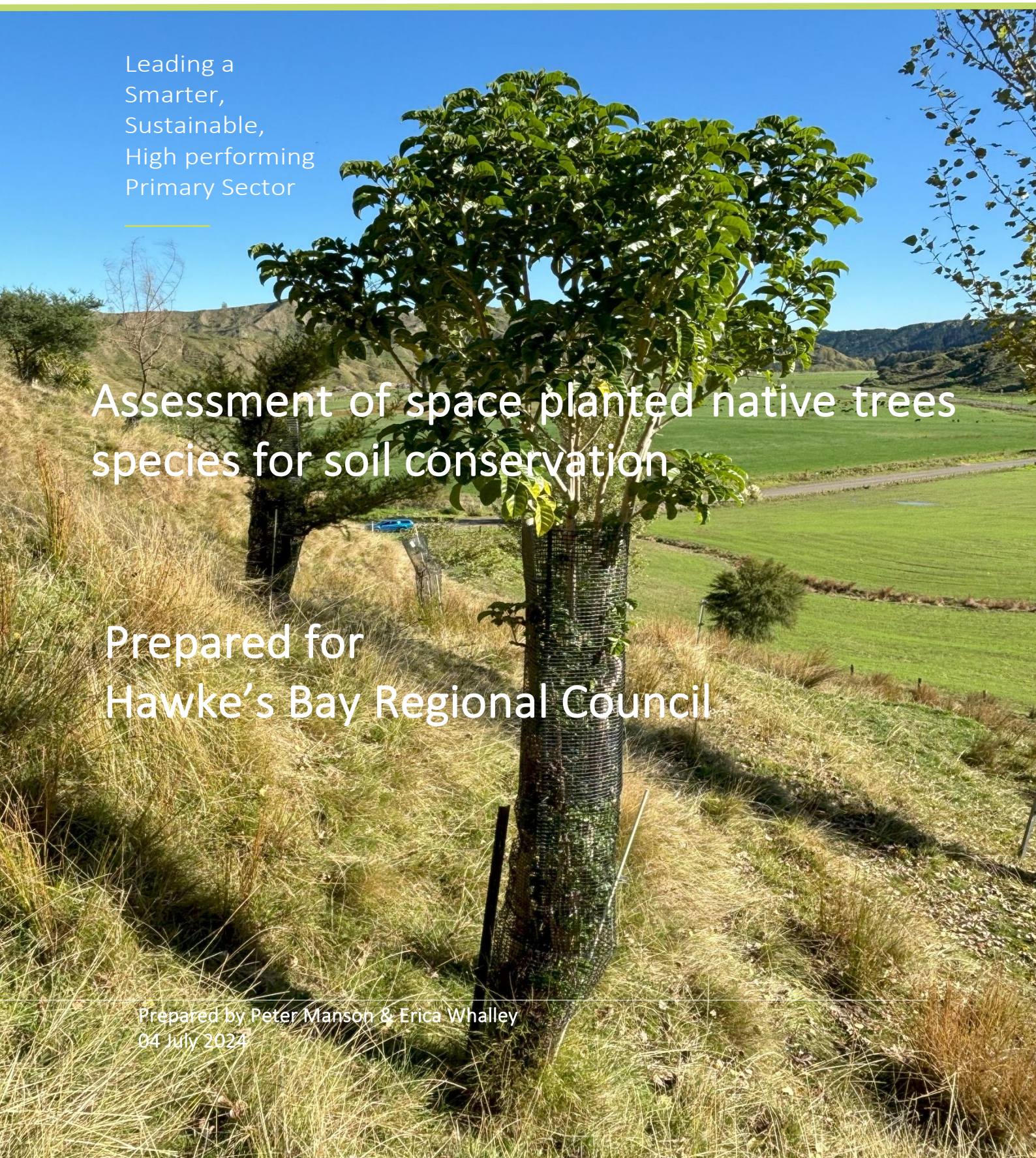
AGFIRST

Leading a
Smarter,
Sustainable,
High performing
Primary Sector

Assessment of space planted native trees species for soil conservation

Prepared for Hawke's Bay Regional Council



Prepared by Peter Manson & Erica Whalley
04 July 2024

TABLE OF CONTENTS

1.0 EXECUTIVE SUMMARY

A trial of space planted native tree seedlings with individual protector guards was established on hill country near Wairoa in 2017. Nine planted sites were inspected in June 2024 to assess tree guard effectiveness and tree survival and growth. The trial was designed to test the ability of seedling trees, particularly native species to be established in a similar manner to poplar and willow poles. There is a desire by landowners to grow more native trees for a range of reasons including to establish trees beyond the normal range of poplars, to complement poplar and willow plantings, add biodiversity and grow longer lived trees.

