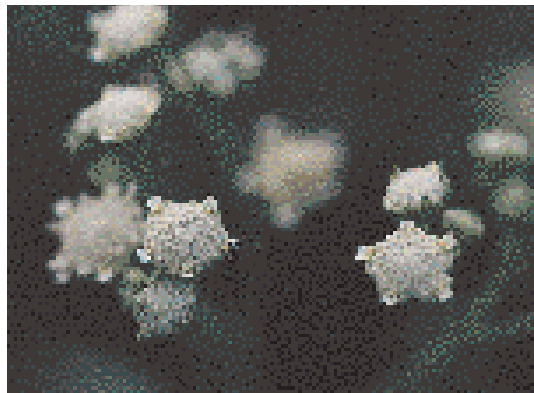
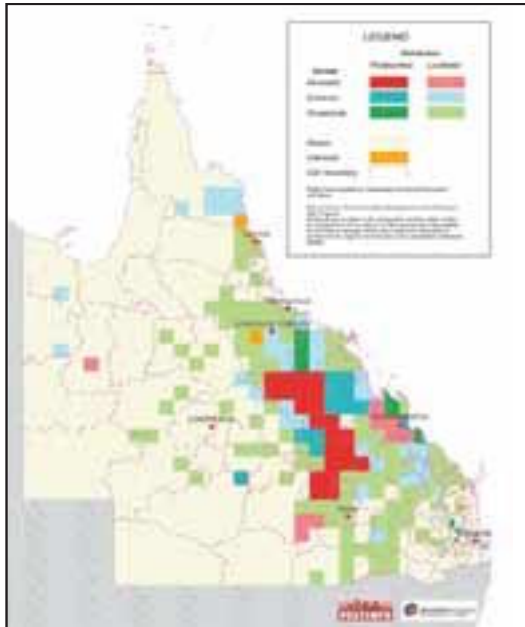
Potential distribution of parthenium weed in Australia (CLIMEX data)



Parthenium weed outbreaks in New South Wales (1982–2003)



Distribution and density of parthenium weed in Queensland, 2003



▲ Flower heads are creamy-white.



▶ Parthenium flowers.





Germination and reproduction

Research shows that parthenium weed achieves highest germination rates at temperatures ranging from 12°C to 27°C, the optimum germination temperature being 22–25°C. This is confirmed by field experience.

In central Queensland it will germinate at any time but does best in September–November and March–May. In north-west Queensland it has an apparent aversion to germinating and establishing in the high temperatures of the monsoon season, and in more southern regions little parthenium germination occurs in the coldest months. Because parthenium germination depends on sufficient rain to leach germination inhibitors from the seed, the main germination flushes coincide with spring, early summer and autumn rains.

University of Queensland research found that parthenium seed has a very rapid rate of germination from the soil seed bank. Parthenium germination peaks four days after wetting with the majority germinating in one week. Germination of grasses from the same seed bank peaks at day five or six but requires about three weeks for the majority to have emerged. This trait gives parthenium weed a great competitive advantage.



Another reason for parthenium's success as a weed lies with its reproductive ability. Parthenium weed has been observed to germinate, grow, mature and set seed in as little as 28 days in central Queensland. And simulated phenology studies at The University of Queensland have indicated that parthenium weed could possibly develop seed in 50–65 days if growing at Emerald in central Queensland, in 80–90 days at Armidale in northern New South Wales, and in 85–100 days at Ballarat in Victoria. Added to that, several successive generations can emerge in a good season.

Parthenium weed is a prolific seed producer capable of producing up to 15 000 seeds per plant, giving it potential to build up a seed bank very quickly. In self-regenerating populations, parthenium seed banks range from 3000 to 40 000 seeds per square metre and typically make up greater than 50 per cent of the total soil seed bank. Up to 400 million parthenium seeds per hectare can be present in the surface soil compared to 120 000 native grass seeds.

Seed dormancy and seed-bank longevity

Parthenium seed banks are persistent, with seed viability greater than 50 per cent after more than two years in the soil. Seed near the soil surface is rarely viable beyond two years. However, undisturbed, buried seed will stay dormant for a longer period. It has been recorded as viable for up to six years, and anecdotal evidence suggests even longer. In climates where rainfall is irregular, dormancy mechanisms prevent untimely germination.

