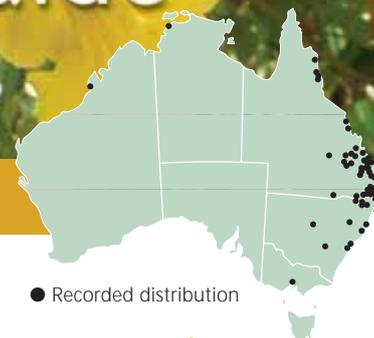


Weed Management Guide

Managing weeds for biodiversity



Cat's claw creeper (*Macfadyena unguis-cati*)

The problem

Cat's claw creeper (*Macfadyena unguis-cati*) was introduced to Australia as a garden plant, particularly for screening trellises and walls, and has escaped to become a major weed of native forests and riparian areas in eastern Australia. Its climbing woody stems (lianas) cling to tree trunks, enabling it to grow into the forest canopy. In native rainforests it can overtop and kill mature trees, opening up the canopy for light-loving weeds. This can lead to further degradation in the structure and composition of the native plant community. Cat's claw creeper competes with native plants by forming a dense above-ground mat

and numerous underground reproductive tubers. It produces abundant seeds that are dispersed by wind and water.

While not among the 20 Weeds of National Significance, cat's claw creeper was ranked a close 23rd in this assessment of Australia's worst weeds. It is already having a major impact in southeast Qld and northeast NSW. It is a threat to several endangered ecological communities and is also a pest of forestry, urban areas and infrastructure corridors.

Cat's claw creeper has been targeted for biological control due to its widespread impacts on native vegetation and the difficulty and expense of controlling established infestations.

Two insects have been released in Australia, both of which attack the leaves. If established successfully, it is hoped that these agents will reduce the growth and seeding of the weed and, in the longer term, the production of tubers. It will be some years before the impacts of these biological control agents can be assessed.

The weed

Cat's claw creeper is a perennial woody vine with numerous stems, generally up to 15 cm thick, which climb vertically and also creep along the ground and over other vegetation. The leaves are opposite and compound, with a 1–2 cm long stalk (petiole). Each leaf has a basal pair of lance-shaped leaflets 2–7 cm long x 1–3 cm wide.

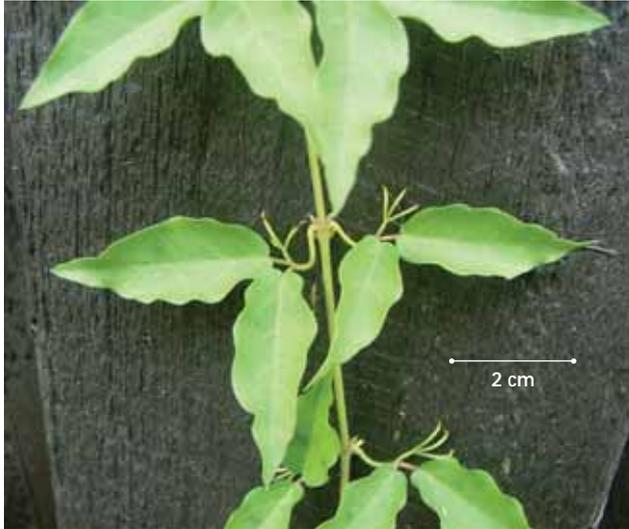
Key points

- Cat's claw creeper is a woody vine that invades warm, moist native forests and riparian zones, killing native trees and understorey plants.
- It spreads readily from seed, carried by water or wind.
- It reproduces vegetatively through sprouting of persistent underground tubers.
- Mature plants can be controlled by cutting off the vines and treating lower stems and foliage with herbicide. Follow up is essential because stems and tubers may resprout.
- Physical removal is feasible for seedlings or very small plants, as long as the roots and tubers are completely removed.



Cat's claw creeper (*Macfadyena unguis-cati*) festoons mature native trees, competing for light and nutrients. Riparian rainforest along the Albert River, SE Queensland.