The seedling protector structures, were not as robust as 3m poles and therefore more vulnerable to damage from cattle. A wide variation in establishment success was observed mainly because of differences in cattle management. Costs per tree were kept as low as possible amounting to approximately $4 more than pole planting. However, an additional electric fence for cattle management added at least another $4 per tree.

Besides electric fencing, farmer interventions to protect trees included adding a protective steel cage, complete retirement and vigilant grazing management of cattle. Complete retirement was the most successful however careful grazing management aided by electric fencing gave the best pasture/tree result. The best commercial tree guard was the 'Cactus' guard especially if topped up to 2m height with section of plastic guard.

Cabbage tree, Pohutukawa and kowhai were among the best overall performers for survival and growth, however puriri showed the best consistent growth.

Observations indicate that the key to early establishment is releasing (weed/grass control) while survival and growth through to an 'animal proof' size depends on the tree guard's ability to withstand cattle pressure. Monitored and managed cattle apply less pressure than set stocked cattle.

Recommended follow-up actions are provided for each site (Appendix 1).

2.0 INTRODUCTION

During the winter of 2017, over 1,000 native trees were planted on 11 sites over nine hill country properties, mainly in the Whakaki catchment. Trees were wide spaced in a similar fashion to traditional pole planting. However, the trial used tree guards that were economical but not fully tested for protection from cattle rub and browse damage.

The project was a partnership between MPI Hill Country Erosion Fund (HCEF) and Hawkes Bay Regional Council. The trial was carried out during the last year of funding from this programme focussed in the Whakaki catchment. The intended outcome of this trial was to see if alternative species options could be developed that would provide more appeal than poles to some landowners or could be complementary to pole planting.

The project also aimed to have community support throughout the upper catchment farms, Whakaki Marae and Whakaki Lake Trust who also operate a native plant nursery.

3.0 LOGIC BEHIND TRIAL 2017 DEVELOPMENT

The native tree seedling trial was established after a few cabbage trees and kowhai were planted amongst a 2016 trial of Robinia pseudoacacia. The early success, though only tested for a year, showed that it was possible to plant and protect slower growing species. The tree guard used for the Robinia trial was redesigned for the native tree trial established in 2017 to be more robust. However, the use of untreated wooden stakes, in the earlier trial was very effective along with environmental advantages over steel and fibreglass products.

Accordingly, most pioneer species were excluded however, in retrospect Mahoe and similarly faster growing trees may be good candidates.

The health and longevity of many native trees is affected adversely by cattle treading and possibly browse damage to the bark. However, although poplars and willows appear to be more resistant, there is an expectation that conservation trees will have a finite life and will need to be replaced. Decades of observations will be needed to determine how well native trees fare in a grazed environment.

The trial was not intended to find a replacement for poplars and willows but to consider additionality and as a complement to those species in the landscape.

3.1 Cost comparison with poles

Materials and method were designed to give the best possible protection from cattle browse and rub damage at a reasonable cost. At the time of planting in 2017, the establishment of a seedling using the above method was approximately $4 more per tree than the cost of pole planting (approximately total cost was $32/per native seedling versus $28/pole).

The tree seedling was cheaper than a 3m pole, but labour costs and tree guard materials were more expensive than pole planting. This was due to more materials required to be transported around hill sites and more tools needed to plant the tree seedling as well as to erect the tree guard structure.

Electric fencing (2 wires) was additional and could add between $4 and $7.50 per tree but provide considerably more ability to control cattle.

3.2 Why native species?

In recent years, landowners have expressed an interest in alternatives to poplars and willows with an emphasis on native species. Poplars and willows are established as 3m poles and can be planted amongst grazed cattle with little disruption to farm management. Pole planting is simple, has a relatively reliable establishment rate and the trees are very effective at soil conservation of grazed hill country.

