

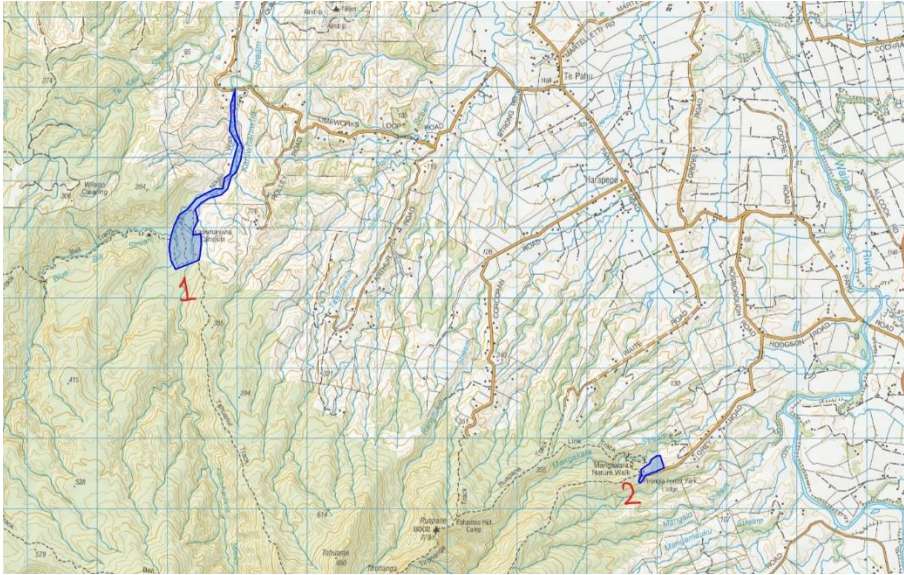
Mistletoe Translocation Guide

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Establishment Sites

1. Nikau Walk and Kaniwhaniwha Campsite – Kaniwhaniwha Stream Recreation Reserve and Pirongia Forest Park.
2. Pirongia Forest Park Lodge (around the car park and within the lodge grounds) – Pirongia Forest Park.



Future establishment sites

Once there has been a successful establishment and the team understand methodologies associated with the collection and establishment of mistletoes, extend the establishment range to Sainsbury Road site (and others).

- Sainsbury Road – Pirongia Recreation Reserve, Afforestation and Water Supply – Pirongia, Waipa District Council owned land
- Aramiro station – private land

Collection Sites

Ileostylus micranthus

- Maungatautari
- Lake Tikitapu Scenic Reserve, Rotorua (back up)

Tupeia antarctica

- Rotorua
 - o Lake Tikitapu Scenic Reserve
 - o Currently, this is the closest population of *T. antarctica* for seed sourcing in this translocation project.

Establishment methods (*Ileostylus* and *Tupeia*)

Collecting seed from host plant

- Seeds are easily plucked from the mistletoe. It is usually best to collect a bunch of seeds still connected to the branch. This aids in longevity of the seeds, especially if establishment will not be on the same day.
- Collect only ripe fruit, yellow/orange and white with varying degrees of pink/purple speckles for *I. micranthus* and *T. antarctica* respectively.
- Collect on the day establishment is planned. If this cannot be done, store it in a paper bag and place it in the fridge. Seeds can dehydrate very easily.
- The fruiting period for *I. micranthus* at Maungatautari is early April-May. Due to the abundance of birds at this site, I would recommend planning to go out earlier in the season and net a couple of plants.
- The fruiting period for *T. antarctica* in Rotorua is August-October.
- Seed collection will not exceed 20% of seed set from the source population. This ensures enough viable fruit remains at the source site.

Establishment

Method

- Remove the exocarp of the seed (skin) to reveal the sticky layer. You can rub the seed quite vigorously between your hands to remove some of the pulp. Apparently, the change in CO₂ can help trigger germination.
- Place seeds in the crevice of branches. This can either be at adjoining branches or branch to leaf node. The rule of thumb (finger) is to establish them on branches smaller than the diameter of the average little finger. The bark on this sized branch is more supple and easier for the mistletoe to successfully penetrate.
- Put around 5 seeds on each marked branch (see labeling section below for more context).

Host selection

Ileostylus micranthus hosts (see appendix for pictures of hosts)

- To simplify the establishment process we picked three key species for the first establishment year. These are the key species that were marked for *I. micranthus* establishment at Pirongia.
 - o *Litsea calicularis* (mangeao) – host at Maungatautari and likely historic key host in the Waikato area.
 - o *Melicytus ramiflorus* (mahoe)
 - o *Pittosporum tenuifolium* (kohuhu)
- I would recommend extending host species in future years. There are many reports that list host species. *Ileostylus micranthus* has an extremely large host range and preference depending on where it is growing in the country. Regional specificity is common among the green mistletoes. So, selection should be based on what species it is found growing on at the source populations at Maungatautari and Rotorua.

