

New Zealand **Tree Grower**

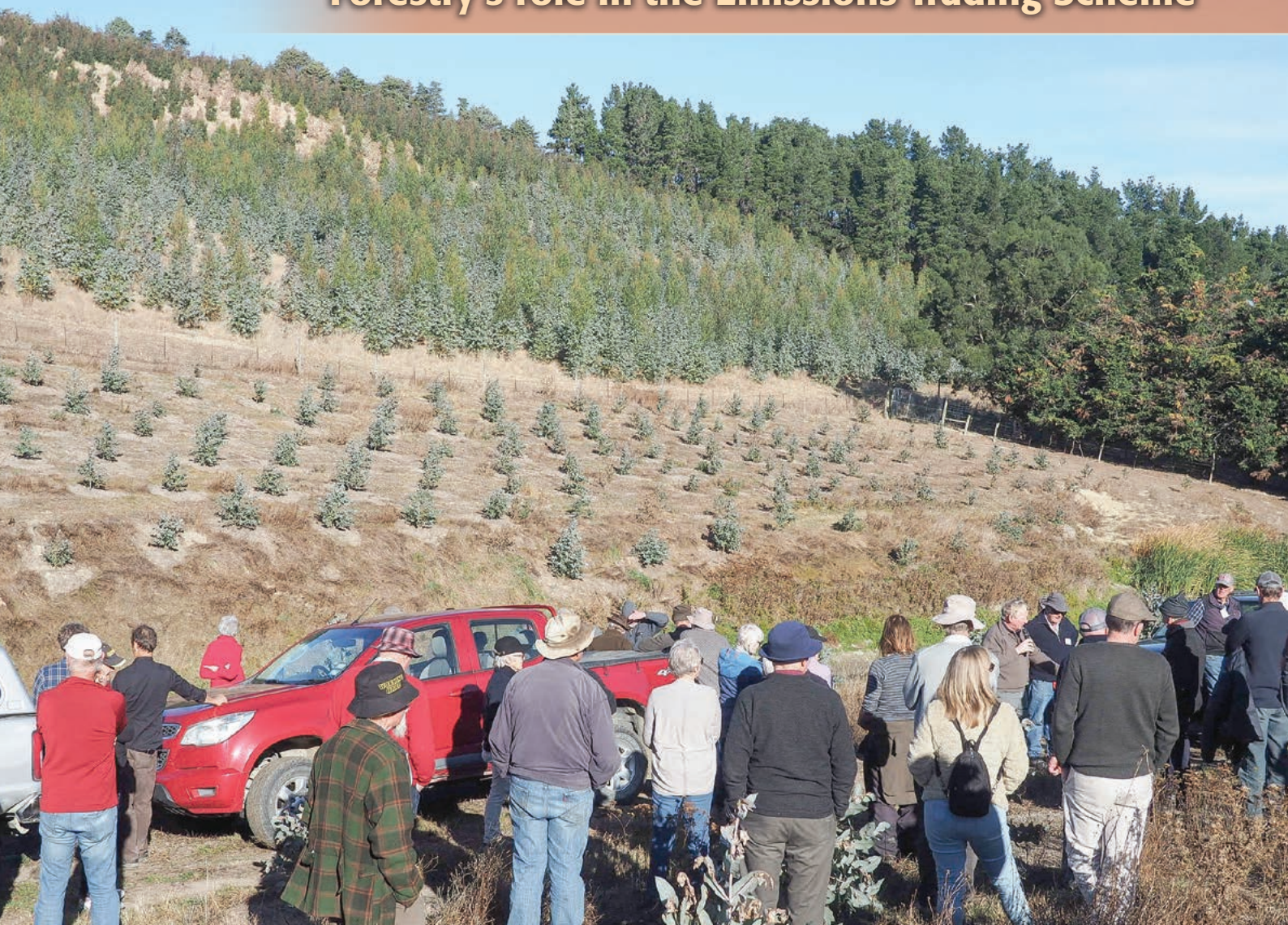
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profit, amenity, sustainability and the environment*



New Zealand Farm Forestry Association | Oranga Rākau Aotearoa

November 2024

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The contribution of trees to carbon neutrality
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Forestry's role in the Emissions Trading Scheme



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SCAN ME



Cypress harvest

8



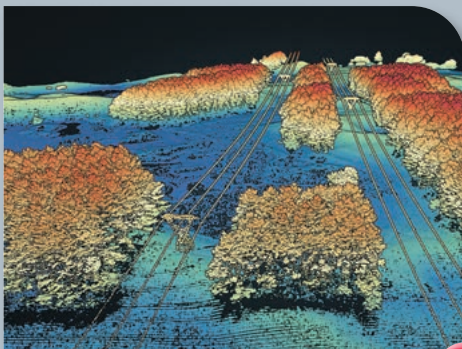
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From the President

Neil Cullen

Along with more than 50 other participants, I spent an enjoyable weekend in Taranaki at the Action Groups weekend organised by Vaughan Kearns. Although this region does not have an active branch, there is plenty of farm forestry and alternative species forestry there. Highlights included the Makara farm of Jeremy Thomson and family at Te Popo which could serve as a model for farm forestry anywhere. As in other parts of the province, the 60 hectares of redwood and cryptomeria at Makara appear to handle the damp humid conditions far better than radiata pine which struggle with the ravages of dothistroma and red needle cast.

The Kingheim Forests redwoods near Whangamomona also impressed. A high value crop of 470 hectares is growing there on steep hill country which should overcome the costs of future extraction and cartage from a distant site. Significant investment in pest control has been one of their keys to successful establishment.

The considerable effort put into seeking improvements in the Forest Growers Levy has had mixed results. There has been acknowledgement that more effort to ensure the results from levy-funded work on productivity, safety and biosecurity are relevant and accessible to small-scale foresters. The NZFFA has a role with communication and we have invested in a database of all land owners with more than four hectares of forestry which we are using to widen the outreach and improve the knowledge of what the levy is achieving. There is also recognition that a more regular revision of research strategy is required. Graham West is helping that with a workshop funded by the Small and Medium Enterprises Committee. This will be in Rotorua and consider what the priorities are to ensure our forests are resilient enough to cope with future financial and climate challenges. The work will complement the work by Forest Growers Research into where the diversified species research should be focused.

As NZFFA President, I have been invited by Minister Todd McClay to be part of a Forestry ETS Registry Reference Group. This is a reaction to the proposal from the Ministry for Primary Industries to charge Emissions Trading Scheme participants an annual fee of \$30.25 a hectare as cost recovery for the development of a new computer system known as Tupu-ake which led to judicial action by several forestry groups.

The Minister delayed the imposition of the fee for a year and has stated that he wants to see it significantly reduced. He has asked the reference group to focus on ways which processes can be streamlined and made cheaper and advice on how to improve the registration process. There will also be consideration on the perpetuity of annual charges because those on the averaging system stop receiving credits after 16 years for radiata pine. Small scale Emissions Trading Scheme participants and those with registered native forests are hardest hit by the annual fee so I am pleased to have the opportunity to argue for a better result.

Our mid-year Councillors meeting is on 20 November in Wellington and we need a good turn-out from branches either in person or online. This is the opportunity for branches to hear from Executive and to give feedback on what grassroot members are thinking. There will be discussion on how our applications for levy projects evolve and whether we need a better process to which more members can contribute. Our new administrator Raewyn Agnew will be present and she is keen to make face-to-face contact with the different branches and address any concerns. 🌲

Catching up at the November Council meeting

Howard Moore

There is another Council meeting in November to update everyone on how we are getting on, and air any concerns about who is not doing what, for whom and why.

Three or four big issues might take some discussion. One is the renewal of the Forest Growers Levy and our attempts to make some changes to the way it is managed and distributed. Another is the work by Matt Highway who we hired to help strengthen our ties to other industry bodies and potential sponsors, and increase our income and membership.

A third could be the new membership management system which I have lightly covered elsewhere. Another could be the necessary changes to the rules of this organisation, to comply with new legislation for Incorporated Societies and the Charities Commission.

There are also several smaller but perhaps more human things to talk about, such as the fact that Raewyn Agnew has taken over the role of Office Manager from Liz Chamberlain, the resignation of Dean Satchell and our plans to attend three agricultural field days next year – Mystery Creek, Central Districts and Southern Field Days. These are of course all unrelated, so ignore any rumours you may hear to the contrary.

Renewal of the levy

First, you will have seen something of our efforts to use the levy renewal process to suggest changes to the way the levy is administered and spent. In a newsletter we sent out last month we advised that we set up a working group in March to identify things that seem to limit the benefits small-scale growers receive from the levy.

The group identified six key issues affecting small growers, and made several submissions and presentations to the Levy Board and the Levy Secretariat. We wanted –

- More effort to ensure the results of research – productivity, safety, biosecurity and resilient forests – are relevant and reach small-scale forest owners. The Levy Board acknowledged that this was necessary.
- Better communication with all potential levy payers so that everyone knows what is happening and why. The Levy Board acknowledged this needed improvement.

- An increase in Levy Board representation to include a broader range of interests across the forest growing industry. The Levy Board did not feel that this was necessary but may consider it at some point.
- Acknowledgement that the fundamental business models of small and large growers are different and they have different priorities. The Levy Board showed little recognition of this.
- A clear structural separation between the Levy Secretariat and the NZ Forest Owners Association to improve transparency. The Levy Board did not acknowledge the need, and the Secretariat was upset that we questioned their integrity. They both missed the point.
- Core funding for membership associations such as NZFFA that promote forestry and communicate on levy matters. The Levy Board declined this.

The view of the Levy Board seems to be that forestry is forestry. There is no great difference between the needs of large and small growers, and no need to cater for either group separately. But while it is true that the trees do not care whether they are owned by large or small growers, economically there can be large differences. Our members on the various levy committees repeatedly have to point these out.

