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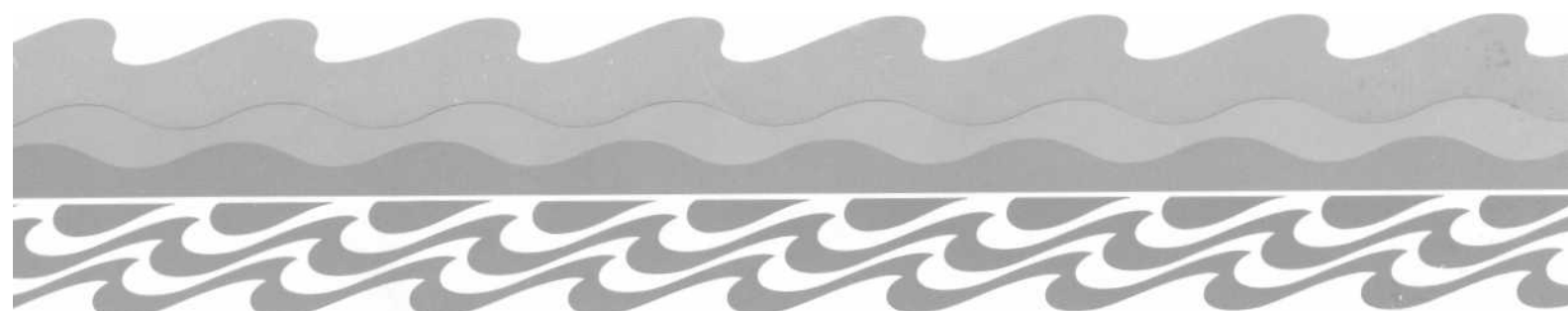
No. 99

REGENERATION OF *PITTOSPORUM TURNERI* COMMUNITIES

(Short Answers in Conservation Science)

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Department of Conservation, P O Box 10-420, Wellington, New Zealand



ISSN 1171-9834

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Reference to material in this report should be cited thus:

Ecroyd, C. E., 1994

Regeneration of *Pittosporum turneri* communities.

Conservation Advisory Science Notes No. 99, Department of Conservation,
Wellington. 34p.

Commissioned by: Tongariro/Taupo Conservancy

Location: NZMS

REGENERATION OF
PITTOSPORUM TURNERI
COMMUNITIES

INVESTIGATION NO. TT3

Chris E. Ecroyd

**NZ Forest Research Institute
Private Bag 3020
Rotorua**

PREPARED FOR:
Department of Conservation
Tongariro/Taupo Conservancy
Turangi

June 1994

**REGENERATION OF *PITTOSPORUM TURNERI*
COMMUNITIES**



Typical juvenile *Pittosporum turneri*

**Chris E. Ecroyd
NZ Forest Research Institute Ltd
Private Bag 3020
Rotorua**

REGENERATION OF *PITTOSPORUM TURNERI* COMMUNITIES

SUMMARY

Possoms are having a major impact on *P. turneri*, heavily browsing mature and semi-mature *P. turneri* foliage at most sites and are probably responsible for the lack of recent regeneration and the scarcity of plants with adult foliage. Browsing damage has also been noted on smaller plants and severe debarking of *Melicytus "flexuose"*+ recorded. While a few larger *P. turneri* plants can be protected with aluminium bands a reduction in possum numbers at sites with *P. turneri* and *M. "flexuose"* is necessary to ensure survival of these species.

Plots were established in Block A of Erua Forest before logging to monitor the effect of felling *Pinus contorta* on the rare native species in the understorey. About 15% of the *Pittosporum turneri* could not be found after the logging and were probably smothered under felled trees. A further 20% were found dead a year after the logging.

Estimates of 9,100 *P. turneri*, 2,600 *Melicytus "flexuose"*, and 1,430 *Coprosma wallii* in Block A after the logging means that this area still holds important populations of these species.