Photo: S. Navie



Cat's claw creeper (*Macfadyena unguis-cati*) leaves are opposite with 2 leaflets and a three-pronged tendril which aids in climbing.
Photo: S. Navie



Cat's claw creeper flowers are bright yellow and trumpet-shaped.
Photo: S. Navie

The third leaflet is modified into a three-pronged tendril. Tendrils are 10–15 mm long with stiff tips that form hooks (like cat's claws) that aid in climbing. Its large yellow trumpet flowers are in clusters of 1 to several, borne in the leaf axils; 4–8 cm long with lobes to 2 cm long. Fruit is a long narrow capsule, 15–45 cm long and 8–12 mm wide. Capsules contain numerous two-winged seeds that are 2–4 cm long.

Cat's claw creeper's tendrils hook into the bark of host trees, assisting the vine to climb the trunk. Young climbing stems produce aerial roots that can attach strongly to bark. Plants grow well in open, sunny situations, but young plants are tolerant of shade. Underground roots are much branched and produce tubers at intervals along their length. Tubers can be up to 40 cm long and each one can produce multiple stems. Entwined roots and tubers form a dense underground mat in mature infestations. Cat's claw creeper is not generally a pasture or agricultural weed, as young stems and leaves close to the ground can be grazed.

Weed identification and similar native species

Cat's claw creeper belongs in the family Bignoniaceae. Two other introduced vines in this family, both from South America have become naturalised in eastern Australia but are localised. They are:

- Flame vine or golden shower (*Pyrostegia venusta*). It has ribbed branchlets, 3-pronged tendrils, and orange flowers.
- White trumpet vine or monkey's comb (*Pithecoctenium cynanchoides*). It has ribbed branches, tendrils, heart-shaped leaflets and yellow flowers that are paler inside.

Other common introduced vines and creepers that threaten similar habitats to cat's claw creeper are Madeira vine (*Anredera cordifolia*), balloon vine (*Cardiospermum grandiflorum*), morning glory (*Ipomoea* spp.) and tradescantia (*Tradescantia fluminensis*).

Native vines

Native vines are common in the habitats invaded by cat's claw creeper but they do not have its distinctive three-pronged tendrils. They include:

- Wonga vines (*Pandorea* species) are related to cat's claw creeper. The small flowers are pink, white or cream. Most species are native to the eastern states, but *P. pandorana* has a wider distribution. It has much smaller leaflets than cat's claw creeper with darker green glossy leaves.
- Silkpods (*Parsonsia* species) are native vines with simple, opposite leaves and small flowers that are not trumpet-shaped. Several species are native in eastern Australian forests.

How it spreads

Cat's claw creeper produces numerous seeds with membranous wings that aid dispersal, particularly by water and wind. Although seed viability is low, seed production is high and some seeds produce multiple seedlings. Established plants can reproduce vegetatively from tubers and creeping stems. Detached tubers and cuttings may resprout in moist conditions.

Cat's claw creeper spreads from gardens, where it is often found, and can be dispersed by human propagation. It is available for sale in the NT but sale is prohibited in Qld and WA.



Cat's claw creeper (*Macfadyena unguis-cati*) seeds have papery wings and are dispersed by wind and water.
Photo: S. Navie

Where it grows

Cat's claw creeper is native in Central and South America and the West Indies. It is widely naturalised around the world, occurring in southern Africa, south-eastern USA and Hawaii, Asia, the Pacific Islands, Republic of Cape Verde, Mascarene and recently in Europe.

In Australia it is very common in eastern coastal regions, mainly north from Sydney and especially from Taree in NSW to Rockhampton in Qld. Cat's claw creeper grows in a range of soil types, but does not tolerate poorly drained soils. Plants are capable of surviving heavy frost but seed germination is reduced at low temperatures.

The plant communities in Australia most commonly invaded by cat's claw creeper are riparian zones and subtropical and tropical rainforests. These include littoral rainforest and riverflat eucalypt forest on coastal floodplains, listed as endangered ecological communities in NSW. Most surviving remnants of these communities are small and particularly prone to weed invasion and degradation.

Potential distribution

Climatic tolerance modelling of cat's claw creeper's potential distribution in Australia indicates that highly suitable habitat occurs from north-eastern NSW to north of Rockhampton, with suitable habitat from south of Sydney



Cat's claw creeper seed capsules are long and narrow.
Photo: S. Navie

to Cape York. There is potential for cat's claw creeper to become more abundant within its current range and to extend its range, mainly along the east coast.