The size and persistence of the seed bank has implications several years beyond a reduction in parthenium weed populations.

- ◀ Parthenium weed is a very competitive weed because it germinates much more rapidly than most grasses.

Colonisation and spread

Parthenium weed colonises a range of vegetation and soil types but the most common are the alkaline clay loam to clay soils on downs; floodplains; and softwood, brigalow and gidgee scrub country.

Parthenium weed is extremely effective at colonising and is a highly competitive plant. It will colonise weak or overgrazed pastures with low ground cover; cultivated lands; disturbed and bare areas such as roadsides and tracks; and heavily stocked areas such as stockyards and watering points.

Parthenium seed is spread easily by water, farm and industrial machinery, feral animals, humans, vehicles, stock fodder and movement of stock, grain and seed.



- ▲ This red loamy soil has healthy vigorous pastures. In contrast, parthenium weed is infesting the clay soil with degraded pasture.



Competition with pasture and native species

During germination, parthenium weed is capable of out-competing other plant species, especially on heavy cracking clays. However, in healthy vigorous pastures, parthenium that germinates in the growing season will find it difficult to compete with the pasture.

University of Queensland research has shown that smoke increases germination of native pastures and may inhibit parthenium germination. This may have implications for the development of innovations in parthenium weed management. Parthenium weed will become more competitive as carbon dioxide in the atmosphere increases (greenhouse effect).

- ◀ Heavily stocked areas such as watering points are susceptible to parthenium weed.



Problems created by parthenium weed

Parthenium weed affects the viability of primary production—both livestock and grain enterprises—as well as causing health problems for humans and animals.

Impact on agricultural viability

Parthenium weed is a serious problem. In grazing country it can dominate pastures under continued heavy grazing and has the potential to exclude useful forage plants, thus decreasing pasture productivity, carrying capacity and land values.

Parthenium weed has also spread to grain-producing areas of Queensland where it may threaten exports by contaminating grain and other produce. Parthenium weed can also taint sheep meat and dairy milk.

Parthenium weed is allelopathic, which means it can chemically inhibit pasture (and other plant species) seed germination and growth. Parthenium weed competes directly with preferred pasture species, reducing pasture vigour and seed set and leading to habitat and ecosystem changes.

Health issues

All parts of the parthenium plant at any stage of growth are toxic to humans and animals.

Humans

Parthenium weed has been shown to be related to health problems for some people living or working in close proximity to it. Individuals in contact with parthenium can develop sensitivity to the plant, which may then manifest as an allergy-type response.



▲ Parthenium weed growing in a sorghum crop.



▲ Parthenium weed infesting wheat stubble, 1999.



- ▶ Good weed husbandry resulted in a parthenium-free sunflower crop. Post harvest, 2000.



A survey in Queensland showed 10 per cent of property workers in infested areas had developed visible allergic symptoms to parthenium.(1)

Contact with any parts of the parthenium plant (such as airborne pieces of dried plant material, pollen or even root) can cause the development of sensitivity as well as the subsequent risk of allergic reactions. In contrast, a person who has allergies may also have an allergic reaction to parthenium even though they may not be sensitive to the plant itself.

Sensitisation to parthenium may occur on the first contact or may take longer to develop. Often a person will develop an allergic reaction to parthenium some hours after the initial exposure, and in this case may not realise that parthenium is the cause of their symptoms. Once sensitised, any direct contact may trigger off an allergic response. The severity of a reaction may worsen over time.

In highly sensitised individuals, indirect contact with parthenium can be sufficient to provoke an allergic reaction. Indirect contact could occur through handling or brushing against clothes which have parthenium particles on it such as minute bits of leaf, stem, stem hairs, pollen or plant root.

For some people allergic symptoms can start to show within minutes of contact, particularly if hay fever is their primary allergic symptom. For others it may take up to several hours before an allergic response shows. The type of allergic reaction depends on the individual's personal characteristics.

Whilst some people may not have any indications of sensitivity to parthenium, there remains the threat of allergic reactions at a later date. Absence of allergic symptoms to parthenium should not be assumed to indicate a lack of sensitivity, since it may take up to twenty years for such symptoms to show.

Reactions to parthenium include:

- severe contact dermatitis
- phytophoto dermatitis that develops on contact and is aggravated by sunlight
- hay fever (allergic rhinitis)
- aggravated asthma (allergic bronchitis).