In addition, the Forest Owners Association seems to have a different vision from us of the future of commercial forestry, and consequently different views on how levy money should be spent, by whom and when. We naturally see the levy as a means of helping to achieve our vision, while they see it as a tool for achieving theirs. Of course, the large growers pay most of the levy, and the structures of the Levy Trust and the Levy Board have been set up to protect their investment, so their reaction to our points above was somewhat expected.

The fact that we made any progress was a little more remarkable. As we all know, the NZFFA is largely funded by members and run by volunteers, and the 14,000 small growers not affiliated with any forestry

organisation have very little voice. By contrast, the members of the Forest Owners Association are largely corporates with a lot of influence, and the Secretariat staff who are paid employees of the Forest Owners Association are funded by the levy for six years at a time.

The fact that we are small, powerless and underpaid naturally makes us uncomfortable and therefore our arguments for a better deal. We will keep trying.

Matt Highway contract

Matt Highway's contract ended earlier this year when he decided he could add no further value. He found that there was little appetite from sponsors for closer relationships with the NZFFA, and limited opportunities for us to take on contracts that might build our networks and help us earn more money. He did set up a relationship with the Ministry for Primary Industries and start negotiations over rebuilding the NZFFA website to help both them and us reach a wider audience for small-scale forestry. He passed this relationship over to the Executive when he left. The Ministry for Primary Industries has asked us for three quotes for the proposed work, and we are trying to get those. However, we do not really know what questions to ask of the software companies, so we have not made any great progress.

Several of us thought that Matt would use his contacts, knowledge and charm to find us members and contracts that would more than cover his costs. This did not happen, so our expectations might have been somewhat unrealistic. His negotiations over the website rebuild assumed the NZFFA would fund a significant part of the project, perhaps in cash, perhaps with volunteer time. His opinion that we should proceed with a total rebuild was unexpected, and given the lack of other income, is potentially unaffordable. My opinion that his opinion was rather unrealistic did not go down well.

The funds for the contract were contributed by the branches as you know, and only around half of those contributions have been spent. I do not know whether the frank exchange of views I had with Matt led to his resignation or whether he felt he had done all he reasonably could in a difficult situation. Either way, at the Council meeting we might discuss how the balance of funds might best be used.

Changes to the rules

Some of you will be aware that new legislation has been passed requiring all incorporated societies to rewrite their constitutions or rules and the Charities Commission has also brought in some new requirements. These are straightforward. We need to clearly ensure our officers meet the new definitions provided in the Charities Amendment Bill, and undertake to review our rules at least once every three years to ensure they are fit for purpose, lawful and help our charitable goals.

The changes to the Incorporated Societies Act are a little more complex. First, we have to have proper procedures written into the constitution and consistent with natural justice for handling disputes. Within six months of the balance date we must prepare the annual financial statements, hold the Annual General Meeting and file our annual return. Our constitution needs to state how someone becomes a member, that they must consent to being one, and how we collect their consent. We must have at least one official contact person, with the process for their appointment shown in the constitution. Finally, all Executive members will be classed as 'officers' and will be required as with company directors to –

- Act in good faith and in the best interests of the society
- Exercise powers for proper purposes only
- Comply with the Act and the constitution
- Exercise reasonable care and diligence
- Not create a substantial risk of serious loss to creditors
- Not incur an obligation they do not reasonably believe the society can perform.

We have until April 2026 to re-register our new constitution.

Human things

Raewyn has replaced Liz as our Office Manager, and she is proving a great asset. Be kind to her, these are complicated times. In a totally unrelated step, Dean has resigned as a member, newsletter editor and webmaster. That is unfortunate, and leaves us a bit short. Anyone wanting a new role in the media please let me know.

Howard Moore is the NZFFA Treasurer. 🌲



NZFFA Conference North Canterbury branch Tuesday 1 to Friday 4 April 2025 Trees in farmed hill country

NZFFA

We look forward to hosting members in North Canterbury for the 2025 conference at the beginning of April next year. Much of our activity as a branch is around monthly field days, where we share experiences and knowledge in informal settings. But there is a deeper practical quest beyond simply sharing, one that is probably universal across the NZFFA. We want to see more trees on farms, while ensuring we use that wise mantra – the right trees in the right place for the right purpose.

A farm forestry challenge

In the wider community, farm forestry is undervalued, crowded out by more vocal views of forestry, with on one hand blanket pines across landscapes and on the other that we should plant native species at all costs. Both viewpoints are unhelpful in their own and narrow way. The conference will aim to reinforce the possibilities and benefits of the NZFFA's middle-ground farm forestry.

Improving the future of farm forestry in New Zealand depends on us continuing to pursue sharing information, the hallmark of the branches and conferences, as well as dealing with this challenging wider community context. The latter has arguably been sticky for the NZFFA to address. We are confident that visiting examples of farm forests during this conference, and learning from the experience of the forest managers, will help reinforce how workable farm based forestry can be, along with considering perceived and real downsides of timber production.

As most members know, the North Canterbury tree environment leans towards dry and droughty, but not everywhere or all the time, coolish and frosty but seasonally hot, and windy. Farm forestry here is practised within and alongside a mix of sheep and beef farming in relatively stable hill country, compared to many regions.

A pragmatic geographical subdivision of land in North Canterbury for farming and forestry, as well for other values such as recreation, conservation, and tourism that we are also good at, is the milder lowlands and associated hill country, versus the harsher high country.

Field day overview

Our three main field visits are in lowland and associated hill country, partly for reasons of economy of travel but mostly because of the quality of farm forestry ventures. At each we will be hosted by past winners of the South Island Farm Forester of the Year Awards.

Recognising the special attraction of the high country to so many New Zealanders, we are offering a full day visit to the high country on the optional Saturday. This will also be hosted by an award winner.

Our area is also rich in wider forest innovation and we will be offering local visits to working examples of these, also as options for the Saturday. For farm forests on Thursday we will visit the Flemings at Mt Grey for half a day and the Malcolms at Selkirk for the other half day.

The Flemings – Mt Grey

Gary and Rebecca are the fourth generation on the family farm. Anyone meeting Gary in the field or lecture theatre knows his knowledge of trees is encyclopaedic, fostered by early training in nursery practice and forestry along with his desire to learn and experiment.

Unsurprisingly, Gary has gone for diversity, not only standard alternatives such as eucalypts, cypress, oaks, redwoods and poplars, but also some novel species. His planting record comprises over 900 entries, covering ornamentals, amenity, shelter and erosion species and fruit trees, as well as trees for timber and for riparian planting.

Gary pays attention to selecting provenances and seedlots, often propagating his own material, setting out and monitoring trials to track performance. Multiple provenances are often planted for future seed production.

Since his first eucalypt trial in 1985, he has planted over 100 species of eucalypts. He has a New Zealand Dryland Forests Innovation *Eucalyptus globoidea* seed orchard, and a clonal *E. bosistoana* block. Cypress include trials of current selections by Scion and, as with the 50 species of oak on the farm, most are being pruned for timber.

Fence lines are planted with diverse shelter species, matching a timber species that will be pruned, teamed with a shrub for low shelter. Gary supplies a North Island polo mallet maker with timber from his block of paulownias, has sold eucalypt logs to China and supplies his own fence posts from naturally durable species.

The rainfall on Mt Grey ranges from 300 mm to 1,200 mm a year. Having experienced two major wind storms, numerous droughts and damaging floods, Gary has gained a deep understanding of what trees grow well in the region. Farm foresters widely attest to the willingness to share his knowledge.

The Malcolms Selkirk

Having aspired to owning a farm forestry block for many years, when they retired from commercial fruit growing and fruit tree nurseries in 2012 Alistair and Jenny Malcolm bought a 63-hectare dryland block of grazed rolling downlands. It was bare grassland except for five hectares of second rotation radiata pine and Leyland cypress hedges. Their first phase of planting was a diverse mix, including native beech, redwoods, Douglas-fir, totara and cedars.

Subsequent plantings from 2016 have been more firmly focussed on carbon farming. They have favoured eucalypts, including the traditional *E. nitens* and *E. regnans*, as well as some ground durable eucalypts. Other species include cypress and poplars. A further native block was planted in 2024. Nearly the entire property, around of 60 hectares, has by now been planted.

An outstanding feature of the forest management has been the lessons and practices he carried over from fruit growing. One is his highly disciplined approach to weed control during tree establishment, especially important in drought conditions.



The Rutherfords Melrose and Double Tops

The second field day is a full day to the properties of Dugald, Andrew and Mandy Rutherford on the Virginia Road west of Hawarden. A total of 6,700 hectares are farmed, ranging in altitude of 300 metres to 1,300 metres, a balance of paddocks through to high country. The operation has grown significantly since the last annual conference visited in 2004, a part of this expansion being made possible from timber sales. They have been practising farm foresters for 50 years and like to feel that the integration of forests into the agricultural system has given a lot of options.

We will spend some time in an agro-forestry block that Neil Barr would have loved. There is a unique set of environmental circumstances which has enabled them to produce good radiata pine at low stocking while growing grass at the same time. There has been a long battle to remove all crack willows from the property and there are hydrological and other benefits which come from that. The founders of the NZFFA, farmers such as Neil Barr, Jim Pottinger, Vic Stevens and Peter Smail, always needed to know about the farm. The day will end in or near a sheep yard.

Conifers in the high country, Waimakariri Basin

There is an optional day of field trips on Saturday 6 April. One of these will be a full day in the high country featuring wilding pines.

When Nick Ledgard first researched exotic conifers in the Canterbury high country with the Forest Service in the mid 1970s, these 'saviours for soil conservation' were beginning to fall from grace. Since then, they have spread across landscapes becoming a threat to biodiversity and a wildfire hazard.

Nick is arguably the most authoritative scientist on the invasive conifer dilemma on a circuit of his research stamping ground. He will demonstrate how this phenomenon is now understood and being managed. You will see some stunning examples of how exotic conifers have adapted to the high country landscape and producing good timber. The day will encompass Lake Lyndon for amenity trees and beech establishment, Kura Tawhiti limestone outcrops, Castle Hill village and Flock Hill terraces and slopes.

