

National Pollination Survey

Background and Aims

The purpose of the National Pollination Survey is to measure the health of bird-plant mutualisms throughout New Zealand, using the pollination service for tree fuchsia as an indicator. In future years we will resurvey sites and see if the pollination service has changed. This is part of ongoing research (jointly run by Landcare Research, Department of Conservation and University of Canterbury) estimating the health and wellbeing of our native ecosystems by monitoring plant-bird interactions. These interactions between plants and animals are a critical feature for maintaining indigenous biodiversity.

In New Zealand birds (especially tui, bellbirds and silvereyes) are important flower pollinators for a number of native plants. Decline in bird species and densities could be limiting plant regeneration. Recording pollination on fuchsia will let us measure whether this is a widespread problem.

This fact sheet provides the necessary information for you to complete the National Pollination Survey. For more information, photo's and copies of the survey form visit the web site http://www.biol.canterbury.ac.nz/pollination_survey/

The role of sanctuaries

In sanctuaries, pest control often elevates bird densities. By surveying pollination on tree fuchsia, it should be possible to quantify any benefits of higher bird numbers to ecosystem function such as pollination. This information will be of use both to the local managers, and when collated over the whole country, to learn about the success and limits of restoration attempts.

At a local level you will need to have a pair of surveys. One inside the sanctuary and the second survey outside/away from the sanctuary. This is the ideal scenario. If the second 'away' site can't be found then just do the survey inside the sanctuary.

Survey plant: Tree Fuchsia.

Tree fuchsia (*Fuchsia excorticata*) flowers are a much sought-after food source for a number of native bird species, in particular bellbirds, tui and silvereyes. This makes it an ideal plant to use for surveying because it is widespread and the levels of pollen deposition reflect the number of birds in an area. It also flowers for a number of months.

Unique pollination features of tree fuchsia enable us to survey pollination in one visit. The pollen is bright blue and highly visible on the yellow stigma. This makes it easy to tell if a bird has deposited pollen on the stigma (presence of blue pollen).

Thus we can use the amount of the clearly visible blue pollen on a stigma as an indicator for how well pollination service is working at a site.

About tree fuchsia

Tree fuchsia is gynodioecious. This means that there are two types (sexes) of plants; hermaphrodites (the flowers produce both pollen and seeds) and females (the flowers only produce seeds - their anthers do not make viable pollen). The only way of distinguishing between the two sexual morphs is to look at the flowers.

Hermaphrodite flowers produce fluffy bright blue pollen from the anthers. Female flower don't produce pollen. Also female flowers are smaller than those on hermaphrodite plants.

Birds visit the flowers of tree fuchsia to feed on the nectar, which is available when flowers are young and greenish in colour. Once the flowers turn red the nectar supply has stopped, and birds will ignore them.

As a flower ages there are several sexual stages it goes through. There are some general changes in the flowers that enable you to tell how old the flower is. This table provides a summary of the sexual stages that a flower goes through as it ages.

Description of the stages that each flower goes through as it ages.

Stage	Flower colour*	Female flower**	Hermaphrodite flower, stigma as for female flowers
Early	Green	Stigma glossy and yellow	Anthers not open, no pollen visible
Middle	Green with a touch of red or purple	Stigma darkening, yellow/red	Lots of bright blue pollen on anthers
Transitional	More red/purple than green	Stigma red/yellow	Pollen starts to fade to a pale blue, less pollen visible on the anthers
Old	Bright red	Stigma starting to wither	Anthers starting to wither

Filling out the survey

Firstly you need to establish that the plants are flowering. Tree fuchsia has a long flowering season through spring and into summer and in general the further north your site is the earlier the plants will start to flower. Sampling earlier in the season is usually best.

When you carry out the survey record data for 10 hermaphrodite plants and 5 female plants at the site. There are usually fewer female plants in a population, so if you can't find 5 female plants record data from as many as you can find.

The main measurement of the survey (pollen load on the stigma) is recording how well the flowers are being visited by birds (and having pollen deposited on the stigma). We have devised a system that allows people to easily score the amount of pollen that can be seen on the stigma, using a scale of 0-4.

For each tree record the pollen load on the stigma for 10 young (early or middle in age, see the table) flowers (i.e. the greenish ones). DON'T USE OLD/RED FLOWERS.

Summary of what needs to be done when carrying out the National Pollination Survey:






- 1:** Print the survey form (one per site) and take it with you. Also take a hand lens if possible.
- 2:** Select the site. A site is any area that has a good sized (10's to 100's of fuchsia trees) population of tree fuchsia.
On the record sheet note:
A geo-reference for the site (latitude and longitude or Easting and Northing).
Altitude of the site (this is optional).
The date you carried out the survey.
Your name and contact details (your phone number or email address).

What if the site only has a few fuchsia trees at it? Still carry out the survey as we are interested in finding out about pollination services for different sized fuchsia populations.

- 3:** Select 10 hermaphrodite and 5 female trees that are flowering, or as many as you can find up to these numbers. You could aim for 10 female plants as well as 10 hermaphrodites. But, in a lot of areas you won't be able to find that many female plants.
- 4:** For each tree find 10 youngish flowers (remember greenish flowers are what you want to find).
- 5:** For each flower score the pollen load that you can see on the yellow stigma of youngish flowers, using the 0-4 scale (see below). You may find it helpful to use a hand lens to check if there are small amounts of pollen on the stigma. Please note on the survey sheet whether you have used a hand lens.

If you are scoring pollen loads of 3 or 4 for the flowers at the site then there are good visitation levels for fruit set. However if the flowers are scoring 0 or 1 then there are very low levels of visitation at the site and fruit set will be poor.

Define the pollen load as one of the following:

				
0 = None, can't see any blue pollen on the stigma	1 = 1-5% of the stigma covered in pollen. Only a few specks can be seen on the stigma.	2 = 6-20% of the stigma is covered in pollen. Up to a fifth of the stigma is covered in pollen.	3 = 21-40% of the stigma is covered. Over a fifth but under a half of the stigma is covered in pollen	4 = 41-100% Lots of the stigma is covered in pollen.

- 6:** Repeat 4 & 5 for the trees that you have found.
- 7:** Once finished please post your completed survey forms to:

National Pollination Survey
c/o Jenny Ladley
School of Biological Sciences
University of Canterbury
Private Bag 4800
Christchurch 8140

Thank you for your help with this survey.