Furthermore, the is the exclusion period for pole plating is 1-2 seasons; almost all other tree species must be planted as seedlings, which in a grazed environment requires more complex tree protection and vigilant cattle management. But seedling trees are as vulnerable as poplars and willows to pests such as goats and possums.

The reasons for trialling native tree species on hill country were as follows:

- A desire by landowners to look at alternatives to poles (longevity, smaller size, less shading, less management).
- A general interest in native species.
- A realisation that natives belong in the landscape and can grow well (e.g. cabbage tree, kowhai etc).
- Cultural/wildlife/biodiversity reasons.
- Investigate species that can grow beyond the soil and moisture range of poplars and willows.

Drawbacks of native species that were already understood:

- Slower growth resulting in longer term need for protection.
- Difficulty of designing a protection structure that is functional and affordable.
- Uncertainty of the most suitable species (survivability, growth rate, site suitability).

4.0 2017 TRIAL DESIGN AND METHOD

4.1 Finance and support (external, farmers)

Materials and labour were fully funded through HCEF however, there was a strong expectation that landowners and farm managers would provide a suitable site, manage cattle appropriately (as carefully as possible within the scope of normal farm operations), assist with planting logistics if possible and provide electric fencing and extra labour if agreed. Some of the fence costs were grant assisted.

4.2 Choice of species

Species were chosen without substantial field-based data, however, personal observations of growth rates and mature trees over a period of several decades gave enough information to make a list. The main features sought for trial species were:

- Growth rate
- Height at maturity
- Suitability for hill country

A range of species were planted included:

- Totara
- Cabbage Tree (ti kouka)
- Puriri
- Rewarewa
- Kowhai

- Pohutukawa
- Karaka
- Titoki
- Ribbonwood (Manatu)
- Akeake

Due to the delivery schedule for plants, there is some uneven distribution of some species across all planting sites.

4.3 Considering poplar/willow and natives as complementary plantings

Among the reasons for considering native and other species for space planting on hill country is to protect and shelter areas that are either outside the site range of poplars and willows, to establish longer lived species or species which provide cultural, landscape or biodiversity benefits. This can be done as an integrated style of planting as illustrated in Figure 1.

Figure 1: Hereheretau Top Yards Block. Native trees planted as a complement to the gully planted with willows.

4.4 Tree guard design

Some experimentation of tree guard design was carried out for two years prior to this trial. The one used throughout this trial comprised the following materials (see photo in Figure 2):

- Weed mat (not used on all sites)
- 1.8m waratah (Y-Post)
- Yellow safety cap (to prevent tearing of the mesh)
- 2m x 10mm fibreglass electric fence rod
- 1.7m length of 'KBC Tree Tube' (Fine mesh, 250mm dia.)
- 4mm Cable ties (approx. 5)

Figure 2: A completed tree guard illustrating all the recommended components. (In this example with an exotic tree seedling).

4.5 Land types and environments

Trees were established on both LUC 6e and 7e hills. All aspects were covered by plantings. Erosion sites were targeted but there was a wide range of exposure to soil instability. Two sites were dominated by rank grass and/or blackberry, all the rest were grazed regularly by sheep and cattle.

4.6 Overall Method

For this trial, all sites were in a grazed hill country environment. The process was as follows:

- Choose a site that is less steep than the surrounding slope and preferably so that the top of the protector is not easily reached by adult cattle.
- Plant the seedling and then place the weed mat around the plant.
- Fix the weed mat to the ground by stabbing the corners into the ground with a spade (depending on the style of weed mat) alternatively use steel pins to hold down the weed mat.
- Drive the waratah in approx. 300mm or more if the ground is soft.
- Place the safety cap on and cable tie it – this helps to protect the tube from the sharp edge.
- Thread the fibreglass rod through the tube mesh and place this structure over the waratah.
- Form the tube to shape, cable tie it to the waratah and drive the rod in 300mm.
- Apply cable ties using the holes in the waratah. Make sure there is a cable tie near the cap (may need to join two cable ties for length).