After lunch at the University of Canterbury research station and Cass railway station, it is on to Cora

Day one Tuesday 1 April afternoon

Action group meetings - part one
Executive meeting
Evening free

Day two Wednesday 2 April

Action group meetings - part two
Councillors meeting
Annual General Meeting
Keynote speaker
Technical session
Awards dinner

Day three Thursday 3 April

Field trips morning and afternoon
Lunch at Amberley
Evening meal Hornby Club

Day four Friday 4 April

Full day field trip
Spit roast dinner, Omihi Hall

Optional day five Saturday 5 April

Full day field trip on wilding pines
Alternative field trips

Lynn, adjacent to Arthur's Pass National Park, to view impressive Douglas-fir being harvested. Then it is home via the 400-hectare Mt Barker forest, probably the only managed wilding forest in the country.

Conference programme overview

Above is the conference overview timetable. The full details will be available when the registration form is available. The conference base, including programmed activities unless otherwise stated, is the Commodore Hotel which is close to Christchurch airport.

Conference registration

This year, as you may have noticed, there is no paper registration form enclosed in the *Tree Grower* and there will not be one with the February issue either. Registration will be online only.

Programme details, including location and timing, will be provided in December via the NZFFA newsletter, email or post when the online registration form will be available. A reminder will be repeated in the February *Tree Grower* and by email. 🌲



The most rewarding cypress harvest in recent memory

Vaughan Kearns

It is human nature to look at our lives and point out where we could have done better. But in this story, I will cover the recent harvest of macrocarpa from Rangitoto farm, where everything appears to have been carried out the right way.

Denis Hocking is a farm forester of some renown. His father Gerald had a distinguished career in the New Zealand Forest Service. It was Gerald who was instrumental in establishing the Middle Districts Branch of the NZFFA and who started the relationship with macrocarpa at the home farm Rangitoto near Bulls. Rangitoto often translates as blood red sky and nicely reflects the summer evenings on the west coast of the North Island.

Exceptional logs

The cypress macrocarpa has an enduring and somewhat unfortunate reputation for being susceptible to cypress canker, an often lethal pathogen, but luckily not all macrocarpa are susceptible. What has been achieved at Rangitoto could be said to cover the selective tree breeding which has been carried out over the working lifetimes two men. Careful removal of inferior genetics over two rotations of macrocarpa has resulted in the superior seed lots which the Cypress Development Group are able to promote under the name of Rangitoto.

The recent harvest of mature macrocarpa from the sand country of the Manawatu has produced some exceptional logs. This has only been possible with the diligence of the Hocking family in tree selection and silviculture. For trees to have good genes is a fine start but thinning and pruning on time has resulted in 44-year-old logs in the peak of condition.

Economic conditions for the new owners, after the retirement of Denis, has led to the harvest of almost all the cypress on the farm. Some of these were perhaps grown to the perfect size, while others probably could have been grown for a bit longer.

Leyland cypress

Leyland cypress is a hybrid of macrocarpa and *Nootkatensis*. It takes its name from the place where it

emerged, as an accidental cross on the Welshpool Estate of Leighton Hall in Wales. Leighton Hall was run as a model farm and came into the possession of John Naylor and then his son Christopher Naylor who lend their names to the hybrid cypresses Naylor's blue and Leighton green. The history of the family and the estate itself make fascinating reading.

The Leighton green hybrid cypress grown at Rangitoto had reached the age of 30 when they were harvested in May this year. They were growing on a west facing dune and a few of the trees were showing signs of toppling after adjacent trees had been previously harvested.

The timber of Leighton green is paler than macrocarpa but there is anecdotal evidence that it has even more durability than macrocarpa due to the durability of its other parent, the Alaskan yellow cedar. These trees had not reached the larger diameter of the macrocarpa. As a result, the end use for the timber will be mainly as weather boards which can be used unpainted and without any chemical treatment.

Cypress cream

The cream of the crop was the 44-year-old macrocarpa, many of which had reached a height of almost 30 metres each producing three good sawlogs. Their stocking rate was a generous 200 stems a hectare and they had grown at this density for almost 20 years after a thinning harvest was undertaken at age 25. The diameter at breast height averaged 77 centimetres. The largest log came from an edge tree which had the benefit of its roots well inside the fertile soil of the adjacent pasture paddock. This tree, pruned to six metres, produced sawn timber using the portable mill of Richard Thompson.

Most of the clearwood from the pruned butt logs will go towards joinery for window reveals, staircase balustrade and door panels. Other uses will include free standing or built-in furniture. There is also a developing



These 44-year-old trees produced excellent sawlogs



Good genetics produce good trees like this 28-year-old macrocarpa



Quality logs from the 44-year-old macrocarpa



Logs such as these are easily worth \$300 to \$400 a tonne



Large clearwood beams 500 mm wide for the Carving School in Rotorua



Macrocarpa with grain and colour variation difficult to find in other species

market for Maori carving timber in areas where large dimensions of totara timber are unavailable.

The 1996 cypress trial

Although the one-hectare site of the 44-year-old trees made up the bulk of the volume from this harvest, there was another area of 28-year-old trees which also had to be harvested.

These trees were part of a fairly extensive cypress trial run by Scion, along with seed lots from cypress stalwarts such as Shem Kerr and Rodney Faulkner. These trees could have been allowed to grow for a bit longer, but harvesting was an opportunity to collect seeds from the best examples, as well as the useful sawlogs. In this area of the farm the inferior genetics of the poor performing seedlots had been weeded out, either voluntarily or with the aid of a chainsaw.

The harvest of these 28-year-old trees will provide some clearwood if sawn carefully, but the majority of timber from these will find its way into uses in house building such as weatherboards, soffit timber, framing and interior panelling. Sadly for Scion, I have to report that all of their selections were weeded out fairly early in the rotation and ended up as firewood due to cypress canker and distinct lack of form.

Productivity

There is still some work to do to discover the value of this harvest. The real numbers will become clear when the milling and grading is complete. However, in terms of log volume, there were 341 tonnes of saleable logs which left the property and a further 16 tonnes which left as firewood. Most of the logs sold at around \$300 a tonne with some as high as \$400 a tonne for the pruned butt logs, which came to total of well over \$100,000.

It would be fair to say that the sand country on which these trees were growing was impoverished, but it would also be fair to say that the grower of the trees was not. Unfortunately, because there was a radiata pine harvest under way at the same time, using the same logging equipment, it is not possible to tease out the exact log value per hectare for the cypress and subtract the logging cost. However, it is easy to say that a good time was had by all.

Where to now for macrocarpa?

There is a steady demand for naturally durable macrocarpa in New Zealand. There is also a ready acceptance of the lesser grades for rustic furniture, garden sleepers and corral style fencing. This normally comes from farm windbreak or hedgerow trees.

Plantation grown woodlots such as at Rangitoto provide timber which competes at the top end of the building market alongside kwilla, cedar, oak and redwood. The export potential is untapped and will not be for the next 40 years until planting at larger scale begins. Growers need to understand they probably cannot expect a cypress harvest in their own lifetime. But I expect that half-grown forests and woodlots will continue to increase in market value as modern inventory methods make it possible to determine the potential volume and value of well-maintained cypress in the future.

If you want to know more about macrocarpa, contact the Cypress Development Group at the email address below. We will be producing carefully selected seedlings for the 2025 season and beyond. If your seeds are labelled Rangitoto you can be sure that you are on to a winner.

Vaughan Kearns is a mainstay of the Cypress Development Group, email ruapehusawmills@xtra.co.nz 🌲

NZFFA Conference North Canterbury

Tuesday 1 April to Friday 4 April 2025

Put these dates in your diary. The field visits will be hosted by past winners of the South Island Farm Forester of the Year, including the full day visit to the high country on the optional Saturday.

The conference will be based at the Commodore Hotel which is close to Christchurch airport. Full details will be available in December. 🌲



Umbrella pine A remarkable tree

Mark Belton

Umbrella pine *Pinus pinea*, is also known as stone pine or pine-nut pine. Unfortunately, it is excluded from the Emissions Trading Scheme because it is classed as a horticultural crop.

The exclusion of umbrella pine inhibits planting this tree species in New Zealand. However, a request has recently been made to the government to review the exclusion of umbrella pine from the Emissions Trading Scheme.

The exclusion is based on guidelines which exclude orchard tree species, which includes umbrella pine on the basis that it might be grown for production of pine nuts. The anomaly deepens because there are over 100 pine species in the world, of which about 20 produce seed kernels eaten by humans, and all except umbrella pine can be registered in the Emissions Trading Scheme.

Many benefits

The umbrella pine's main virtue is its effectiveness for carbon sequestration. The tree lives a long time and has heart wood with exceptionally high carbon density. Spain, Portugal, France and Italy, which collectively have 75 per cent of the world's umbrella pine, have submitted it for inclusion under European Union forest carbon accounting.

Umbrella pine also has a raft of other positive attributes that warrant consideration. The trees can live for between 200 and 300 years and grow to be quite large, more than two metres in diameter and 35 metres tall. Unlike most pines, they are prized for appearance and they are the pre-eminent tree in some of world's most valuable real estate, such as the Mediterranean coastal resort areas.

They are also valued for traditional agro-forestry and used for the dense durable timber as well as for biofuel, charcoal and biochar. Umbrella pine is exceptionally hardy, tolerating degraded soils, extreme drought and salty winds although they also thrive in high rainfall of up to 1,000 mm a year.

As a result, the pine has value for coastal dune protection and soil conservation planting. Overall, it has much to offer for integrated sustainable rural land use. However, its use by the farming sector, for coastal soil conservation and climate adaptation purposes is being constrained because, as outlined above, its carbon value cannot be realised.



