

# Chinee apple

*Ziziphus mauritiana*



Dense infestations of chinee apple (or Indian jujube) create impenetrable thickets that seriously hamper stock management and reduce pasture production and accessibility. Mature trees produce large quantities of fruit that are readily eaten by stock, feral pigs, wallabies and birds, which assists the spread of the seed. Damage to top parts of the plant usually ensures vigorous regrowth from lignotubers or cut roots.

## Legal requirements

Chinee apple is a category 3 restricted invasive plant under the *Biosecurity Act 2014*. It must not be given away, sold, or released into the environment. The Act requires everyone to take all reasonable and practical measures to minimise the biosecurity risks associated with invasive plants under their control. This is called a general biosecurity obligation (GBO).



**Queensland**  
Government

At a local level, each local government must have a biosecurity plan that covers invasive plants in its area. This plan may include actions to be taken on chinee apple. Some of these actions may be required under local laws. Contact your local government for more information.

## Description

Chinee apple is a large shrub or small spreading tree up to 8 m high and 10 m in canopy diameter. The plants are densely branched, from ground level in some cases. Stands of chinee apple grow as open forests or form thorny thickets along waterways. Branches are zig-zag in shape and have a leaf and a thorn at each angle.

Leaves are rounded, glossy green on top and almost white underneath, and grow on alternate sides of the branches. Flowers are small and inconspicuous, greenish-white and emit an unpleasant smell. The edible fruits are similar in size and structure to a cherry, but pale yellow or orange when ripe.

## Life cycle

Flowering occurs mostly from January-June with fruit developing from February onwards. The seeds germinate during the summer wet season but the tree can also regrow from damaged roots.

## Methods of spread

Mostly spread by animals and birds eating the seeds in the fruit.

## Habitat and distribution

Chinee apple is native to southern Asia and eastern Africa. It was first recorded in the Torres Straits in 1863 and in Townsville in 1916.

The species is widespread in north Queensland, mainly in the areas surrounding towns associated with mining early this century. The largest areas of dense chinee apple are around Charters Towers, Mingela, Ravenswood, Townsville and Hughenden, but the plant also occurs around many other towns in north and central Queensland.

Chinee apple is generally restricted to the seasonally dry tropics with an annual rainfall ranging from 200 to more than 1000 mm. During the dry season, the plant drops most of its leaves in response to water stress but rapidly produces new leaves with the opening rains of the wet season. Although the species does have a tendency to spread along watercourses in the drier regions, it is also capable of growing into dense stands on dry, exposed hillsides.

Chinee apple occurs in a wide range of soil types in association with different vegetation groups. It has successfully established on coarse-textured, gravelly mullock heaps; deep coarse-textured sands; deep alluvial soils; shallow-surfaced solodic soils; and cracking clay soils. The pattern of spread away from the towns has shown no marked preference for any soil type or vegetation association.

The major factor that appears to affect the growth of chinee apple is the density of the associated vegetation. Chinee apple does not establish successfully under the canopy of other trees and the species is normally restricted to areas that have sparse tree cover or where the other tree vegetation has been removed.

The old mining centres provided ideal conditions for establishment of chinee apple with the removal of all trees for pit timber and fuel.

## Control

### Managing chinee apple

The GBO requires a person to take reasonable and practical measures to minimise the risks posed by chinee apple. This fact sheet provides information and some options for controlling chinee apple.

Effective control of chinee apple can be achieved through a combination of mechanical and herbicide treatments, or by herbicide treatment alone. All areas treated must be periodically checked and any regrowth treated or the initial treatment efforts will be wasted. Follow-up is essential to ensure a successful control program.

### Mechanical control

Dense infestations can be initially cleared by stick raking, ripping or using a cutter bar (if the terrain and soil type permit). Remaining broken and exposed stems should be treated by basal bark spraying as soon as possible following clearing.

In order to ensure a successful control program, regrowth must be sprayed.

Cultivation and planting crops or improved pasture will assist in the prevention of re-infestation. Herbicide treatment of regrowth should still be carried out and maintained so the initial program is not wasted.

Fire will cause some damage to the plant but regrowth is normally rapid and few plants are killed. Seedlings may be more susceptible to fire but mortality declines rapidly once they reach more than 30 cm in height.