Growth cycle

Cat's claw creeper has a well defined growing season, extending from spring through to autumn. Roots start to develop tubers in their second year and plants may be well established before they start to flower. Flowering occurs in spring and seed capsules mature in late summer to autumn, approximately 8–10 months after flowering. Seed begins to drop in late May, with peaks in July and August. Mature plants grow more rapidly when the vines emerge above the forest canopy and the growing tips receive more light.



Cat's claw creeper (*Macfadyena unguis-cati*) seedling that sprouted in a Brisbane garden.
Photo: S. Navie

Seeds germinate best when not buried and will germinate readily in moist leaf litter. During the prolonged seedling stage, the root system and tubers develop rapidly. Cat's claw creeper has low levels of seed dormancy and is not known to produce a persistent seedbank.

What to do about it

In regions where cat's claw creeper is widespread, sites with the greatest biodiversity significance should be the highest priority for weed removal. At the local or property scale, a long-term management program can reduce the weed's harmful effects, help contain its spread and encourage the recovery of native vegetation. Coordinated control programs involving neighbouring landholders can maximise effectiveness and reduce ongoing spread.

Liberating mature native trees from vine weeds to enable recovery of the canopy is a key first step in restoring rainforest ecosystems. Even heavily infested sites may have hidden potential for natural regeneration following weed management. A planned, strategic approach is essential to ensure that after control, cat's claw creeper is replaced by desirable plant cover rather than new seedlings, regrowth or other major weeds. For example, short-lived minor weeds that invade after primary weeding may have a temporary role in sheltering young native plants, but long-term restoration processes will not continue if removal of one major



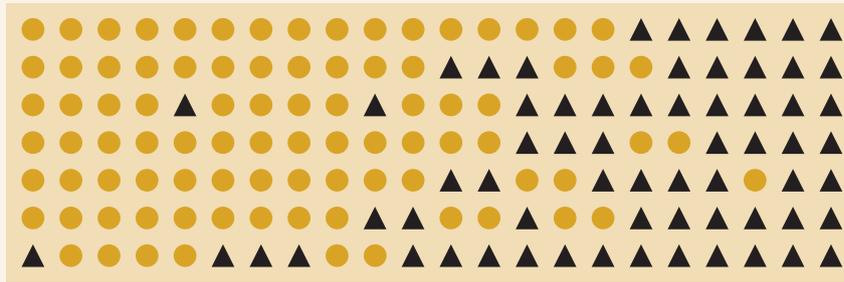
Cat's claw creeper (*Macfadyena unguis-cati*) climbing stems produce aerial roots that cling to tree bark.
Photo: S. Navie



Strategic weeding in native vegetation

● Native vegetation

▲ Weeds



→ Weed from the least weed-infested bush towards weed-dominated areas

weed species is followed by expansion of another. As well as the information presented in this guide on cat's claw creeper, a plan needs to be based on specific knowledge about the site—including the distribution of other major weeds.

Prevent cat's claw creeper spread:

Identify locations where cat's claw creeper occurs as isolated plants or sparse populations. Remove seedlings and treat isolated plants or clumps first and follow up. Cat's claw creeper can spread along rivers, particularly from seeds dispersed by floodwaters. Keep uninfested areas free of cat's claw creeper.

Reduce established infestations:

Develop and implement a **long-term** weed management plan.

1. Investigate the site

- **Identify all plant species:** weeds and native plants.
- **Map cat's claw creeper infestations:** indicate cat's claw creeper density throughout the site, identify major sources of seed from which re-invasion can occur. Mature infestations are most readily detected during the flowering season.
- **Map native vegetation condition:** assess its capacity for recovery after

cat's claw creeper is removed and identify sites of high biodiversity value, such as rare flora.

- **Values and risks:** identify native fauna habitat values and sites with high potential for erosion and other risks.

2. Develop the site action plan

- Identify goals and priorities based on the site information.
- Define priority areas for control by overlaying maps of weed density, native vegetation, site values and risks.
- Plan to weed strategically:
 - protect the better quality native vegetation first (treat cat's claw creeper infesting trees that are still living) and consider the needs of fauna and flora
 - work from isolated cat's claw creeper plants towards core infestations
 - control plants from upstream to downstream.
- The size of the area targeted at each stage should be manageable enough to follow up thoroughly. Weed control that is not followed up is a waste of resources and can contribute to bigger weed problems in the long-term.
- Include control of other weeds so that they do not establish where cat's claw creeper has been removed.
- Select the most suitable control method for each cat's claw creeper

growth stage in each area to avoid damage to native vegetation. Plan appropriate disposal of weed material.