Distribution

Umbrella pine is endemic to Spain and Portugal and widely distributed from ancient planting across coastal Mediterranean and the Black Sea. It is now grown world wide due to it being very tolerant of arid coastal climates and poor soils. In New Zealand it can grow well on coastal sites from Northland to Southland, as well as in dry and cold winter climates such as Alexandra in Central Otago. Up to 1,000 hectares is estimated to have been planted in New Zealand where the opportunities are mainly within farms and lifestyle properties as a multi-purpose agro-forestry species.

Land use benefits

For farmers and land managers there is a range of potential opportunities for umbrella pine, but the principal reason is near-term profitability which hinges on its recognition for carbon sequestration. Economic evaluation indicates that the rates of return, if sequestered carbon could be monetised, are higher than if solely based on production of timber or edible seeds.

Returns on carbon are very important. Modelling indicates an internal rate of return of around 10 per cent at 50 years for umbrella pine carbon plantations on low productivity land. In comparison, growing it for edible seeds only indicates a return of around five per cent.

Umbrella pine is initially slow growing and has high wood carbon density compared to radiata pine. It also sequesters more carbon than radiata pine in its heavy crown branching and massive root systems. It has significant root development with depth up to six metres and spread of up to 35 metres. It is also tolerant of degraded infertile soils, extreme drought and saline climate conditions. This makes it an important species for dryland hill country and for soil conservation



planting as well as for land slip stabilisation.

Wilding tree spread risk is a problem for many pine species. However, umbrella pine seeds have virtual zero risk of being spread by wind because they are large and heavy. With a tall, wide-spreading canopy, the tree creates a woodland environment providing forest floor grazing and partial shade and shelter for livestock. Shelter for animal health and wellbeing is increasingly important for livestock farming which makes umbrella pine an important option for providing animal shelter.

Timber use

Umbrella pine heartwood is naturally very durable and the timber is used for furniture, pallets and fruit bins. The wood also has high calorific value for biofuel, charcoal and biochar.

In Europe it is rated as having a particularly robust forest health profile. Mature woodlands have comparatively low risk of mortality from fire because it has thick bark which helps insulate living tissue.

Mark Belton is the Director of Emerging Forests Limited. 🌲





Machinery options for viable small-scale selective harvesting

Paul Quinlan

In 2022, and then again in 2024, the Northland Totara Working Group harvested a small volume of totara from a Pamu property in Northland. Both of the harvests involved single tree selection along with low-impact felling and extraction techniques. This was in accordance with the Sustainable Forest Management Plan provisions of the Forests Act 1949. The harvests used quite different-sized machinery. This has provided some opportunities for comparison.

The forest and sustainable harvest plan

The forest area in this project occupies a total of 27.7 hectares and occupies the steeper and rockier parts of one of the company's Northland farming units. Totara is the dominant species reflecting a lengthy influence of livestock grazing during the early regeneration phases

of the forest areas. Dense, almost mono-culture stands of totara are a defining feature, but there are smaller pockets of more advanced regeneration and some remnants with large trees. These provide opportunities to harvest a mix of larger trees and to production-thin among the pole-stands.

The approved Sustainable Forest Management Plan allows for a total annual harvest of 8.6 cubic metres – which equates to a harvest rate of 0.3 cubic metres per hectare each year. For practical reasons, several years of allowable harvest volume may be applied for in each logging plan. However, the actual harvest volumes are still small. In addition, the selected harvest trees are not all in a single group but spread across a localised area of forest. Frequent but small-scale harvest operations are a feature of such sustainable forest management plans and this has implications for harvest economics.



Selection forestry as stand improvement, production thinning to leave the best trees

Tree selection and forest management

In both operations the harvest was mainly used for stand improvement using production thinning. This means a single-stem selection process, with the focus on removing poorer but still merchantable trees to the benefit of adjacent and better trees which are left to grow and become even more valuable. It is the opposite to taking the best trees and leaving the rubbish. In practice, these harvests were a mix of production thinning of poor, dead or damaged trees and selecting some large trees of reasonable quality so that there was some higher value timber to sell.

Avoiding damage to the forest during felling and extraction was important for tree selection. Harvested trees were generally within 50 metres of the forest edge and where a machine could gain access from the adjacent paddocks.

Harvest volumes and mean log sizes					
Year of harvest operation	Number of trees and logs extracted	Mean diameter at breast height	Mean log length	Mean log volume	Total volume harvested
2022	20 trees 22 logs	40.5 cm	5.7 metres	0.71 cubic metres	15.72 cubic metres
2024	10 trees 10 logs	63.83 cm	8.3 metres	2.34 cubic metres	23.4 cubic metres

Agricultural tractor and winch

The first harvest, in February 2022, generally targeted smaller trees so we had the opportunity of using lightweight machinery. Contractor Li Legler was engaged to carry out the harvest using a 45-horsepower agricultural tractor with a forestry winch driven by the power take off. The winch had a maximum pull capacity of four tonnes.

This type of extraction equipment is commonly used in many European forests, but even by their standards the tractor and winch used here would be considered very light. Professional foresters in Europe would usually

have winches with a six to nine tonne pulling capacity or more, and larger forestry tractors often around 95 horsepower.

The tractor arrived on the back of a flat-deck truck. This was backed off using ramps and with the winch already mounted on the three-point linkage, was immediately operational. The tractor worked from the paddock close to the fence and did not enter the forest so no tracks were necessary.

Due to the spread of trees to be removed, only one to three trees were felled and extracted at a time before the tractor needed to be moved to a new winching position at the edge of the paddock. The wire rope was run out under the bottom wire of the old post-and-batten fence. The adjacent post staples were removed to enable the wires to be propped up so the logs could be pulled underneath and through the fence line. There was minimal damage to the fence but some reinstatement and re-stapling was necessary.

Competent directional felling avoided hang-ups and minimised damage to the surrounding trees, although at



A 45-horse power tractor with winch on a power take-off



Tractor arriving on the back of a light flat-deck truck



Logs taken a short distance across the paddock from the harvest area

times snatch blocks and the winch were used to make sure the trees fell in the most appropriate direction to avoid damage to the forest. Snatch blocks were used to winch logs on the least damaging path. Logs were also moved or rolled with a cant hook to get past obstacles or trees.

A skidding cone made from a mussel buoy was used to avoid snagging logs on rocks, roots or stumps. One potential crop tree was damaged when a log rolled while being winched, but the forest is well stocked with good crop trees and overall, a low-impact harvest was successfully carried out.

Advantages with the light-weight machinery include

the minimal costs for transporting the tractor to site and the low cost of the plant and its running costs. This enables more time to be spent for a sensitive harvest, such as using snatch blocks.

Using a tracked skidder

The second harvest in February 2024 involved some much larger trees. One tree was dead but still standing, with a diameter at breast height of 100 centimetres and 12 metres from ground level to the first crown of branches – the clear bole. Other live trees included several with diameters between 75 and 95 centimetres, and with an approximate log volume of between 4.2 and



A 12-tonne DH4 winching a totara log from the paddock edge

Operational harvest costs for on-farm milling site

Year of harvest operation	Total harvest volume	Felling and extraction	Forest management	Combined costs for mill site
2022	15.72 cubic metres	\$153 a cubic metre	\$140 a cubic metre	\$293 a cubic metre
2024	23.4 cubic metres	\$115 a cubic metre	\$160 a cubic metre	\$275 a cubic metre

6.5 cubic metres. They were all on steep terrain beneath the adjacent paddocks.

These logs were too large for the small tractor and winch. Tom Harrison's Future Ltd were engaged and used a 12-tonne DH4 tracked skidder with a powerful winch. The machinery did not need to go into the forest. The fenced was cut in several places and the skidder stayed on the paddocks and used the winch to assist with directional felling and extract the logs. Top logs were not cut from the butt logs, and despite the steep land, the equipment managed to pull the whole logs up and out without even damaging the log ends. Once again, a low-impact selective harvest was carried out by an experienced crew.

Felling and extraction costs

The table above sets out a summary of various costs associated with each harvest. Felling and extraction includes getting the logs to an accessible site on the farm for a portable sawmill, but within a few hundred metres of the harvest area.

The costs associated with forest management include –

- Preparing and submitting an annual logging plan to the Ministry for Primary Industries
- Site visits and harvest planning with the contractors, manawhenua, Ministry for Primary Industries, forest inspectors, farm manager and land owner
- Tree selection
- Record keeping during and after harvest
- Milling specifications and some early timber sales.

The prices in the table above do not include GST, the cost of obtaining the original Sustainable Harvest Management Plan, the land owner's time or any milling costs.

Timber sales

Both harvests had timber sales arranged before the harvest. Some timber was milled to order and sold green off the saw, for between \$2,000 and \$3,500 a cubic metre which covered the harvest costs. The remainder of the timber was milled and filleted to air-dry for later sale. This timber provides a profit above the costs of production.

Comparisons and conclusions

It is interesting, even if not quite fair, to compare the harvest costs between the two operations. The 2022 harvest involved much smaller trees, more trees and logs and therefore more handling per cubic metre. The bigger machinery used in 2024 may seem to be more cost effective from the figures shown in the table. However, it is not clear whether the larger skidder could have carried out the 2022 harvest any more cost effectively than the smaller agricultural tractor and winch.

What is known is that the lighter machinery proved to be satisfactory and economically viable. However, for the heavier logs, the heavier machinery was definitely needed although the heavy wire rope discourages and limits the use of snatch blocks for redirecting logs during extraction. Matching equipment to the work required is arguably the main experience.

These harvests demonstrated that small-scale, low-impact, selective harvesting, can be carried out and be economically viable. This is probably the most relevant point for farm foresters.

Paul Quinlan is part of the Northland Totara Working Group. 🌲

NZFFA Conference North Canterbury

Tuesday 1 April to Friday 4 April 2025

Put these dates in your diary. The field visits will be hosted by past winners of the South Island Farm Forester of the Year, including the full day visit to the high country on the optional Saturday.