Pittosporum turneri starts to flower at about age 24 years and can live to 50-80 years. It is dioecious with separate male and female plants at a 50:50 ratio. Flowering takes place from about 7 November to 15 December and the flowers are moth-pollinated. The fruit matures and the seed is probably bird dispersed in late winter or early spring. The seed germinates a few weeks later in October or November.

Keywords: *Pittosporum turneri*, *Melicytus "flexuose"*, *Coprosma wallii*, threatened species, conservation, ecology, *Pinus contorta*, Erua.

1. INTRODUCTION

Pittosporum turneri, *Ranunculus ternatifolius*, *Melicytus "flexuose"*, *Olearia capillaris* and *Coprosma wallii*, all occur at Erua. The first two are classed as "rare", *Melicytus "flexuose"* is classed as "vulnerable", and *Olearia capillaris* is classed as "insufficiently known" (Cameron et al 1993). *Coprosma wallii* is localised in the North Island and at its northern limit at Erua. These five species are not known to occur in Tongariro National Park although it is adjacent. *Pittosporum turneri*, *Coprosma wallii* and *Melicytus "flexuose"* are understorey species in a mixed *Pinus contorta* / *P. ponderosa* plantation and in native vegetation while *Olearia capillaris* and *Ranunculus ternatifolius* have only been found in the native vegetation west of the Waimarino Stream.

Pinus contorta has been declared a class B noxious weed in this region and the land manager, the Department of Conservation, is required to remove it.

+ Previously known as *Hymenantha angustifolia* (Allan 1961), this species is now thought to be an undescribed species in the genus *Melicytus* and Cameron et al (1993) use this tag name.

The purpose of this research was to provide information to assist the conservation and management of *Pittosporum turneri* and its associated indigenous community and in particular to monitor the effects of felling the *Pinus contorta* on these plants.

Field work was carried out between October 1992 and April 1994. Plots were established in Block A of Erua Forest prior to logging and remeasured after logging. Height, diameter and other data were collected on *P. turneri* plants at Erua and at other sites for comparison, and used together with data collected previously by the Biotechnology Division, New Zealand Forest Research Institute.

2. BACKGROUND

Pittosporum turneri was first discovered by E. Phillips Turner in 1909 at Erua (Phillips Turner 1909) and described in 1924, with Erua selected as the type locality (Cheeseman 1925). In 1954 a Forest Sanctuary of 6.7 hectares was set aside by an act of parliament for the purpose of preserving the *P. turneri* association. Twenty years later, J.L. Nicholls of the Forest Research Institute reported being unable to find any adult plants in the Sanctuary. Some seven or eight juveniles were found, but only one was alive (N. Z. Forest Service letter 1974)

In November 1981 about 50 juvenile plants were found in the Sanctuary and "at least hundreds, possibly thousands", were estimated to occur under the moribund *Pinus ponderosa* in Block A (Ecroyd 1982). Some were 5 m tall and just starting to produce adult foliage. It was recommended then that some of this pine forest should be reserved as it contained more plants of *P. turneri* than the Sanctuary.

From about 1970 to November 1988 there were no records of *P. turneri* flowering in the wild and Rogers (1988) wrote a paper titled "Parentless *Pittosporum turneri*." On 12 November 1988 at least 40 adult plants were observed flowering in the Whenuakura Clearing, Hauhungaroa Range (Ecroyd 1988). The next month further adult plants were found in the Ripia Valley, northern Ahimanawa Range, (Nicholls 1988; Shaw 1989). Two years later adult plants were found near the Waimiha No. 2 Bridge at Pureora and at Kuratau, however in total less than 100 adult plants had been found at all sites. Rogers (1988) suggests the lack of adults is because the species is "locally ephemeral and particularly short lived for a native woody species with a short reproductive life for the adults".