- Prepare a weed management calendar to maximise the effectiveness of control activities.

3. Implement the action plan

- Remove cat's claw creeper from the least infested areas into the more infested areas. Ensure that activities do not spread the seed and tubers or disturb ground cover. Do not overclear. Adapt to local seasonal conditions.
- Follow up weed regrowth each year in areas previously treated before moving to new areas of infestation.

4. Monitor and evaluate outcomes and adapt the plan accordingly

Include monitoring of native plant regeneration, as well as weed response. In weed management programs there is often a tendency to focus on the removal of weeds as a goal, but at the site level the ultimate goal is restoration of native vegetation.

Control methods

Dense infestations of cat's claw creeper are very difficult to control due to its numerous lianas, abundant seed and ability to resprout from the tubers, sometimes for years.

In selecting the most suitable control techniques it is essential to minimise adverse impacts on native vegetation and to encourage its subsequent recovery. The methods chosen should be adapted to the type of native vegetation invaded, stage in the restoration program, size and growth stage of the weeds and level of infestation. Weeding should proceed gradually as creation of large gaps can lead to further weed invasion.

Follow up is essential. Regrowth should be treated before it reaches the foliage of the host tree, or the hanging



ends of previously cut stems of cat's claw creeper. Regrowth may require treatment for five or more years and ongoing monitoring is needed.

Biological control

Cat's claw creeper has been targeted for biological control in Australia and South Africa. Several biological control agents have been identified and are at various stages of testing and introduction. Australian releases of the leaf-sucking lace bug (*Carvalhotingis visenda*) and leaf-tying pyralid moth (*Hypocsmia pyrochroma*) have recently been approved. Community groups are involved in distribution of these biological control agents.

Physical weed removal

Even seedlings and small plants have tubers that are difficult to dig out and the large tuberous root mass of older plants cannot be removed without excessive soil disturbance. Tubers must be disposed of properly, as they will regrow in moist conditions in contact with soil. It may be impractical and dangerous to attempt to pull lianas out of the tree canopy and the upper vines are generally cut and left to die in situ. Cutting the vines does not prevent regrowth from the basal stumps.

Chemical control

Herbicide can be effective, providing it is carefully chosen and selectively applied when plants are actively growing. For mature plants, climbing stems are cut before herbicide is applied to the lower stems. The main herbicide treatments for cat's claw creeper are foliage spray and painting of cut stumps. Stem injection and basal bark application are less commonly used. Herbicide treatment should be undertaken in spring to autumn when cat's claw creeper is actively growing. Remember always to follow label directions when using any herbicide.

Foliar spray

Stems of cat's claw creeper are strongly attached to the trunk of the host, so it may be difficult to avoid contact with the host plant when spraying. Hand-held equipment (handgun and hose or knapsack) is generally suitable to spot spray prostrate stems and regrowth less than 2 m tall. It may be necessary to pull cat's claw creeper off native vegetation and spray the vines on the ground to minimise spray drift and off-target contact. The growing tips must be wetted with herbicide. The best time for foliar spray is when new growth is present.

Cut-stump application

Suitable for all basal stem sizes

Cut all climbing stems well above the ground (1–2 m high) and leave the aerial parts to die. Cut all the basal stems again horizontally with secateurs, bush saw or a chainsaw as close to the ground as possible and paint the cut surface **immediately** (within 15 seconds) with herbicide, using a hand-held spray bottle or a brush. For large plants, a team of two or more people need to work together to treat each stem as it is cut. Stems less than 1 cm in diameter should be cut higher so that a 20 cm length of bark can be scraped off on one side of the stem and herbicide also applied to the sapwood. Use a dye in the mixture to show that stems have been treated. In some situations it may be necessary to treat the upper stems or detach them from host tree trunks to prevent them from resprouting.