The conference will be based at the Commodore Hotel which is close to Christchurch airport. Full details will be available in December. 🌲



The contribution of trees to carbon neutrality using a farm forestry case study

David Scobie, Michelle Barry, Craig Trotter and Jorie Knook

The Great Pyramid of Giza was not built quickly. It took time and planning. The Pyramid farm in the Waihopai Valley, 30 kilometres south west of Blenheim, may not have quite the same length of dynasty but the farm has been through succession, development, succession, expansion, further development and some land use change. No doubt it will go through further cycles.

The Pyramid farm

Chris Dawkins returned home from a course about wool at Massey University and began a farming career in the early 1970s, the same time at which he started planting trees. That is somewhat fortunate because wool has seen a sustained decline while wood has had some ups and downs but is currently on a growth trajectory. It is important to note that being a non-perishable commodity, you can be strategic when choosing a harvest date for trees.

The farm sits at the confluence of the Tummil, Avon, and Waihopai rivers. The total area of the property is

602 hectares, with an additional 40-hectare lease block closer to town. The remainder of the farm is mostly in a river gorge, which is registered as a QEII Covenant and significant natural areas. This native vegetation has been allowed to regenerate along the riparian areas to stabilise soil, improve water quality and create an eco-corridor for biodiversity.

There are exotic softwoods planted from around 1980 with macrocarpa that date back to 1985. Blackwoods and honey locusts were planted from 1989 with eucalypts, oaks planted in 1990. Around that time a case study by the Forest Research Institute, now Scion,



was conducted by Leith Knowles and suggested that 10 per cent of the farm could be planted in trees without compromising animal production.

Following this advice, planting has steadily increased. Radiata pine planted in 1991, 1992, 1995 and 1998, have been harvested or are due to be harvested in the near future. Other planting of pine from 1994 to 2023 is spread across the farm with forecast harvest dates out to 2053.

There are now almost 80 hectares in radiata pine, but also a wide range of other species, including exotics in permanent woodlots. They include hundreds of poplars planted on once erodible areas, still grazed but after 20 years no slips can be seen. A notable entry is the recent retirement and planting of a 10-hectare wetland and a steep five-hectare bank. These areas are predominantly planted in native podocarps, with a vision of creating a landscape similar to that of hundreds of years ago and with no intention to harvest. This extends well beyond Richard Dawkins's farming career, the current custodian of the Pyramid.

The economics of the farm

Despite the huge commitment to forestry, biodiversity and recent vineyard developments, the Dawkins' think of themselves as sheep and beef farmers. By targeting the least productive areas of the farm and providing shade and shelter for livestock and reduced wind over pasture, the Dawkins' are confident that animal production has improved rather than suffered. The Pyramid is widely known for innovation and improvements in sheep farming, with a highly productive composite ewe flock, integrated with dairy beef and Jersey bulls.

The farm has approximately 1,100 ewes lambing at 150 to 160 per cent and 350 wintering ewe hoggets lambing at 90 to 100 per cent. About 1,900 lambs and hoggets and more than 300 ewes were sold in the year July 2022 to June 2023.



Wool was once a premier earner for the Pyramid, totalling 65 per cent of gross farm income in the early 1990s. However, this has changed significantly over the last decade. Last year, shearing costs were \$14,000 and 7,000 kilograms of wool sold for just \$9,500. This was under two per cent of the gross farm income for the livestock enterprise. Currently, cattle are integral to the farm and a herd of Jersey bulls are very efficient at converting low quality dry matter into income.

Only 328 hectares is grazing area on the home farm, 25 hectares of holding paddocks and laneways with 115 hectares of trees. Ironically, the Pyramid did not stand still over time, and 116 hectares of the farm is now planted in vineyards – a land use Chris did not envisage when he embarked on his farming career. Some of the pines were felled to raise capital to plant the vineyards, where two hectares of harvested pine each funded a hectare of vineyard development. The felled areas will return to forest for another rotation. Planting somewhat overshot the suggested proportion of area to where 19 per cent of the land area is currently in trees.

Carbon modelling

Lincoln University researchers entered all the data on livestock and forestry into the Farmax modelling package and used the new module to estimate the amount of greenhouse gas emitted by the livestock and the amount accumulated in the forests. The forests were estimated to sequester 1,710 tonnes of carbon dioxide from the atmosphere between July 2022 and June 2023. The livestock were estimated to generate 888 tonnes of methane, 220 tonnes of nitrous oxide and 6.7 tonnes of urea hydrolysis.

The methane and nitrous oxide production are presented as carbon dioxide equivalents, the unit of measurement used to standardise the climate effect of various greenhouse gases. The figures suggest the forests are sequestering 595.8 tonnes more than the sheep and cattle are releasing. This is on par with other estimates for other farms which incorporate trees. Around 10 to 16 per cent of land area in trees is sufficient for carbon neutral red meat production.

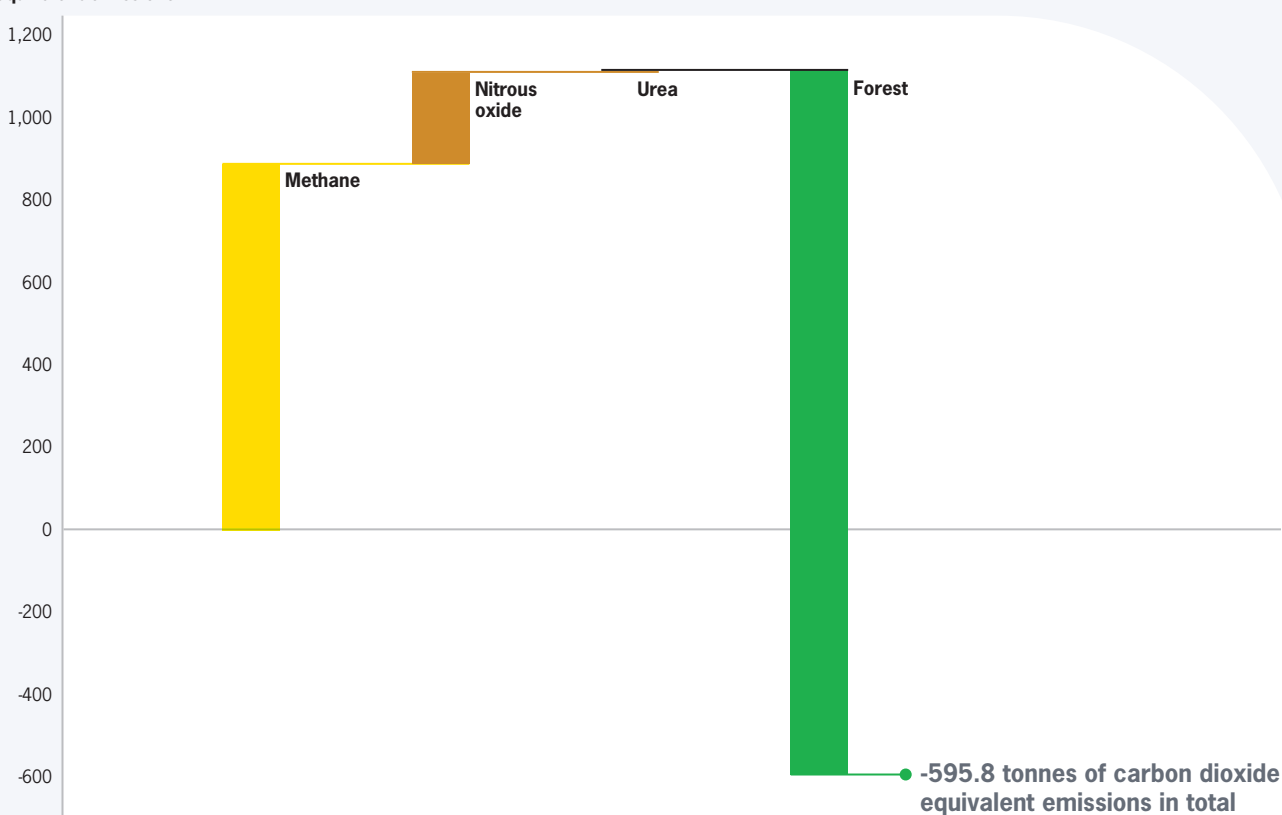
Grazing among trees

A Farmax model is just that, a model, an attempt to understand all the complex interactions where beef grazing adds to the sheep enterprise and vice versa. One and one do not make two in the complex ecology of farming but the model does its best to reflect that one and one always make two for a computer. The modelling notes that grazing areas are grazing areas and forest areas

Estimated farm emissions and forest carbon sequestration rates

Farm emissions		Carbon sequestered	
Methane	887,962	Forest	1,701,501
Urea	6,682		
Nitrous oxide	220,029		
Total emissions	1,114,672	Total sequestered	1,701,501

Tonnes of carbon dioxide equivalent emissions



are not grazing areas. Research tells us that agroforestry is possible without too much compromise to the trees, but on the Pyramid, forest areas are mainly ungrazed forest areas.

In reality, you cannot let a bull loose in a young pine forest, but when the north winds blow and Marlborough dries out, the feed becomes short. It is under those circumstances when store lambs can be allowed into young forest plantations to reduce fire risk and eek out some forage. Vineyards grow grape vines, but between April and September the grass between the vines is also grazed by hoggets, bull calves and then lactating ewes.

This case study is just one year of many, a snapshot. After the clear felling of four areas planted from 1991 to 1998 there will be dramatic changes to the amount

of carbon sequestered. However, with the large area of Pyramid covered in trees carbon neutrality may be maintained.

Planting and silviculture require resources and without proper care, like any crop not cared for, trees could fail. Small patches and blocks scattered across the farm and across time make more sense. It took time and planning to build a carbon neutral Pyramid.