Tupeia antarctica hosts (see appendix for pictures of hosts)

- *Tupeia antarctica* has a more restrictive host range than *I. micranthus*. These are the three key host species chosen for establishment at Pirongia.
 - o *Pseudopanax arboreus* (whauwhaupaku)
 - o *Carpodetus serratus* (putaputawētā)
 - o *Pittosporum eugenioides* (tarata)

Picking the best establishment habitat

- Mistletoes like sun! They photosynthesise so require quite high light environments to get them on their way. Host trees at margins are usually best suited. They have a high light environment and host trees have more access to nutrients in surrounding soil.
- Healthy host trees! There is no point in selecting an unhealthy host just because it is in a good area. If the host is already struggling, a parasite may cause death resulting in loss of the mistletoe AND the host.
- As mentioned above, establishment on branches smaller than the average pinky.

How we have labeled host trees

- Hosts have been permanently labeled with a four-character pattern followed by a numerical ID. This character pattern gives us information about (1) area of establishment, (2) host species, and (3) mistletoe species. For example, a mahoe host at Kaniwhaniwha with *I. micranthus* as the established (or to be established) mistletoe species would read like this: KMRI 001. K = Kaniwhaniwha, MR = *Melicytus ramiflorus* (mahoe Latin name), I = *Ileostylus*. Another example: whauwhaupaku (five finger) at Pirongia Lodge with *T. antarctica* would read like this: PPAT 003. P = Pirongia Lodge, PA = *Pseudopanax arboreus*, T = *Tupeia*.
- Host info is initially marked on this sheet [DOC-7064160](#) in the field, then transferred into this document [DOC-7064251](#).
- Twelve *I. micranthus* host trees have been marked at Kaniwhaniwha. Digital info can be found here [DOC-7064251](#).
- Permanent markers were nailed into the host trunk. Nails were not hammered in all the way to ensure hosts have room to grow in the future.
- In addition to the permanent host plaques, small aluminum tags were tied on selected host branches. These branches adhered to the recommendations under the 'picking the best establishment habitat' section. The tags were tied on with thin wire. The tags for the initial twelve hosts marked at Kaniwhaniwha used DOCs threatened species tags. These tags have a four-digit number. On the recording sheets ([DOC-7064160](#)) branch numbers are listed under the host details. As well as the branch code, the height of the branch off the ground is also recorded. This helps the branch to be relocated again in the event the branch tag falls off. The idea for a branch tag is to ease monitoring in the future and allow the established seeds to be easily located. Each branch is recommended to have around five seeds placed on it. Two to four branches are recommended to be marked per host tree. This means each tree will have between 10 and 20 mistletoe seeds placed on it during establishment.

- GPS co-ordinates have also been taken for the marked *I. micranthus* hosts at Kaniwhaniwha. These can be found here: S:\Mistletoe Translocation\GPS Data\Ileostylus Host Marking Waypoints 2022.

What does successful parasitism and mistletoe monitoring look like?

- It can take up to a couple of years for successful parasitism to be observed in mistletoes. It is not uncommon to see successful germination and then the seed appear as if it has died back.
- Small cotyledons will appear when there is successful parasitism. These can be difficult to see so don't lose hope.
- Draft monitoring sheet, more like a starting point [DOC-6989685](#).
- Success rates are usually less than 5%!
- Monitor the mistletoes once a year due to their slow growth and establishment.
- Is the mistletoe there? Yes/No? How many? Make it simple.



Image showing *I. micranthus* attaching haustoria to host.