Typical symptoms of an allergic reaction to parthenium include:

- skin rashes, especially on face and hands (itchy, red, irritated and weepy skin)
- peeling skin
- puffy eyes/excessive watering
- swelling and itching of the membranes of the mouth and nose
- fatigue
- wheeziness or constant cough, especially at night
- continually running nose, repeated attacks of sneezing
- itching of the roof of the mouth.

Some people also have an allergic reaction to other plants in the same family group, for example, sunflowers and chrysanthemums.

(1) Chippendale, JF & Panetta, FD 1994, 'The cost of parthenium weed to the Queensland cattle industry', *Plant Protection Quarterly*, vol. 9, pp. 73–6.





Animals

Parthenium weed is also toxic to animals. It can cause:

- dermatitis with pronounced skin lesions on all animals including horses and cattle
- mouth ulcers with excessive salivation if eaten
- eye irritation in working dogs
- loss of condition in farm animals
- death due to rupturing and haemorrhaging of internal tissues and organs.

Dealing with parthenium weed

Never pull parthenium weed out of the ground with bare hands—not even a single plant! Wear gloves, and remove it in the early morning or late afternoon/early evening when it is cooler. Make sure you remove all of the root system or the plant may regrow from root remnants left behind.

Do not pull the plant out if it is in flower as the disturbance will release pollen. To prevent seeding, spraying with weed killer must be carried out before flowering since weed killer will not kill the seeds once they are set. Protect your face. Wear a lightweight face/dust mask or scarf to prevent particles of parthenium plant getting in your nose and mouth. Face masks for nose and mouth can be purchased in hardware or garden shops and are inexpensive.

Protect your skin. Wear lightweight long-sleeved garments and remove them as soon as possible afterwards. If your skin itches after handling parthenium weed, especially on the face or arms, don't rub it. Instead, wash your face and arms thoroughly in cold water as soon as possible.

If necessary, have a shower afterwards, putting contaminated clothing in a plastic bag for dealing with later. Once they are in the bag, remove them to the laundry—away from living areas. Don't leave any contaminated clothing lying around the shower or bathroom inside the house. Take care when dealing with the contaminated garments that you do not again expose yourself to parthenium particles.

Obviously, if working on land where parthenium weed is present, it is not possible or always practical to cover oneself completely as protection. But the following measures can help:

- In dense parthenium weed growth try to protect at least the face and arms.
- Carry a water supply to wash dust and pollen off the face and arms.
- Shower, and change clothing as soon as possible.
- If you use anti-histamines (e.g. Claratyne® or Teldane®) or breathing medication (e.g. Ventolin®), take them with you. Use as directed immediately you feel any allergic response starting to develop. Since some anti-histamine medications can make you drowsy, it is important to check with a doctor as to which is safest to use for maximum effect, especially if driving or operating machinery.

The best way to prevent an allergic reaction is to AVOID contact.





Declarations and legislation affecting parthenium weed

Parthenium weed is now recognised as a weed of national significance (WONS) and declared noxious in all states of Australia. Parthenium weed is a declared Class 2 pest under the Queensland *Land Protection (Pest and Stock Route Management) Act 2002*.

A person must not supply anything containing seed of parthenium unless they give a written notice (e.g. Weed Hygiene Declaration) to the person being supplied. Examples include fodder, gravel, machinery, mulch, packing material, sand, soil, stock, vehicles and water. Under the Act, a person must take reasonable steps to ensure that a vehicle or anything else transported on a road is free of parthenium seed or, if contaminated, to restrict the escape of seed.

In Queensland under the *Agricultural Standards Act 1994* the sale of commercial pasture and crop seed containing parthenium seed is prohibited.

Under the *New South Wales Noxious Weeds Act 1993*, parthenium weed is categorised as control category W1. The presence of a W1 weed on land must be reported to the local control authority and the weed must be fully and continuously suppressed and destroyed. This Act also contains specific provisions to prevent agricultural machinery entering from Queensland without an inspection for 'notifiable' weeds such as parthenium weed.



▲ Parthenium represents a potential threat to grazing and cropping lands and natural ecosystems across northern and eastern Australia.



▶ Charlie (pictured) and Evon Marks of Winvic, Clermont use flexible grazing management to control parthenium weed.