David Scobie is Senior Lecturer in the Department of Agricultural Sciences, Craig Trotter is Lecturer in the Department of Land Management and Systems, Jorie Knook is Senior Lecturer in the Department of Land Management and Systems and Michelle Barry is Research Assistant and PhD student in agro-ecological economics, all at Lincoln University. 🌲



Planting and growing a pine forest

Revenue not the main aim

Rhod Lloyd

Oikoumene Forests, the company I worked for, was a fencing materials company in Helensville just north west of Auckland, milling fence battens. They decided to buy 100 hectares of sand dune country on the South Kaipara Head which had been cleared from mature kanuka then grazed by deer and later cattle. Apart from some dry north-facing slopes, there was a good fertile topsoil under kikuyu grass.

In 1993 about 10 hectares was planted with radiata pine. My boss Ernie realised that planting the whole area was going to take more time and money than was available, so he asked me if I was interested in planting a part of the land.

In May 1994 Ernie, along with his wife Christine, and I had a meeting to plan the idea and a few days later we looked at two blocks at each end of the 100-hectare farm. I chose the 10-hectare block at the northern end because it had a boundary deer fence and had just been heavily grazed. A forestry right agreement for the joint venture was discussed, but as the planting season was near, a gentleman's agreement was made so that I could start preparatory work for a July planting. A forestry right agreement was later drawn up on a 35 per cent to 65 per cent split of revenue.

Collecting the seeds

The previous winter I had researched growing radiata pine seedlings and collected cones from five trees thinned from Ernie's forest at his house in Helensville. I sprayed an area at the top of our garden and had a local contractor rotary hoe 200 square metres for a nursery and house garden.

A soil test indicated a light dressing of granular slow-release general fertiliser worked into the soil was all that was needed, but queried whether the site had ever been inundated by sea water. We are seven metres or more above the tidal Kaukapakapa river half a kilometre away and 13 kilometres from the west coast surf beach but there was an indication of salt drift from the sea. I manage to raised 1,500 trees from the seeds I had collected.



Nursery from seeds collected locally



Sprayed spots planted with a mix of purchased and home-grown GF 16

Planting the trees in 1994

On the south side of a ridge there were patches of manuka regeneration a metre or so high. I cut this, stacked it in rows up the steep bank, obtained a fire permit and burnt it to prevent it blowing over the site when dry. Early in June I spot sprayed with glyphosate, at three metres by two metres, using sight poles to get straight lines to help finding trees when release spraying later. I had experience in the past searching for tree seedlings in long grass.

I bought 5,000 of the GF16 seedlings from Manu Mountain nursery near Whangarei in two lots a week apart because I was doing all the work myself. Planting in the sandy soil was easy although keeping a straight line across the slope not so easy where the spots were indistinct. The home-grown seedlings were planted in the first five rows up the north boundary and grew similar in form to the bought trees.

Planting on the dry north side of the ridge I found some patches where rain had not wet the sand, it was still powder, so I scooped out hollows to trap water. The 100 mm of rain at the weekend had only sunk in a few centimetres.

A mixture of seeds

Planting four hectares was finished at the end of July and I built a temporary fence so the rest of the block could be grazed. The end of 1994 was a drought and at New Year what was left of the grass on my block was pale straw and I lost 1,200 tree seedlings on the north side of the ridge but only the odd one on the south side.

As expected, once the rain started the grass and

annual weeds grew rapidly on the south side and flat areas. I found the best control was hold the tree with a forked stick and tread the weeds flat around it. On the flatter areas I again held the tree back with the stick and sprayed glyphosate on the trampled weeds in two half circles. This was carried out in early June and at the same time I spot sprayed the dead trees along with a further hectare or so for 1995 planting.

Growing my own seedlings had been a success, so I bought GF 16 and GF17 pine seed from Proseed and in early October 1994 I sowed 4,000, expecting to get 3,000 good seedlings, but actually grew 3,250. Planting was at the end of July and early August. The benefit of growing my own seedlings was that I could dig them up in the evening or morning I was going to plant them to coincide with rain.

I needed more seeds to plant the next four hectares and finish the block and planted another 4,000 seeds in October 1995. Half of these were from the previous year but there was little difference in germination. I bought 2,000 more seedlings from Manu Mountain to finish the area. I had left the most fertile and easy contour ground for this year because I was planning on running the 9.5 hectares as one class.

New resource consents

Late in 1995 the Rodney County Council proposed that future significant tree planting would require a resource consent to avoid spoiling view corridors. They produced a map showing areas that would be affected, including our land. The snag was that if the proposal passed it would become binding at the proposal date,

not when approved.

Public submissions were sought, and as my 1996 planting stock was growing I wanted to finish the block. The thought at the time was that if I was so against the proposal I should elect to speak to my submission. Ernie, the land owner, although a good speaker, elected me to represent his interests as he also had land to plant that year. Hearings were to be at the council head office in Orewa over two days and I made a presentation on the first day with a late afternoon slot.

While waiting for a start I talked to the Carter Holt representative who had a multi-page submission, and I said that my simple submission was insignificant beside theirs. He said that a submission was expected from them, but mine would be taken more seriously as I was representing small land owners who did not want councils dictating their land use.

The proposal was not upheld when subsequently re-presented to council. The area I was planting that year only had one corner visible from outside the fence and road, so I had decided to plant whatever the result.

Pruning

I started form pruning the first planting winter of 1996, mainly double leaders or damaged trees. Because I had the time and wanted as small a diameter over stubs as I could get, I decided to prune all trees annually to a 100 mm stem diameter rather than the three lifts usually carried out. This was mainly because my winters were the easier time and left the rest of the year for milling work.

I decided to prune all the trees because I wanted to leave the first thinning as late as I could to keep branch size as small as practical. With the trees between seven and nine years old, crop trees could be outgrown by surrounding unpruned trees. A neighbouring farmer was given the rough grazing free of charge on the understanding that he put the cows in early winter before I wanted to prune. Pruning all trees allowed more grass growth, and made the thinning work easier.

Most of the block was thinned in 2003 for posts, from 1,500 trees a hectare to about 550 a hectare. A total of 225 tonnes of peeled posts were recovered. The last high pruning to 6.5 metres was completed in 2004. A second thinning was completed in 2009, from 550 trees down to 375 a hectare with some areas thinned to waste.



Final pruning in 1995 after first thinning



Peeling posts from the first thinning



Harvesting in 2023

Ernie harvested the land adjoining my block when the trees were 25 years old, mostly for export, and some pressure was put on me to harvest mine. However, I did not want my pruning effort to go to waste and I had planned on harvesting when the trees were 28 years old.

Three years later the logging contractor and crew were to harvest another 40 hectares about a kilometre up the hill from my trees. To save the cost of building two roads for truck access it was decided to use a forwarder to carry the logs to trucking points, one being near the gate to my block. This work started in April, just after the log prices dropped, but it was agreed to continue.

Shortly after starting the harvest, the consultant asked if I wanted them to cut my trees when they were finished, which would be about September or October. I said I was interested, but concerned about the prices at the time. By August prices were creeping up so I agreed for them to go ahead.

Skid sites

The plan had been to put a skid site 200 metres inside my trees, but the contractor asked if he could put a skid site to handle both cuts, which involved clearing a site 50 metres inside the gate beside a formed logging road. This would involve felling all trees within one and a half tree lengths of the skid, so a two-level skid was made.

Apart from the skid site only a few loads of mine went out at the end of October. November saw a rise in the prices when most of my logs left, with a special cut of the best pruned logs sold domestically at a good rate. The last logs left the first week of December 2023.

Payments were made promptly at the end of the month for the previous month's weigh dockets. A payment \$2,000 was held back to cover an Auckland council environmental inspection. The council were late in invoicing for the January inspection and I only received the balance early in June. All my block was on old west coast sand dunes, no waterways, so the contractor and I were given an 'A' assessment.



The decision to harvest my logs was influenced by –

- The availability of the contractor to start.
- It needed to be done because the trees had reached the planned harvest age
- The gear was already on site at a cost of about \$15,000
- The future of log prices did not look promising
- The February cyclone had resulted in a dozen trees on their neighbours, and I did not want to risk another cyclone.

Do it the same again or differently?

Ernie, a forward-looking forest owner, died in May 2021 aged 90, working up to the last few years of his life. My thanks to Ernie for the opportunity, for his help, and after his death to his family for a successful completion of the forestry right. At the start Ernie and I agreed that revenue from the project was not the main result we wanted.

I have to commend the Auckland Council Rodney Ward for their road maintenance. When Oikoumene Forests’ work was notified, the 6.5 kilometre unsealed road was graded and metal added where needed, and potholes filled. For the nine months over winter, the road had eight truck and trailer units five days a week, as well as ancillary and local traffic. The surface remained

better than it usually was and has been since.

I think all forest owners have been worried by local authorities wanting to impose a special rate on forest land for public road maintenance. It was talked about here, but nothing was ever done.

Beware of the Emissions Trading Scheme and carbon credits because these can seriously affect your ability to manage your land. What seems like a good source of income now, can have financial implications should your circumstances change. Oikoumene Forests claimed the carbon credits for my 9.5 hectares and wanted to revert it to grazing, but that is not now financially viable. The legislation is obviously working as intended.

I had public liability insurance for the forest and extra cover for the harvesting. Both I and the insurer made sure that health and safety rules were followed throughout, I only visited twice during working hours and then by arrangement. I walked around and photographed after working hours and at weekends.

What would I do differently if I could start again? Mainly I would not keep bad form trees and would thin to waste all the poorly performing trees up to the first thinning because I had 1,660 trees a hectare to play with. I would still plant at a similar rate.

Rhod Lloyd is a long time member of the New Zealand Farm Forestry Association. 🌲



Plan, commit and secure your future harvest

Kelly Coghlan

There have been plenty of market reports published over the last six months with a general negative message to forest owners about export log markets being over-supplied, especially China which is our largest log market. Forecasts are that prices are unlikely to reach the highs we have experienced in the past as export customers continue to use price to control supply.