In 1991 six Victoria University students surveyed Block A at Erua using transects and found 479 *P. turneri* and 46 *Melicytus "flexuose"* (Airey et al 1991) but they made no estimate of the overall size of the population. The tallest *P. turneri* they recorded was 3.6 m and although several plants had semi-adult leaves no adult plants were found. The situation was surprisingly similar to that recorded in 1981 despite being ten years later.

Many aspects of the biology of *P. turneri* are unknown. Why do large numbers of juvenile plants exist at sites where there are no adults? At what age do they start to flower? How long do they live? Will they flower when growing in the understorey? Answers to these and many other questions would greatly assist effective management of this species at Erua.

3. PURPOSE AND OBJECTIVES

Purpose:

To provide information for the conservation management of a nationally ranked threatened species, *P. turneri* and its associated indigenous community.

Objectives:

1. To undertake research on the effect of possum browsing on *P. turneri* and to evaluate methods for protecting the plants from possums, such as banding the trees, trapping and poisoning possums.
2. To monitor the effect of the 1992 felling of *Pinus contorta* and the proposed felling of *P. ponderosa* in Block A at Erua on *Pittosporum turneri* and other rare or local native plants. This includes the effect of increasing light levels caused by the removal of the pine canopy.
3. To gain a more complete understanding of the reproductive biology and regeneration of *P. turneri*, primarily to assist management of its community at Erua.
4. To produce recommendations for enhancing the survival of *P. turneri*.

4. METHODS

4.1 Effect of possum browsing

- Selected mature *P. turneri* plants at Erua, Kuratau, Kapoors Road, Lake Otamangakau and Pureora were protected from possums by placing aluminium bands around the trunks. Where other more common species grew close to the *P. turneri* they were removed or trimmed to prevent access by possums to the crowns. The crowns of the protected trees were photographed.
- Possum control using traps and cyanide was undertaken by Mr. D. Barker within Block A of Erua Forest. The crowns of a few of the larger non-banded plants were also photographed so that the effectiveness of the possum control operation could be compared with that of the aluminium banding. No possum control was carried out on the western side of the Waimarino River but the crowns of selected banded and unbanded plants were photographed there to compare with those in Block A.
- Flowering and health of *P. turneri* plants at other sites have been monitored and related to possum control.

4.2 Effect of logging in Block A, Erna

- Prior to the logging, 58 10 m x 10 m plots were spaced at 100 m intervals throughout Block A along lines at 285 degrees (magnetic). Map 1 shows the layout of the plots and approximate locations. At the start of lines one to nine a numbered wooden peg was placed close to the road and a similar peg was put in the south-east corner of each plot. Plant species within the plots were recorded and any threatened plants measured and numbered with a permanent metal tag. Within a 5 x 5 m corner of about every third forest plot all trees and shrubs over 1 m tall were measured. Diameters of all small trees and shrubs were measured at ground level.
- Just after the logging in November 1992 and again a year later, plots containing several threatened plants were revisited and the damage assessed to those plants that could be relocated.

4.3 Ecology of *Pittosporum turneri*

- To compare with the ecological data collected on *P. turneri* in Block A, similar data were collected from plants found in Erua Sanctuary, Kapoors Road in Tongariro Forest, near Lake Otamangakau, the upper Kuratau River Bridge, Whenuakura Clearing in the Hauhungaroa Range, near the Waimiha Bridge at Pureora, Ripia Valley and North-West Ruahine Ranges. At some of these sites the plant species in a sample plot and habitat information such as the soil pH were recorded. Plants were classified as healthy or unhealthy based on the density of foliage and presence of dead branchlets in the crown.
- The western bank of the Waimarino Stream from its junction with the Makomiko downstream about 4 km was searched for *P. turneri*, *Melicytus* "flexuose" and *Ranunculus ternatifolius*. At the Kapoors Road site likely habitats further down the Otamawairua Stream were searched for *P. turneri*. An attempt was made to find *P. turneri* at sites mentioned in old records.
- To assist with categorising plants as mature or juvenile, and defining the size of mature foliage, leaf length measurements were made on 40 leaves associated with flowers or fruit.
- A time-lapse video system with infra-red lighting was used to monitor *P. turneri* flowers for possible pollinators at Whenuakura and Pureora during both day and night. Flowers were tagged on two trees at Pureora and Kuratau and their development noted.
- The ground under female trees at Lake Otamangakau, Pureora and Kuratau was cleared of weeds to encourage seed germination. Duff was collected at Pureora from beneath a female tree which had produced seed two years before and tested for the presence of viable seed.
- Stems of dead *P. turneri* were collected and cross-sections made from near the base. Then either a microtome knife was used to thinly slice a cross-section or the section was finely sanded and the smooth surface viewed under a binocular microscope. The growth rings were counted and diameters recorded where possible, for each five "years".