Relevant links

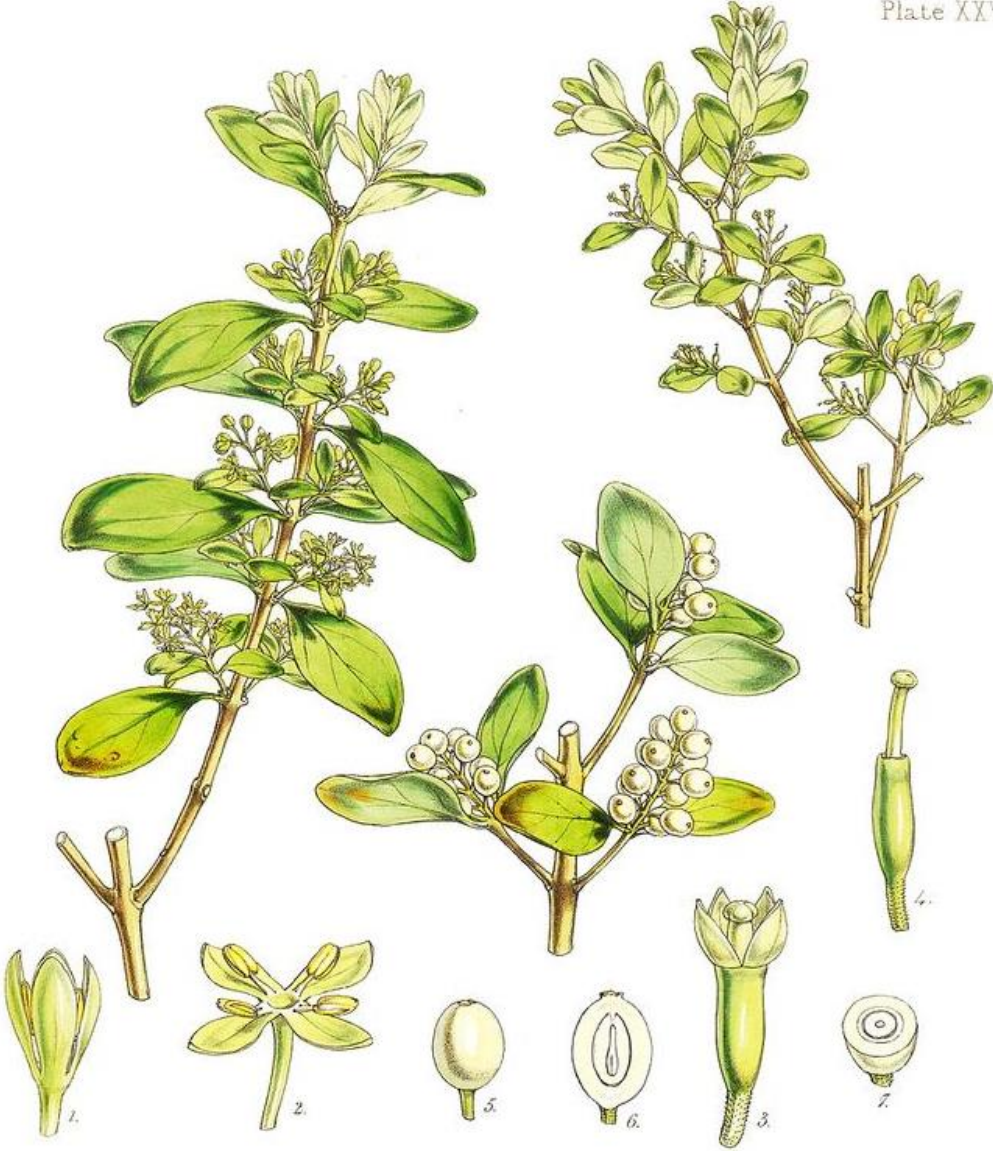
- [DOC-6930625](#) Translocation Proposal
- [DOC-6989685](#) Draft mistletoe monitoring sheet
- S:\Mistletoe Translocation – Mistletoe folder location on S drive
- [DOC-7064160](#) Host recording sheet (field)
- [DOC-7064251](#) Waikato host data

Contacts

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Appendix 1 – Plant parts of *Tupeia* as drawn by Walter Hood Fitch in 1893.

Plate XXVI



Walter Hood Fitch

Tupeia Antarctica.

Hooker, Fl. Novae-Zelandiae (1853)

Appendix 2 – Host tree descriptions (all images and descriptions have been taken from the NZ Plant Conservation Network)

Illeostylus hosts

Litsea calicaris – mangeao, tangeao

Stout, spreading tree up to 18 m tall. Small bushy tree bearing glossy green thin undulating oval leaves and dark purple fruit inhabiting the upper North Island. Leaves 5-12.5cm long by 3-5cm wide, taper to both the tip and base, leaf stalk dark. Flowers yellowish, in clusters. Fruit 15-20mm long.



Photographer: Bec Stanley

Pittosporum tenuifolium – kohukohu, kōhūhū, black matipo

Small tree with very dark twigs bearing pale green shiny wavy thin leaves and very dark flowers and 12mm wide capsules that split into two or three to show the black sticky seeds. Leaves are usually 2-4cm long.



Photographer: Jeremy R. Rolfe

Melicytus ramiflorus – mahoe, whitey wood

A shrub or small tree up to 15 m tall. Common small tree with a knobby pale trunk and thin light green toothed leaves that have the vein network much more visible on the paler underside. Leaves 5-20cm long, tapering to tip. Flowers greenish, in clusters along twigs. Fruit purple.



Photographer: Jeremy R. Rolfe

Tupeia hosts

Pseudopanax arboreus – whauwhaupaku, fivefinger

Small bushy tree with glossy green fleshy toothed leaves arranged in fans of 5 (occ. up to 7) leaflets. Fruit purple, in obvious clusters



Photographer: Jeremy R. Rolfe

Carpodetus serratus – putaputawētā, marbleleaf

Small tree with smallish round or oval distinctively mottled (hence common name) toothed leaves; branchlets zigzag (particularly when young).



Photographer: John Sawyer

Pittosporum eugenioides – tarata, lemonwood

Tree bearing light green wavy-edge oval leaves and with a contrasting pale green central vein, dense sprays of yellow flowers and small dry fruits. Leaf buds covered in dark-edged scales. Fruit pointed, 5-6mm long which splits into two to show a papery layer covering black sticky seeds.



Photographer: Jeremy R. Rolfe