Export log prices have improved slightly, with a minor seasonal rise in sale price, falling shipping costs and a more favourable exchange rate. It is difficult to predict if we will see any more improvement on export prices, or how long these prices will remain.

The recent closure of pulp mills and sawmills blames increasing costs of electricity as the major factor, which I am sure made a contribution. However, the position of the current and future markets is a serious concern because there are processing plants operating at reduced production due to reduced demand and weaker prices. In addition, another major factor to consider will be the capital investment required to maintain and upgrade existing processing plants.

The last six months became the final nail in the coffin for many harvesting contractors especially those involved with small-scale owners. They have either been stopped or placed on heavily reduced production volumes which is not sustainable on current rates. Discussions with many seasoned contractors is concerning as many have decided to lock up the chainsaws and hang up the boots.

The reasons include increasing regulations, lack of quality staff, along with increasing capital investment pressure in improving and maintaining plant and equipment. Compounded with these is the lack of contractual integrity from forest owners and managers towards contractors which died with the Forest Service. No other industry operates where contractors can be shut down without warning.

Future demand for logs

As long as logs continue to be traded as a commodity, with prices set to suit the process, there are some serious fundamental changes developing which need to be considered. These changes are going to have a serious effect on the future value of raw logs.

In the 1990s Korea was the main export market for New Zealand logs, but in the same way that Korea urbanisation slowed, the demand for logs China is trending the same way. While there has always been the suggestion that India will be the next emerging market, not much has evolved over the last 20 years. However, recently there has been some increased interest in India as the slowdown in China continues.

Another consideration is the reducing demand for lower-grade export logs, those such as KI and KIS grades. These grades can represent 15 to 20 per cent of the harvest and the alternative options such as pulp, firewood or biofuel, are not very good value. Depending on the forest location there are limited domestic market options for lower grade logs and generally the domestic processors only want pruned and high-quality sawlogs.

The future supply

If we are to achieve any price stability, future log harvests are going to have to match the demand. This will be difficult as the current planned national and potential cut, especially over the next five to eight years, is likely to be greater than the demand.

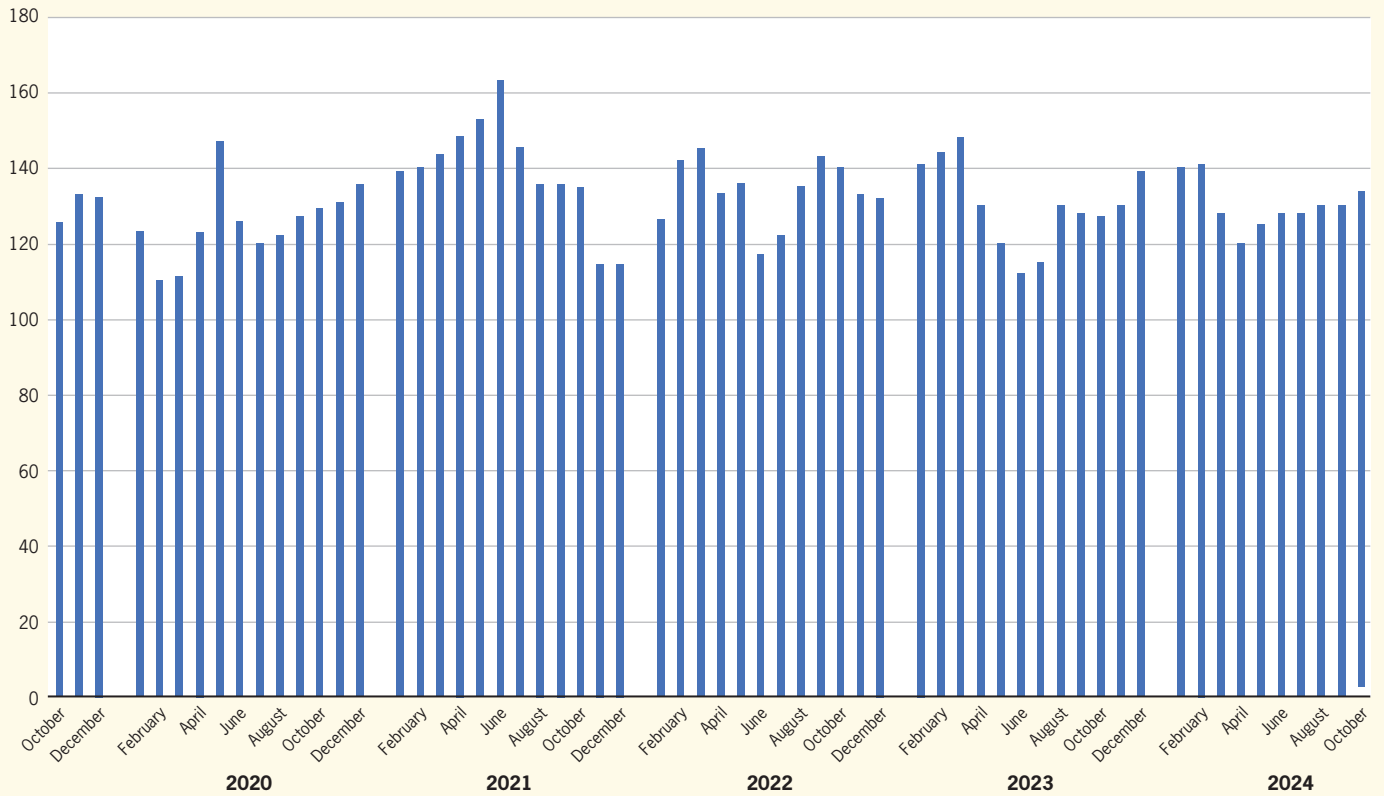
There is a real danger that small-scale forest growers operating near regional ports will have to compete for market share and on price. There are two main supply sources, the central North Island corporate owners and small-scale owners. Both sources will compete in the future for market share. Many exporters operating at ports are expecting a declining demand so it is possible that we will also see fewer exporters in the future.

Market outlook

Prices have rebounded slightly in October, which is the first real rise since April. The shipping rates are weaker and the exchange rate is more favourable. The improved sale price is a possible seasonal factor, although the

Five year composite export and domestic log prices

New Zealand dollars per tonne



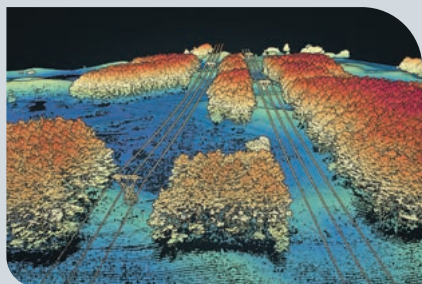
Chinese government have announced a stimulus package to kick-start the property market. In other markets, Korea is steady and India somewhat over-supplied. The graph above highlights the composite price of all log grades combined, highlighting the last six months being the longest flat market period.

The table below highlights the composite annual prices showing that the market has remained flat over last five years. If you add to the mix the increased costs experienced over the last two years, forest returns remain under pressure.

It may seem that I am preaching the same message but it is becoming increasingly critical that private forest owners need to plan, commit and secure their harvest to ensure the best possible results in the future. In addition, it is important that we support and protect the contractors and their staff to avoid heading down the same road as shearing contractors across regional areas. With regard to the Emissions Trading Scheme and where the value of carbon credits are heading, I will leave any comments to others who know a lot more than I do.

Kelly Coghlan is Director of Taml forestry in Taranaki. 🌲

Log price averages				
Grade	Five year average	Three year average	One year average	Current
A grade	\$123	\$120	\$119	\$121
K grade	\$115	\$112	\$111	\$112
KI grade	\$105	\$101	\$98	\$101
KIS	\$96	\$93	\$90	\$93
Domestic	\$119	\$121	\$123	\$120
Domestic pruned	\$186	\$190	\$190	\$190
Export pruned	\$174	\$176	\$177	\$180
Composite	\$132	\$130	\$130	\$131



New research data projects for small-scale forest growers

Les Dowling

The New Zealand Farm Forestry Association is made up of a pretty diverse bunch. Everyone has a different story on how they came to be interested in trees. In my case, I became involved from my role as a forest researcher. Over the years I have worked with forest data and am particularly interested in how data and new methods can help run the numbers on trees to support or debunk new ideas for managing forests.

The path I have taken provides its own perspective. I think it allows me to see the potential benefits of some of the data-focused projects for owners of smaller forests. In this article I want to share my enthusiasm for some of the methods emerging from research programmes, particularly those focused on information and data and from the Precision Silviculture Programme led by Forest Growers Research. I hope it helps spread knowledge and enthusiasm for the projects and might spark some conversation about how growers and owners of smaller forests might use the methods being developed. It could also get some members to ask questions about these projects with the various research providers and programme managers.

The few projects mentioned below have included my view on how they might support growers of smaller forests. The small grower benefit is an angle not always focused on and I hope this helps people imagine how the methods in development could support the management of their own forests.

Tree tracking app and GPS planting spade

The tree and stock tracking app PlantIT is a mobile application designed to provide detailed traceability of trees from the nursery to the forest. In development the app allows nursery workers to scan unique GPS-linked identifiers on each box of trees as it leaves the nursery and at every stage of its journey, including delivery as well as by the planting contractor as they open and plant the contents of each box. The data collected from the process could be particularly useful for forest owners.

Another idea under development is a GPS planting

spade. This maps a point wherever a tree is planted. When combined with tree tracking, the spade provides an almost complete picture of the planting operation, showing where, when and what trees were planted. This allows forest owners everything they need to ensure the right tree stock is planted efficiently and at the right stocking rate.

When a planting contractor arrives at your forest with their staff to plant a block, a lot is happening and there is a lot to manage. The site will be bustling with activity as everyone works quickly to get trees in the ground. However, what matters is making sure trees meet the specifications for size and health, to be planted quickly after being taken from the nursery and in a way which ensures the roots are properly positioned. Normally you would rely on the contractor's foreman or forest manager to ensure everything goes according to plan.