### Herbicide control

The methods of chemically treating chinee apple are described below. The herbicides registered for these methods are listed in Table 1.

#### Basal bark spray

For stems up to 15 cm in diameter, carefully spray completely around the base of the plant to a height of 40 cm above ground level. It is important to thoroughly spray into the crevices of multi-stemmed plants.

Larger trees may be controlled by spraying to a greater height, up to 100 cm above ground level. The best time for treatment is during autumn when plants are actively growing and soil moisture is good.

## Cut stump treatment

At any time of year, cut the stems off horizontally as close to the ground as possible and immediately (within 15 seconds) swab or spray the cut surfaces and associated stem with the herbicide mixture.

## Soil application

Apply granules over an area extending from the main stem to 30 cm outside the canopy drip line to cover the main part of the root system. Treated plants will not be affected

until sufficient rainfall moves the herbicide into the root zone. Do not use residual herbicides within a distance of twice the height of desirable trees.

## More information

For more information contact your local government or visit [biosecurity.qld.gov.au](http://biosecurity.qld.gov.au).

**Table 1. Herbicides for the control of chinee apple**

Situation	Herbicide	Rate	Comments
Agricultural non-crop areas, commercial and industrial areas, fence lines, forests, pastures and rights-of-way	Triclopyr 240 g/L and Picloram 120 g/L (e.g. Access <sup>®</sup> )	1 L/60 L diesel	Thoroughly spray all crevices. Basal bark spray plants up to 15 cm basal diameter. Cut stump plants greater than 15 cm basal diameter. For cut stump, spray immediately after cutting (consult label).
	Fluroxypyr 200 g/L (e.g. Acclaim <sup>®</sup> , Flagship <sup>®</sup> 200)	3 L/100 L diesel	Basal bark plants with up to 15 cm diameter. Treat circumference of stem to a height of 45 cm from the ground. For cut stump, treat plant up to 15 cm diameter and spray immediately after cutting (consult label).
	Fluroxypyr 333 g/L (e.g. Starane <sup>®</sup> Advanced, Fluroken 333 <sup>®</sup> )	1.8 L/100 L diesel	
	Fluroxypyr 400 g/L (e.g. Comet <sup>®</sup> 400, Decoy 400 <sup>®</sup> )	1.5 L/100 L diesel	
	Triclopyr 600 g/L (e.g. Invader <sup>®</sup> 600 <sup>®</sup> , Garlon <sup>*</sup> 600, Redeem <sup>®</sup> 600)	1 L/60 L diesel	Basal bark plants up to 5 cm diameter. Cut stump plants up to and in excess of basal bark diameter. Spray immediately after cutting (consult label).
Agricultural non-crop areas, commercial and industrial areas, fence lines, forests, pastures and rights-of-way	Triclopyr 300 g/L and Picloram 100 g/L (e.g. Conqueror <sup>®</sup> , Fightback <sup>®</sup> )	350 mL/100 L water	Spray plants and seedling regrowth up to 2 m tall. Spray when plants are actively growing and cover foliage thoroughly to the point of run-off (consult label).  Add a wetting agent e.g. BS-1000 or similar at 100 mL/100L water for best results (consult label).
	Triclopyr 300 g/L, Picloram 100 g/L and Aminopyralid 8 g/L (e.g. Grazon <sup>®</sup> Extra)	350 mL/100 L water	
Grazing pastures, forests	Picloram 20 g/kg (e.g. Tordon <sup>™</sup> granules)	35–45 g/m <sup>2</sup>	Treat before growth begins or during vigorous growth when rainfall is expected (consult label).

**Read the label carefully before use. Always use the herbicide in accordance with the directions on the label.**





Fact sheets are available from [biosecurity.qld.gov.au](https://biosecurity.qld.gov.au). The control methods recommended should be used in accordance with the restrictions (federal and state legislation, and local government laws) directly or indirectly related to each control method. These restrictions may prevent the use of one or more of the methods referred to, depending on individual circumstances. While every care is taken to ensure the accuracy of this information, the department does not invite reliance upon it, nor accept responsibility for any loss or damage caused by actions based on it.