5.0 5.0 ASSESSMENT AFTER 7 YEARS

5.1 Farms visited

The following farms and farm sites were visited and planted sites inspected (Figure 3):

- Three sites at Hereheretau Station:
  - Whakaki
  - Hereheretau Road
  - Top Yards
- Te Whakaari Inc. (SH2)
- Tangiwai Station (Whakaki) (SH2)
- Waikatuku Station – Hereheretau Rd
- Darren Hill (SH2)
- Whakaki Marae
- Properties planted but not inspected:
- Richard Robinson (landowner assessment)
- Opoho Stn (not shown on the map in Figure 3)
- Archie Waikawa (not shown on the map in Figure 3)

Figure 3: Locations of space planted native tree trial plots in 2017.

5.2 Additional farmer interventions (Guards)

Several properties implemented extra protection for their trees. Topping up existing 1.7m high tree guards by 300mm (Figure 4) as tree seedlings reach the top, has prevented cattle and goat browse in all cases observed. Notwithstanding rubbing and crushing of the tree guard.

- One property owner (Jon Knauf – Tangiwai Stn) added steel reinforcing mesh surrounds and considerably reduced the cattle grazing pressure as well. Results have been among the best seen throughout the trial.
- Hereheretau station and Waituku both used electric wires to reduce cattle pressure by managing the planted areas more carefully.
- A steel cage with spikes known as the 'cactus' tree guard was used on Darren Hills property. This was very effective where it was supported by a waratah/Y-Post.
- Where trees had emerged from the top of the 1.7m tree guards, some farmers had topped up the guards by adding a 400-450mm section of KBC Tree Tube cut from a standard 1.7m tube. Attached using 3-4 cable ties with an overlap of 100mm which gave sufficient support to prevent cattle browse.

Figure 4: A 'topped up' tree guard showing the overlapped extension and 300mm extra height preventing cattle browse.

5.3 Observations by site

The location of the below trial sites is shown on the map (Figure 3). See Appendix 1 for the follow-up actions recommended to ensure good tree survival at each site.

Site	Assessment
Hereheretau Station – Whakaki (Figure 5)	• Known gorse issue at time of planting. • Totara predominantly planted as resistance to Mesulfuron allowing landowner to spray gorse. • The top of the hill slope was planted with cabbage trees and the larger area down slope was planted with totara. Grazing pressure had been low and gorse regrowth had been rapid. • Tree guards were largely intact and totara trees were healthy in most cases.
Hereheretau Station – Hereheretau Road site (Figure 6)	• Fenced with a 2-wire electric fence to give better control of cattle. Unfortunately, the fence had been affected by soil slips and cattle were able to graze freely. • Seedling losses were evident due to cattle rubbing and browsing damage but there were also examples of trees with very good growth. • The healthiest seedlings were cabbage tree, ribbonwood, kowhai, puriri and one akeake. • Numerous unexplained losses with tree guards still intact indicating that tree seedlings did not live long into the trial. Lack of releasing from competition with grasses etc is the most likely cause of seedling losses.
Hereheretau Station – Top Yards (two sites)	• Both sites were separately fenced with electric wires. • The smaller site nearer the yards had less cattle damage than the larger site. • The healthiest seedlings over the two sites were puriri, lacebark, karaka, cabbage tree, totara. • Some seedling losses particularly on cattle camp sites with the larger of the two areas having a higher percentage of losses due to cattle damage.
Te Whakaari – SH2, Whakaki	• Only a few trees had survived on this property which were predominantly in areas that had better stock management. • Pohutukawa and totora thrived in this site. • Pohutukawa did suffer from browse damage at emergence from the tree guard.
Tangiwai Station – Whakaki block	• The landowner had enhanced tree survival by significantly reducing grazing pressure and adding a steel reinforcing mesh cage around each tree. • Seedlings had significant amount more height growth than other trial sites with lush foliage well beyond the diameter of the plastic guard. • The healthiest were kowhai, pohutukawa, followed by cabbage trees. There was also one good example each of totara and rewarewa. • Significant losses prior to the extra protection were likely.