- Assistance was given to an M.Sc. student, Rebecca Wheble, to collect foliage samples and other data from eight populations of *P. turneri*. These samples will be analysed for genetic diversity using Polymerase Chain Reaction to obtain information on ribosomal DNA sequences and amplification polymorphisms and the results written up by the student as an M.Sc. thesis.

5. RESULTS

5.1 Effect of possum browsing

Animal browse was noted on the top branches of many of the *P. turneri*, especially those changing to adult foliage. On one tree the browsing was only heavy in parts of the crown where a neighbouring pine provided easy access for possums. Possum pellets were observed in most plots in Block A at Erua and heavy possum browsing noted on many other species including *Pinus contorta* and *Pittosporum tenuifolium*. Possum pellets were frequently found on the ground directly under the crowns of the larger *P. turneri* trees at sites with no possum control such as Lake Otamangakau and Kapoors Road. During the 1993 remeasurement of logging damage in Block A, browse damage was also noted on 19 (16.5%) of the tagged *P. turneri* plants, including some quite small plants.

Some minor possum bark biting was noted in the crowns of a few *P. turneri* but of more concern was the severe debarking noted on at least six *Melicactus "flexuose"* in Block A at Erua (Fig. 1). Near the junction of the Makomiko Stream and the Waimarino River two plants had been killed by being almost completely debarked and two others were severely damaged. Possum pellets were found in the crowns of two *P. turneri* trees several months after they had been banded with aluminium sheeting. However this had only occurred on trees where the band was secured with a wire placed around the middle to hold it in place. After the wire was replaced with rivets or moved to the top of the band there was no new evidence of possums in these trees. Other *P. turneri* trees protected with bands were showing signs of recovering from browsing damage a year after being protected (Fig. 2).

At the Pureora *P. turneri* site, an aerial application of 1080 poison in late 1992 together with poison bait stations laid along the forest edges was very effective at reducing possum numbers with very little damage observed to flowers of nearby *Dactylanthus* plants. No possum pellets were observed around the *P. turneri* plants and most of the mature plants flowered in 1993. Similarly at Kuratau and Whenuakura where possum numbers have been reduced with aerial applications of 1080, abundant flowering was evident in 1993 on many of the mature *P. turneri* plants. Some flowering has been observed at these three sites whenever they have been visited in late November or early December since 1988.

At Erua, Lake Otamangakau, Kapoors Road, Ripia Valley, and North-west Ruahines (G. Walls pers. comm.), the only flowering observed has been on one or two "male" plants despite there being many other plants of similar size to those flowering elsewhere (Table 1).

The possum control operation in Block A at Erua resulted in 84 possums being caught for 742 trap nights and 23 killed on 263 poison baits in an operation lasting from 27 October to 24 November.



Fig. 1: *Melicytus* "flexuose" bark damaged by possums



1990



1992



1993

Fig. 2: A mature *P. turneri* at Kuratau, healthy in 1990, but showing severe effects of possum browsing in 1992 and some recovery in 1993