

Bergin, D.O; Houghton, M; 1998: Establishing Pohutukawa (*Metrosideros excelsa*) Along the Eastern Bay of Plenty Coast, Proposed Planting trial. Forest Research, Rotorua (unpubl).

A collaborative research trial is proposed between *Forest Research* and Opotiki District Council and local communities to investigate the establishment of pohutukawa along the eastern BOP coast, to survey and determine major factors likely to affect the survival and growth of pohutukawa seedlings. This will include survey of existing plantings, planting trials to measure effects of stocking, fertiliser, site variation and substrate type. Monitoring of the trial should be for a minimum of 3 years during the critical establishment phase.

ESTABLISHING POHUTUKAWA (*METROSIDEROS EXCELSA*) ALONG THE EASTERN BAY OF PLENTY COAST

PROPOSED PLANTING TRIAL

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INTRODUCTION

A collaborative research trial is proposed between *Forest Research*, Opotiki District Council and local communities to investigate the establishment of pohutukawa along the eastern Bay of Plenty Coast. The proposed research will involve firstly, surveying operational-scale plantings of pohutukawa carried out in the region over the last five years to determine factors affecting success and failure of plantings. Secondly, a planting trial will be established on representative coastal sites to evaluate a range of treatments that will assist in the development of practical guidelines for successful establishment of pohutukawa.

Performance of earlier planting trials involving pohutukawa by the *Forest Research* are variable and are therefore consistent with assessments by the Opotiki District Council of planting programmes in the Opotiki district. A joint *Forest Research*, Environment Waikato and Whitianga Beach Care group trial established at Buffalo Beach at Whitianga on the Coromandel Peninsula was established in 1995 on a modified backdune site evaluating performance of 26 local indigenous coastal species including pohutukawa (Bergin *et al.* 1995). Early results show only moderate survival and growth for pohutukawa (Bergin & Herbert 1997). Key factors on this site in affecting survival and growth of pohutukawa appear to be unseasonal frosting and degree of shelter.

Further trials are therefore required to test performance a range of factors that will improve chances of survival and growth of pohutukawa. Factors that are likely to be worth evaluating are size of planting stock, choice of microsites and use of artificial shelter or planting of nurse crops of hardy species on exposed sites to provide shelter.

OBJECTIVES

- To briefly survey the performance of nursery-raised seedlings of pohutukawa planted on key sites throughout the Opotiki district over the last five years.
- To determine the major factors likely to be affecting the survival and growth of planted pohutukawa seedlings.
- To design and implement a joint *Forest Research*, Opotiki District Council and local community planting trial on at least two sites evaluating a range of planting treatments based on results of the survey.

- To maintain trials and monitor the performance of planted pohutukawa in trials during a 3 year establishment phase.
- To produce practical guidelines for managing agencies and local community-based interest groups on establishment of pohutukawa on coastal sites.

METHODS

Survey of existing plantings

It is proposed to inspect all major plantings of pohutukawa in the Opotiki district that have been undertaken within the last five years. Records will be used to determine the location, planting density, date of planting and other relevant information on the establishment and performance of management scale plantings of pohutukawa. Survival and height growth will be assessed for a sample seedlings at all major planted areas.

Planting trials

Two sites have been selected to establish a comprehensive planting trial. Treatments will be selected on the basis of the results of the survey of performance of previous planting in the Opotiki district and early results of limited *Forest Research* trials using pohutukawa in other regions. The trial is likely to test some of the following treatments:

- Size of nursery-raised planting stock - large, small (larger plants in pilot trials have survived unseasonal frosting better than small stock).
- With and without application of a slow-release NPK fertiliser at time of planting.
- Choice of microsite - depending on site, comparing two or more microsites such as slope vs flat, sheltered vs exposed.
- Comparison of different types of shelter - artificial shelter (shadecloth enclosures of different sizes), nurse plantings of hardy species (e.g., planting shelter of *Ngaio*, karo), open exposed sites.
- Substrate type - sandy beaches, shingle beaches, topsoil/subsoil on banks.

Trial design and layout

The trial will be a Randomised Complete Block design with four replicates or blocks. Each block will be located on a relatively uniform site to enable comparison between plots within each block. Blocks will contain plots that will have a group of 1-5 planted seedlings in each with each plots assigned a single treatment combination. All plots will be identified by numbered wooden pegs to enable assessment of all seedlings on an individual basis. Trial sites will be mapped to enable relocation of plots for future monitoring.