D Hill property – SH2	• Property had used the steel 'Cactus' tree guard and many had been topped up with a section of plastic netting guard to prevent browse after emergence. • Significantly more cattle pressure was evident on this site than most others and losses were high. • There were many healthy trees though not well grown in most cases • Kowhai, cabbage tree, totara, pohutukawa were included in the survival count.
Whakaki Marae hillside – Hinepua Road, Whakaki	• Trees on this block had been planted by a community group. • The grazing of this block had been light and intermittent since planting resulting in considerable blackberry growth but also a significant number of healthy, well grown trees. • The best growth was seen from, pohutukawa and kowhai with one excellent cabbage tree. • Two karakas were seen though not as good as the other species. • All trees on this site had space to growth due to lack of cattle and had spread their branches widely enabling considerable total biomass growth and support for fast height growth. •
R Robinson – Iwitea	• Site not inspected due to access difficulties at the time. • The owner reported that cabbage trees and Puriri had survived the best, however, there had been large losses due to cattle rubbing damage. •
Waituku Station – Hereheretau Road	• Trees on this site are one year older than the other sites in this report. • Extra protection from an electric fence has been provided until storm damage in 2023 allowed full access of the site to cattle. • Excellent results have been achieved at this property mainly due to farmer vigilance. Standout species were rewarewa, puriri, cabbage tree, kowhai, karaka, pohutukawa and totara.
Opoho Station SH2	• Total loss of many trees predominantly due to poor stock management and lack of releasing.
Archie Waikawa SH2	• Total loss of many trees predominantly due to poor stock management and lack of releasing.

Figure 5: Totara on Hereheretau Whakaki Block

Figure 6: Cabbage tree on the Hereheretau Road site.

5.4 Summary of observations

Table 1 below shows the best performing tree species by site.

Excluded from the table are Ribbonwood, Lacebark and Akeake which performed well as isolated examples on some sites. The number of species performing per site may reflect the limited range planted on that site (e.g. Hereheretau Stn – Whakaki only had two species).

	Species							
		Puriri	Rewarewa	Kowhai	Karaka	Totara	Cabbage tree	Pohutukawa
Site	Hereheretau Stn - Whakaki					✓	✓	
	Hereheretau Stn – HHT Rd	✓		✓			✓	
	Hereheretau Stn – Top Yards	✓			✓	✓	✓	
	Te Whakaari					✓		✓
	Knauf - Whakaki			✓			✓	✓
	D Hill			✓		✓	✓	✓
	Whakaki Marae			✓			✓	✓
	R Robinson*	✓					✓	
	Waituku – N Broad	✓	✓	✓	✓	✓	✓	✓

Table 1 Only species present in significant numbers and with good growth were checked (✓). A blank cell does not necessarily mean a species was absent.

* Site not independently checked.

5.4.1 *Dominant surviving species*

Survival and growth rate has been variable across all properties and sites. Some early observations of tree growth after the first two to three years showed that Puriri (Figure 7) and Pohutukawa were amongst the best performers. These were followed by Cabbage Tree and Kowhai. Rewarewa (Figure 8) was slow to start but has grown rapidly once established.

These good growth rates were not expected and is possible that other native species which meet the general criteria could perform just as well. Smaller quantities of ribbonwood were planted in this trial but has shown very fast growth. Totara, though slow to start has grown steadily and once it has established, even small branches are less likely to be browsed than other species giving it a significant advantage. Not all species were seen on all sites at inspection time. For example, Ribbonwood was only seen on one site.

Figure 7: The largest Puriri seen on all sites. Puriri has been an unexpected performer generally (Hereheretau Station Top Yards).

Figure 8: Rewarewa (Hereheretau Rd -Woolshed). Slow to start but 'ideal' form for space planting on pasture.

5.4.2 *Tree losses due to rubbing by cattle*

Rubbing and destruction of the tree guard is by far the most impacting of the damage types (see Figures 9 -12). This can either destroy the plant immediately in the worst case or expose it to browsing by cattle and sheep. Rubbing may topple the whole structure or break the netting open exposing the tree.

Damage to the tree guard structure was most severe on 'camp' sites (flatter, congregating areas) and where it was obvious that cattle had been able to graze beyond the optimum length of time. See section 6.2

Figure 9: Destroyed tree guard exposing a small Totara to browse/rub and total loss.

Figure 10: Slight damage from cattle rubbing. Repaired temporarily with cable ties.

Figure 11: Damaged tree guard mesh enabling cattle and goats to browse foliage and bark.

Figure 12: Destroyed tree guard, however the Totara is relatively unpalatable and may be large enough to survive.