Registered herbicides for cat's claw creeper

Cat's claw creeper is not listed on the label of any registered herbicide. A 'Permit to allow minor use of an AGVET chemical product' may be issued to

allow registered products to be used for a specified purpose or in a manner that is not included on the approved label. Permits that include treatment of individual cat's claw creeper plants with systemic chemicals including glyphosate, triclopyr and fluroxypyr exist in Qld and NSW. Refer to the Australian Pesticides and Veterinary Medicines Authority website to find the relevant permit for cat's claw creeper or for environmental weeds and note its provisions. Contamination of waterways must be avoided and for most chemicals an exclusion zone applies.

Glyphosate is generally the preferred herbicide, particularly for cut and paint treatment of cat's claw creeper, and is used by volunteer community groups restoring native vegetation due to its ease of use and lack of residual herbicide action in the soil, therefore it does not prevent subsequent regeneration of weeds or other plants. It is not selective and can affect any type of target or non-target plant through contact with foliage, green stems or exposed non-woody roots. Use special formulations for infestations near waterways where appropriate.

The herbicides listed in this guide are systemic (translocated). They are transported throughout the plant and within the plant to the roots, storage organs, stems and foliage. This means they can be effective on perennial plants.

When using herbicides always read the label and follow instructions carefully. Follow the permit advice on methods of application, dilution and other requirements. At least one member of a group should have formal training in the safe storage, handling, preparation and use of the chosen herbicides.



Controlling cat's claw creeper on Cabbage Tree Creek

As part of its program to promote natural regeneration of riparian and other native vegetation, Brisbane City Council runs a WipeOut Weeds program for raising weed awareness and weed management at priority sites. Cabbage Tree Creek links important natural areas providing habitat for native flora and fauna and WipeOut Weeds funded control of a cat's claw creeper infestation in Cabbage Tree Creek from 2004.

The infestation was first found in 2003 by chance along a section of the creek near the upper end of the catchment. The vegetation is a narrow fringing riparian community of forest red gum (*Eucalyptus tereticornis*) with lilly pillie (*Acmena smithii*), brush cherry (*Syzygium australe*), sandpaper fig (*Ficus coronata*) and native laurels (*Cryptocarya* spp.). Away from the creek the community is dominated by regrowth of green wattle (*Acacia irrorata*) and other wattles. The infestation was well established, being 9 hectares in size. The vines had reached the tree canopy, affecting an estimated 50 % of the trees and were also carpeting the ground.

Recent research into cat's claw creeper at the Alan Fletcher Research Station has shown that seed remains viable for only about one year. Seed is mainly dispersed by water and wind and new plants have been found hundreds of metres away from the main infestation. Each seedling forms a tuber as soon as it germinates and these rapidly multiply, with each tuber forming a new plant. Spray treatment needs to be repeated until all these tubers are dead and the contractors have found that it is important to respray within about 3 months of the original treatment.

In the long term, successful rehabilitation will depend on protecting the native plants in the infested area



Cutting and swabbing cat's claw creeper vines at ground level to prevent tubers regrowing, and then removing about 1 metre of vine stem so workers can easily see which trees have already been treated. Photo: Maggie Scattini

during the control program. Careful spraying is required to prevent off-target herbicide damage and trampling, and native seedlings are to be located (and marked if necessary) before treatment commences.

Priorities for controlling cat's claw creeper on this site include:

1. treating flowering vines before seed set, by cutting vines at ground level and painting with neat glyphosate
2. treating all other cat's claw creeper stems that are climbing trees, by cutting at ground level and painting
3. spraying the vine where it forms a carpet on the ground (the preferred herbicide is glyphosate, but where native grasses are present a broadleaf selective herbicide is used)
4. following up spraying of regrowth; some patches have been treated three or four times.

The work that commenced in 2004 has continued each year. There has been good natural regeneration of native grasses, lilly pillies and native laurels which has been accelerated by the



Small cat's claw creeper tuber. Each seedling forms a tuber as soon as it germinates and these rapidly multiply, with each tuber forming a new plant.

Photo: Maggie Scattini

removal of the cat's claw creeper. Removal of this infestation is a major task requiring persistence and resources over the long term. Cat's claw creeper seedlings can germinate in quite dense shade, therefore ongoing maintenance of the vegetation will be needed.