MONITORING AND MAINTENANCE

Planting height and cover will be measured for all seedlings soon after planting to provide a baseline on which to determine growth rate. The site will be inspected regularly at three monthly intervals at least for the first year to record any factors affecting plant performance

such as frosting, drought, browsing, disturbance by beach goers and competing weed growth. A survival assessment will be carried out 3-6 months after planting.

A full survival and plant growth assessment will be carried out annually for at least 3 years after planting depending on overall performance of planted seedlings. The major growth parameters to be assessed for seedlings include:

- survival
- plant height
- plant cover - width x breadth of the live crown of each plant
- subjective assessment of plant vigour and health as one of five categories:
- comments - any addition information on plant condition (eg., browsing, disturbance by beach users)

Plant growth assessment will be entered onto customised *Forest Research* Field Record Forms (Appendix 2). Field measurements will be entered into the computer directly off field sheets for analysis.

Where necessary, seedlings will be kept free of competing weeds and shade cloth shelters repaired.

RESULTS AND OUTPUTS

Results will be written up in *Forest Research* Project Records and appropriate articles with the eventual aim of producing guidelines for the establishment of pohutukawa. All outputs will be submitted to the Project Crimson Trust. Specific outputs include:

- Work Plan/Establishment Report to be submitted to the Project Crimson Trust.
- Report on performance of trials annually for the Project Crimson Trust.
- Articles to the Coastal Dune Vegetation Network Newsletter.
- Other news media outlets such as newspapers and radio interviews where appropriate subject to approval of the Project Crimson Trust.

TIMEFRAME, RESPONSIBILITIES AND COST

It is proposed that the trial is established in mid-1998 when operational-scale planting of pohutukawa is normally undertaken by Opotiki District Council. Monitoring of the trial should be for a minimum of 3 years during the critical establishment phase.

Responsibilities are:

Forest Research

- assist with survey and interpretation of existing plantings
- provide background information from relevant parts of the *Forest Research's* current Sand Dune Research Programme.
- provide trial design from *Forest Research* Biometrics section
- provide advice on treatments

- write joint work plan
- assist with supervising the implementation of the trial
- undertake annual survival and growth assessment of all seedlings
- analyse data and write a joint report annually in collaboration with Opotiki District Council on trial progress.
- contribute other written articles as appropriate.

Opotiki District Council

- manage the contract with the Project Crimson Trust
- assist with survey and interpretation of existing plantings
- identify typical sites for the planting trial, consult with local communities and landowners, and provide protection from stock and beach users
- supply all materials for trial including planting stock, pegs, fertiliser, shadecloth, etc...
- supervise and provide labour for installation of trial
- inspect trial sites regularly, minimum of once every three months for the first year
- carry out all trial maintenance including weed and pest control, protecting sites from beach users, repairing artificial shelters, etc...
- assist with annual survival and growth assessment of all seedlings
- assist with production of joint reports and other written articles as appropriate.

Local Coast Care groups and community interest groups

- provide assistance with installation of the trial on two sites
- undertake regular inspections of sites and inform when necessary Opotiki District Council of overall trial performance and concerns.
- assist with assessment of seedlings survival and growth where appropriate

The estimated costs for *Forest Research* involvement for each year are like to be similar at \$5000 plus GST per year. Briefly, this will include for each year:

1998/1999 - survey, trial implementation, initial monitoring and reporting
 1999/2000 - trial inspections, second year measurements, data analysis and writing up
 2000/2001 - trial inspections, third year measurements, data analysis and writing up

REFERENCES

- Bergin, D. O. & Herbert, J. W. 1997: Revegetation of sand dunes in New Zealand using indigenous species. Proceeding of *Pacific Coasts and Ports '97 Conference*, 7-11 September 1997, Christchurch. Vol. 1: 425-30.
- Bergin, D. O.; Herbert, J. W.; Dahm, J.; Spence, H. 1995: Establishment of an indigenous coastal plant species screening trial, Buffalo beach, Whitianga. New Zealand Forest Research Institute Project Record No. 5050, (Unpubl). 19 p.