5.4.3 Tree losses from browsing by cattle and goats

Damaged tree guards enabled cattle and goats to browse tree leaves and bark at a low level. However, the most common browse damage was observed above the 1.7m tree guard height. This was exacerbated when the animal tried to push further down into the tree after eating the top.

On hill country it is very difficult to provide protection from cattle due to their ability to lean from a higher point and reach over the top of a 1.7m tree guard. This also applies to pole sleeves; however, poles often survive because of the 600mm of woody stem which extends above the sleeve which is less palatable than the leafy apex of a seedling.

Browse at the top of the guard (Figures 13 - 16) once the tree seedling emerges, is an important but not urgent issue because the tree has reached a size that guarantees the extra investment to top up the structure and enable it to grow out of reach. However, left untended, the tree will never grow further, and it is likely that the guard and tree will be pushed over at some stage and the tree will be lost. Conversely, trees established on the two sites with almost no cattle pressure, appeared to grow fast in diameter as well as height, giving the impression that branch growth aided overall tree health and rate of establishment (Figures 17 & 18).

Figure 13: Pohutukawa browsed as it emerged from the tree guard.

Figure 14: The same tree with browse damage evident.

Figure 15: Lacebark with bark damage from cattle or goat browse. Not all species have palatable bark.

Figure 16: Cabbage tree browsed by cattle. One of the most targeted native species.

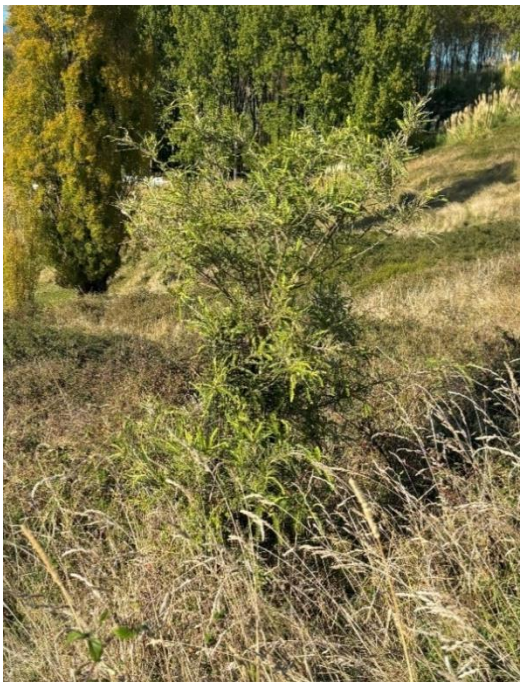


Figure 17: Kowhai with no cattle browse (Knauf property, Whakaki).

Figure 18: Kowhai with no cattle browse (Marae hill, Whakaki).

5.4.4 Weed/grass competition severity and impact on tree survival

Observations on several sites that there were many tree guards in good condition, but trees were absent (Figure 19). The obvious reason seemed to be lack of control from competing vegetation (grass etc). However, the superior growth of trees on the two properties where cattle damage had been largely prevented despite vigorous competing vegetation, indicates that cattle (and possibly goats) have significantly more impact on tree growth. Nevertheless, weed control (releasing) during establishment is well understood as a limiting factor and is more important than realised by most tree growers. Competition from other plants is especially tough on new seedlings and can affect them for 1—2 years.

Figure 19: Entire tree guards with little cattle damage but few surviving trees indicating early survival issues, likely to be weed /grass competition

6.0 RECOMMENDATIONS

6.1 Livestock and animal pest protection

1 Physical tree protector – Disposable/Single use (Figure 2)

The 'KBC Tree Tube' is a fine black mesh which was used in this trial. Used with a supporting Y-Post and fibreglass poly rod, this is very effective against sheep and cattle browse for as long as the structure is free from rubbing damage. The Y-Post and poly rod may possibly be re-used however, it is likely that the tree roots will have grown around them, and they will be impossible to extract once the tree is large enough to survive without protection.
There are a few more options for sheep-only guards. The KBC Willow and Poplar sleeve is a round corflute style protector which suits some species of seedling trees.

2 Physical Tree Protector – re-usable (Figure 20)

Reusable protector guards are commercially available. The most effective are the 'Cactus' guard. Others are generally hand made using reinforcing mesh and similar materials, or 'Hurricane' netting. Both options needs supporting posts or waratahs/Y-Posts.