Contacts

State / Territory	Department	Phone	Email	Website
NSW	Dept of Primary Industries	1800 680 244	weeds@dpi.nsw.gov.au	www.dpi.nsw.gov.au/weeds
NT	Dept of Natural Resources, Environment and the Arts	(08) 8999 4567	weedinfo.nreta@nt.gov.au	www.nt.gov.au/nreta/natres/weeds/index.html
Qld	Dept of Primary Industries and Fisheries	132523	callweb@dpi.qld.gov.au	www.dpi.qld.gov.au/
WA	Dept of Agriculture and Food	(08) 9368 3333	enquiries@agric.wa.gov.au	www.agric.wa.gov.au
Australia-wide	Australian Pesticides and Veterinary Medicines Authority (APVMA)	(02) 6210 4700	N/A	www.apvma.gov.au/

Contact details for state and territory agencies with responsibility for weeds are listed above, along with the APVMA. The APVMA website hosts the PUBCRIS database which contains information on all herbicides that are registered for use on weeds in each Australian state and territory, including minor use permits.

Consult your local council or the natural resource management organisation for your region for more information on managing weeds for biodiversity, including community groups working on cat's claw creeper.

Refer to the CRC for Australian Weed Management website (www.weedscrc.org.au) for weed management guides in this series, as well as guides for Weeds of National Significance and Alert List species. The Introductory Weed Management Manual (also available from this website) may assist in developing a plan tailored to your situation.

Legislation

No species of *Macfadyena* are on the AQIS list of plants permitted entry to Australia, therefore they must undergo weed risk assessment. Cat's claw creeper is prohibited entry to WA. In Qld, its sale is prohibited and landholders may be required to control it if their land is adjacent to an environmentally significant area. In NSW it is declared in some councils so that the plant may not be sold, propagated or knowingly distributed. In part of the Sydney region, existing cat's claw creeper must be contained or removed (see the contacts table above to obtain current details relevant to your location).

Invasion and establishment of exotic vines and scramblers has been listed as a key threatening process under the NSW *Threatened Species Conservation Act 1995*, with cat's claw creeper being a species of special concern.

Acknowledgments

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Map: Australia's Virtual Herbarium, (*Macfadyena unguis-cati*), via Royal Botanic Gardens Melbourne, Council of Heads of Australian Herbaria.
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Strategic management of cat's claw creeper

Quick reference guide

Regional / local status of cat's claw creeper	Not yet established	Small, isolated outbreaks	Widely established
Management goals	Prevent establishment	Eradicate	Contain infestations and mitigate threats
Strategies required	Prevent propagation, supply and new plantings Provide safe disposal options for garden refuse Monitor, detect and identify possible new infestations	Manual or herbicide treatment with follow up Dispose of plant material safely	Native vegetation: Identify high priority biodiversity assets threatened by cat's claw creeper. Protect them through implementing long-term site management plans
		Prevent re-establishment or invasion by other weeds through site restoration	Riparian zones: Plan management of cat's claw creeper and other weeds at the catchment level
			Gardens: Plant alternative non-weedy climbers and encourage removal of existing plantings

Vegetation management or weed control?

Adopt a strategic, integrated, long-term approach to maximise restoration of native vegetation and minimise reinvasion by cat's claw creeper or other weeds.

Natural regeneration of native plants is the best form of revegetation, but in sites dominated by cat's claw creeper and other weeds over many years, there may be no native plants or seed remaining. Where this is the case, establish locally collected indigenous pioneer plants.

Adapt the control method to the situation

Dig out seedlings and small plants including tubers. Cut mature plant stems at 1–2 m high, cut close to

the ground and paint with herbicide. Spot spray foliage of regrowth and low growing stems.

Apply herbicides during periods of active growth

Herbicide should only be applied when plants are actively growing. Avoid hot or wet conditions, or periods when plants are under stress, as specified on the herbicide labels.

Follow up

It is essential to monitor for regrowth from roots, tubers and stumps after physical or chemical treatment and follow up thoroughly. Spot spray regrowth before it reaches hanging cat's claw creeper stems or climbs on native vegetation. Regrowth may require treatment for 5 or more years and ongoing surveillance is needed.

Prevent cat's claw creeper re-establishment

Once mature plants have been killed, the focus is on preventing re-establishment from seeds brought in by wind or water.

- Avoid large-scale disturbance such as overclearing of weeds that would create extensive gaps.
- Identify likely cat's claw creeper seed sources and patterns of invasion.
- Monitor weed-free areas every 2 years to detect and remove seedlings before they mature.

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