



Biocontrol of Hudson pear *Cylindropuntia pallida* using the **Cochineal** *Dactylopius tomentosus* (*californica* var. *parkeri*)

What are cochineal?

Cochineal are soft-bodied scale insects that feed solely on plants in the cactus family, especially species in the genera *Opuntia* and *Cylindropuntia*.

Four cochineal species have been released and established as biocontrol agents in Australia, some of which have different lineages that specifically target different *Opuntia* and *Cylindropuntia* species.

The various lineages differ significantly in their impact so it is important to match the correct lineage to each target species.

What do cochineal look like?

Cochineal are easily identifiable on cacti when females have attached themselves to the plant, and have covered themselves with a white, wax-like covering.

Adult females are:

- soft-bodied
- oval shaped
- deep red-coloured
- wingless
- 2 - 2.7 mm long
- sessile (i.e. once they start feeding, they do not move).

Adult males are:

- winged and able to disperse
- difficult to see
- 1.55 mm long.

Eggs are:

- red in colour
- oval shaped
- 0.3 mm wide and 0.5 mm long
- able to hatch in approximately 17 days.

Nymphs are:

- a deep red-colour
- 1 mm long
- wind dispersed
- male nymphs are able to spin a white, silky cocoon.



How to collect, transport, store and spread the Hudson pear cochineal

Dactylopius tomentosus (californica var. parkeri)

When is the cochineal active?

The cochineal has a lifecycle of approximately 30 to 45 days at temperatures between 25 to 30°. The cochineal will, therefore, be most active during the warmer months. During rainfall events, nymphs (crawlers) may be washed off the plants, so impeding the control process.

Where to collect the cochineal from?

It is near impossible to differentiate between the various cochineal species or lineages available in Australia, so always contact your local weeds officer for assistance. Collecting and releasing a mismatched lineage may result in poor control.

How to collect Hudson pear cladodes (segments)

After consulting your weeds officer and verifying where to source a cochineal population of the correct lineage, insects can be easily collected.

1. Make sure the cladodes are free of predators (ants, lacewings eggs or larvae, spiders and ladybirds).
2. Using long handled tongs break off a cladode approximately 20 - 30 cm long.

Cover image: Female *D. tomentosus* at base of spines and nymphs (crawlers) moving up spines for wind dispersal.

1. Mature females attached to a cladode covered by a white, waxy like covering.
2. Newly hatched nymphs (crawlers).
3. A congregation of crawlers with wax-like filaments on their backs, ready to be wind dispersed.
4. Adult male cochineal.
5. Egg mass under the white, waxy like covering.
6. Adult female with the white, waxy like covering removed.

- Make sure the break is clean (at the base), and the segment isn't torn.
 - The clean break at the base of the cladode will seal in any moisture and prevent premature desiccation.
3. Place cladodes into sturdy plastic containers with lids for transportation (Hudson pear spines will pierce through material like cardboard).

How to transport and store Hudson pear cladodes

1. Once the cladodes have been collected, make sure you secure the container lid.
2. Place the container in your vehicle and secure it in place.
3. If you need to store the container of cladodes overnight store it in a cool, well ventilated area (out of the weather), and away from inquisitive animals and humans.
4. Mist the plants with a spray bottle after transporting them to keep them fresh.
5. Leave the lid slightly open to allow ventilation.

When to release the Hudson pear cochineal

Ideally, releases should take place in spring and summer when temperatures are suited for rapid development of all cochineal life stages. In areas with mild winters, releases can be made year-round; however, the impact of the cochineal will be slower.

How to release infected Hudson pear cladodes

Release the infected segments as soon as possible after collection for the best results.

1. Make sure they are released upwind of the core infestation.
 - Crawlers are dispersed through the site by the wind.
2. Check for ants or other predators.
 - Crawlers are a food source for ants and lacewings.
3. Using long handled tongs, carefully remove infected cladodes from the plastic container.
4. Place the infected cladodes on top of the release plant.
5. Make sure they are placed securely so they don't fall off.
6. Release on every 2nd or 3rd plant:
 - on smaller plants (< 1 m tall) place 3 - 5 cladodes, and
 - on larger plants (> 1 m tall) place approximately 10 cladodes.

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7. Collecting cladodes with long handled tongs.
 8. Sturdy plastic containers with lids are best for transportation.
 9. Mist the cladodes with a spray bottle to keep them fresh during transportation.
 10. Placement of infected cladodes on release plant.





Further options for controlling Hudson pear

Integrated management

Integrated management is the use of more than one control method to control an infestation or weed incursion. When using biocontrol in combination with other control methods, let the former deal with the core infestation. This will allow outliers to be treated chemically or physically.

Chemical control

When using herbicides, care must be taken to ensure adequate coverage of the plant (all sides of the segments) to prevent regrowth. In the case of foliar spraying, the addition of a marker dye will assist with identifying any missed plants or cladodes.

Plants should be actively growing and not under stress from heat/drought or cold conditions. Plants may die more quickly as a result of warm weather spraying, as cooler conditions can slow the uptake of herbicides.

Herbicides may not result in a complete kill. Control sites should, therefore, be monitored for regrowth and follow up activities applied if necessary.

References

Sheehan M.R. and Potter, S. (2017), Managing Opuntoid Cacti in Australia: Best practise control manual for *Austrocylindropuntia*, *Cylindropuntia* and *Opuntia* species. Department of Primary Industries And Regional Development (WA), Perth.

Sheehan M.R. and Potter, S. (2019), Invasive Cacti Field Guide: Identification and control of invasive cacti, North West NSW, Northern Slopes Landcare Association.

Mathenge, C., Holford, P., Hoffmann, J., Spooner-Hart, R., Beattie, G., & Zimmermann, H. (2009). *The biology of Dactylopius tomentosus (Hemiptera: Dactylopiidae)*. Bulletin of Entomological Research, 99(6), 551-559.

You should always check the product label and seek advice from your local government weeds officer. You can also visit NSW WeedWise for more information weeds.dpi.nsw.gov.au.

The Australian Pesticides and Veterinary Medicines Authority (APVMA) regulates the use of chemicals in Australia. For more details on herbicide registration and permits visit the APVMA website, www.apvma.gov.au.

Physical control

Care must be taken when mechanically or manually removing opuntoid cacti due to their spiny nature. Small, isolated plants are easier to remove than large, dense infestations and some species, such as Hudson pear and devil's rope, can pose significant risk of injury when handled. Physical removal can be difficult as any cladodes detached in the process can regrow to form new plants. Material must be disposed of appropriately via deep burial.

Other removal methods can be identified in the Invasive Cacti Field Guide: Identification and control of invasive cacti.

Help us protect our land, plants and wildlife



For control and biosecurity information for Hudson pear, visit **WeedWise** <https://weeds.dpi.nsw.gov.au/Weeds/HudsonPear>

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Disclaimer: The information contained in this publication is based on knowledge and understanding at the time of writing (June 2020). 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 NSW Government department.