3 Physical Tree Protector – Permanent (Figure 21)

Post and rail structures are commonly used for ornamental trees in a park-like setting. The cost for each tree may be $300-$400.

4 Electric (Figure 22)

Some of the farms who took part in the trial, erected 1-2 wire electric fences around the planted block to enable better management of cattle. Damage from soil slipping, loss of power through broken insulators, loss of power feed and maintenance issues were the main reason for failure. However, where the fence was maintained, cattle damage was considerably less than where planted areas were included in a larger paddock.

5 Electronic/GPS (Figure 23)

GPS cow collars are beginning to appear on hill country farms. The cost is too high for most farmers, however, once the technology becomes mainstream then tree planting may become significantly cheaper and more successful. Disadvantages presently are that some animals have been known to have a high tolerance to the electronic barrier and break through Furthermore, the GPS cell around a planted tree may need to be several metres across.

In summary, the two recommended tree protection methods are as follows:

High-cost option ($70-$80)

- Use 1.7m 'Cactus' tree guards. These should be topped up with a section of plastic netting to provide an extra 300mm height once the seedling has reached the top of the 'Cactus' guard.
- The 'Cactus' guard should be supported by two waratah (Y-Post) standards.
- An additional protection of a single electric wire around a group of trees will reduce the risk of damage even further.
- Weed control is essential – either a good quality weed mat and proper fixing or very careful use of glufosinate around the base several times through the season.
- Other maintenance includes regular inspections and making sure that branches are kept inside the guard and not eaten by livestock.

Medium cost option ($30-$40)

- Use the plastic netting option with one waratah and one x 2m poly rod plus weed mat
- Recommended additional protection includes the use of a hot wire surrounding groups of trees for ease of cattle management
- Sheep are able to be grazed ad lib but with very careful cattle management as follows:
    - Cows – maintain good feed quality, introduce large numbers for minimal time (remove as soon as the grass is eaten, or the cows are fully fed – whichever occurs first) OR
    - Yearlings – graze with care and close monitoring. Remove from the paddock when grass has been eaten or at the first sign of damage – whichever occurs first
- Top up tree guards as above as soon as trees reach near the top of the 1.7m guard
- Maintain tree guards throughout the establishment period. In this context, establishment means the tree has developed to a robust size.
- Preferably use an electric 1-2 wire for pasture management and tree protection.

Figure 20: 'Cactus' tree guard. Reusable steel guard with spikes.

Figure 21: An extreme version of a permanent tree 'cage'.

Figure 22: Two wire electric fence useful on hill country to manage cattle in tree planted areas.

Figure 23: GPS 'Cow Collar' technology used for grazing may be suitable to prevent tree damage.

6.2 Livestock Management

Total exclusion of cattle gave excellent tree growth results, but this also resulted a considerable amount of blackberry growth (arguably adding more protection) which is very difficult to chemically control amongst native trees. A similar effect is seen in gorse reversion areas. The opposite effect is seen with 'set stocking' where a mob of cows is left for days amongst the young trees. As above, cows are focused on rubbing once they are fully fed. Damage from rubbing and browse can also happen if cows are hungry and run out of feed. These are both worst-case scenarios for establishing seedling trees. Goats and deer are a particularly difficult issue. Both are high fibre diet animals and the amount and type of pasture on offer has little bearing on their interest in eating trees. Furthermore, goats and deer are more difficult to control with conventional fencing.
Observations over the nine sites indicated that cattle had been managed differently between farms. Cattle pressure is directly related to tree guard integrity and tree survival. Assumptions could be made that managing cattle in the planted areas in a manner that minimises damage to tree guards would result in poor pasture quality, however, this was not always the case. Two systems appear to be the most beneficial to tree establishment and pasture:

- Cows:
  Depending on the paddock size, the principle of a large number of cows for a short grazing period works well. Assuming the animals have been moved in from a grazed-out paddock, they will be hungry and focussed on grazing pasture. However, they must be moved out again as soon as they have eaten all the pasture or have eaten their fill, whichever happens first. Preferably, all the grass should be eaten, though the timing is critical because trees are not part of the intended diet. Once attention is off the pasture feed, trees become a target for rubbing and browse through or over the top of tree guards.
- Yearling/R2 cattle:
  Another proven technique has been to graze just young cattle, preferably heifers, which can be set stocked with care.

While the tree guard structure was robust against sheep, it was vulnerable to rubbing by cows. Ongoing rubbing, despite the design efforts, resulted in damage and destruction.

Nick Broad had several years' experience with a similar style of seedling establishment and has made recommendations based on his experience. Nicks recommended grazing management is to:

- Isolate planted areas from the main grazed part of the paddock by electric wire during the first few years of establishment.
- Allow sheep-only grazing in the planted area for the first 2-3 years (depending on the rate of tree growth). After trees are more robust, allow weaner cattle to graze with care and close monitoring.

- Then 2-3 years later, breeding cows can be introduced and managed as follows:
- Allow as many cows as possible into the planted area for the shortest time possible that will result in good pasture control but not result in tree damage. They must be closely monitored and removed as soon as they have either eaten all the grass or eaten their fill, whichever comes first.
- It is recommended that adult cattle should be removed from the new trees as soon as they have finished feeding to their satisfaction.

7.0 SUMMARY

The best tree establishment results to the date of inspection, in order of most to least effective, were on sites where there was:

- complete or near complete exclusion of livestock (Knauf and Marae blocks)
- added robust steel protection from cattle using reinforcing mesh (Knauf)
- use of 'Cactus' tree guard (especially with a top-up section).
- natural tree protection (gorse, Hereheretau - Whakaki) combined with Totara (low palatability)
- careful cattle management using electric fencing (N Broad, Hereheretau Top Yards/Road) with a top-up section of tree guard
- As above without the top-up
- No additional protection and set stocking/continued grazing with cows.

In all grazed scenarios, the addition of a top-up section giving an extra height of 300mm allowed trees to grow beyond the browse height of a cow even on steep slopes (a total protector height of 2m).

APPENDIX 1: FOLLOW-UP MAINTENANCE REQUIRED ON TRIAL SITES

- Hereheretau Stn – Whakaki

  The low level of cattle pressure is currently allowing good establishment and growth of Totara. However, there are two options as proposed by the farm manager; either aerial spray the gorse with metsulfuron which would likely kill the cabbage trees (Totara is resistant) or leave the gorse to grow and assume that Totara will eventually dominate the site. The second option has much more merit due to the difficulty and expense of controlling gorse long term. There are cultural and ethical reasons that this farm would prefer to encourage native tree cover where appropriate.

- Hereheretau Stn – Hereheretau Road

  The landowner needs repairs to the two-wire electric fence, including some new posts, replace the gate with a conventional one (as suggested by the farm manager) and a more secure electricity supply. Top up tree guards as required.

- Hereheretau Stn – Top Yards

  Continue the good management of cattle amongst trees in the small block and adjust management of cattle in the larger block to take pressure off the trees there. Top up tree guards where required.

- Te Whakaari

  Top up all Pohutukawa tree guards and strengthen others (mainly Totara) or rebuild guards in some cases. Try to reduce cattle pressure.

- Jon Knauf (Tangiwai) Whakaki

  The management and extra tree protection to date has been very successful. Continue with the same inputs until trees are self-supporting (another 4-5 years). A few smaller trees may need some extra protection.

- Nick Broad (Waituku)

  Reinstatement of the broken electric fence. Topping up tree guards and strengthening with an extra (fibreglass) poly rod in some cases.

- Darren Hill

  Several tree guards need extra support with a waratah standard and many need to be topped up.

- Marae (Whakaki)

  This hillside plantation is in excellent health and no further intervention is needed, as long as cattle are excluded.

- Richard Robinson (Iwitea)

  Due to the high level of losses and the large paddock area, strengthening of remaining tree guards and topping up are the main inputs needed. If possible, cattle pressure should be reduced.

Contact

Peter Manson

Agribusiness Consultant
Phone: 027 496 6398
Email: peter.manson@agfirst.co.nz

AgFirst Pastoral (HB) Ltd
Carlsson House, 201B Warren Street North
PO Box 1261, Hastings 4156, New Zealand
+64 6 872 7080
hawkesbay@agfirst.co.nz
www.agfirst.co.nz