Combining the results of the GPS spade and the tracking app could help the forestry professionals involved, but more importantly, it could provide the data you as a forest owner would want to know. Key questions include –

- Where did the trees come from?
- Were they from a local nursery or transported over a long distance?
- Do they have the genetic quality you expected?
- How long did it take from delivery to planting?
- Where were the trees planted?
- Does the data suggest even spacing and logical progression around the planted area with no gaps?

These are all questions that the data from these projects can answer while the planting contractor is still on site.

The photograph below shows a line of planters working through some difficult planting with blackberry to contend with. Data from the tracking project and GPS planting spade should provide information to help forest owners check how well the contractor has been able to maintain a consistent stocking even on rough terrain.

Tree detection methods

If you do not have an individual tree location at the time of planting, it is still possible to find individual trees later on. Using computer processing, the tree detection project aims to automatically identify trees from images which can be obtained by drones, planes or satellites. As the types and quality of available images continually improve, so does the precision of tree counts and the ability to identify trees earlier.

Usually, tree detection takes place a few years after planting when seedlings have grown large enough to be visible in the photographs. Higher resolution imagery and better weed control allow for earlier detection. While research is continuing to refine the process, there are already commercially available options once you have suitable images.

Without automatic tree detection, foresters rely on manually mapping the afforested areas. This involves using the same images but having a person draw around the trees in a mapping system. Manual mapping is still the most common method used today. This project aims to make mapping faster and cheaper while providing the precise location of every tree, enabling accurate stocking

estimates across the forest.

Pinpointing each tree is a game changer because it allows you to monitor survival rates, even in difficult areas such as weedy gullies or dry, exposed ridges. It also allows you to identify problem areas for additional management and in pre-planning future operations so you can estimate the cost on a precise basis for thinning and pruning. Beyond usual forest operations, this project could also be useful for registering forests in the Emissions Trading Scheme by providing quick and cost-effective mapping.

Spray drones

Release spraying is used to control weeds around young trees. The project on release spray drones has the potential to replace knapsack spraying as the main method for treating small or tricky areas, as well as potentially larger areas, using a payload of 40 to 50 kilograms and a flight time of an hour. Part of making drone spraying bigger and better is increasing precision, minimising chemical use and treating only the area around each plant. Combined with the tree detection project, drones can fly directly to each tree and apply chemicals based on pre-mapped locations.

Although this process is still being fine-tuned, there is significant potential for technological development. In the future, chemical doses could be tailored to each tree, and if I may dream a little, I believe this project could eventually support mixed species forestry. This could involve using more frequent, lower dose applications for sensitive species or even multiple drone passes applying



A line of planters working through some difficult planting with blackberry to contend with

different chemical mixtures for different species. However, these are probably outside the scope of the current project.

Using drones should already be the first choice for small woodlots near pasture or other sensitive boundaries where weeds have grown too high for efficient knapsack spraying or boundaries are too narrow and sensitive for a helicopter. Good forest management and planning should prevent this, but it does happen in certain circumstances. The technology will continue to evolve and we can imagine pre-plant spraying and post-plant release spraying being entirely managed by drones for any small forest areas near streams or the neighbour's boundary.

The photograph below shows a recently planted block. This block was sprayed by helicopter but would have been a perfect candidate for drone spraying and releasing. It is a small block at the back of the farm between grazing areas with sensitive boundaries such as the neighbour's pasture and with tall trees as obstacles for the pilot.

Battery power for pruning and thinning

Testing battery powered pruners and chainsaws was among the initial projects under the Precision Silviculture Partnership. Evaluation of battery powered pruners, usually used in horticulture, revealed potential improvements for forestry applications. The University of Canterbury is currently redesigning the pruning head. With development, battery powered pruners could become a viable option for contractors

wanting increased efficiency. They could also appeal to enthusiastic forest owners who prefer to prune without the strenuous forearm workout.

Testing battery powered chainsaws was also carried out but from a contractor's perspective they were found to be less suitable compared to petrol powered alternatives. However, they are another option which that is likely to improve. Lower noise, no vibration and the instant torque of electric motors, along with the convenience of not having to mix and carry fuel, just plug in a battery, is particularly appealing for those who are thinning small woodlots.

Thinning management in real time

Thinning is a crucial operation which determines how your forest will grow until harvest. Ensuring the correct stocking rate after thinning is essential and deserves a lot of attention.

The real-time thinning project is similar to the tree detection project but focuses on managing thinning operations. As with the planting information, the aim is to provide data on high and low stocked areas to plan operations and conduct quality control during the work. It involves using drones to measure tree location before and during thinning. This means chainsaw operators, forest managers and forest owners know where many trees need to be removed, where only a few need to come out and potentially how tall those trees are. This allows for better planning and progress monitoring in real time.

A significant advantage of this method is that it



This was sprayed by helicopter but would have been perfect for drone spraying

helps prevent the need for contractors to return when problems are found later during traditional quality control procedures. It keeps everyone informed as the operation progresses.

Forest data

Although not part of any current forest research programmes, various image and Lidar data sources are available for use with existing methods. Free high resolution aerial images can be found on council websites and at www.koordinates.com. Additionally, government funded Lidar data is accessible at www.opentopography.org with some recent data giving excellent detail.

For more detailed or specific needs, paid options are available, such as hiring specialists with drones or aircraft, or buying satellite imagery which can be surprisingly detailed and often quite cheap. Drones are a good way of obtaining real time information over small areas. The number of contractors with drone services is steadily increasing. Additionally, for those inclined to take it all on, there are operating procedures for using drones and analysing the data in the reports on the Forest Growers Research website.

The photograph below shows a lidar image downloaded from the website mentioned above. This shows the level of detail available for no cost from government funded Lidar programmes for some of the more recent information for anyone with a computer.

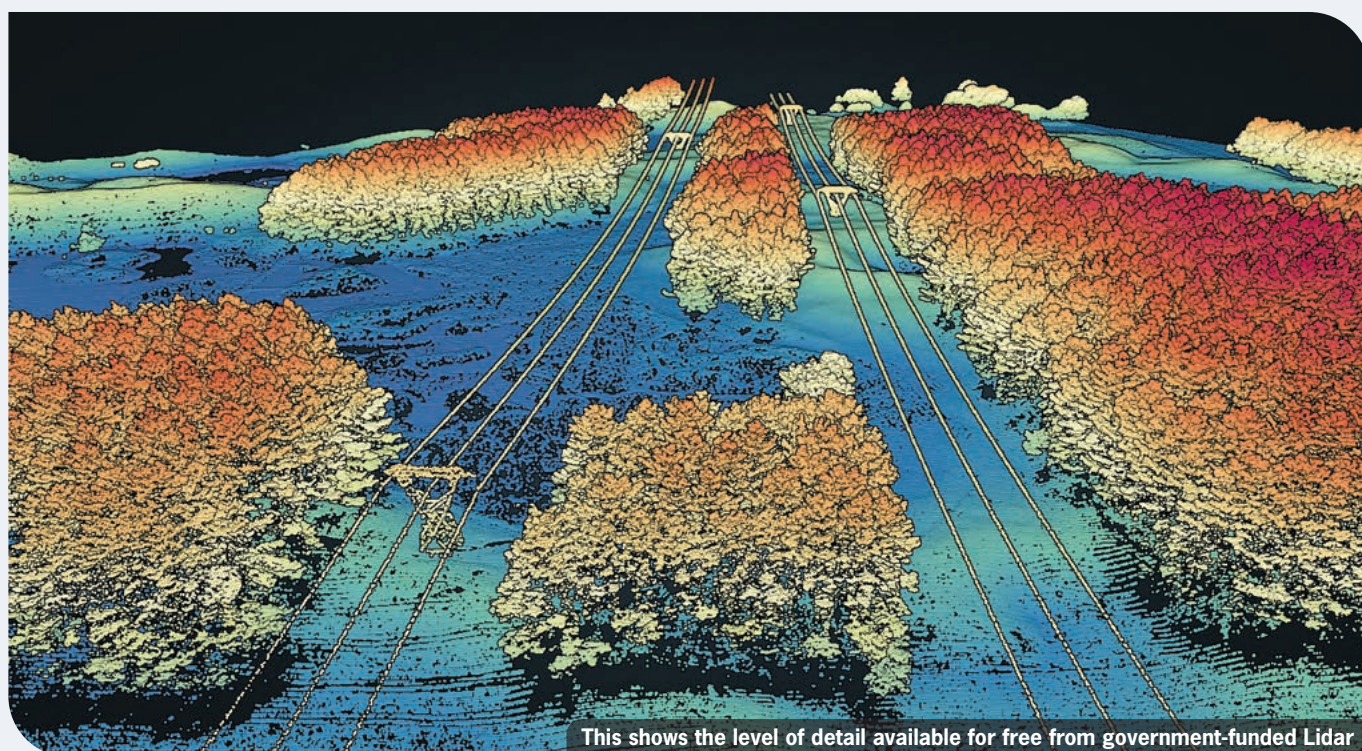
Final remarks

They say knowledge is power and these projects have the potential to provide just that. They could accelerate the flow of information, allowing owners of small forests to monitor their operations. However, this is not guaranteed. We need to be involved in developing these methods to ensure they are accessible and to develop the necessary skills to use them. Otherwise, we risk missing out on their benefits.

The Precision Silviculture Partnership has successfully used Forest Grower Levy funds with a Sustainable Food and Fibre Futures partnership grant. Now, two and a half years into a seven-year programme, it is time to get involved and upskill to maximise the benefits.

I hope this article has illustrated how these methods could support those who grow small forests and woodlots. I would encourage anyone interested who has not already done so to check what freely available imagery is available for their trees online and test some of it. The barrier, of course, is the learning curve. However, technology will continue to progress whether we are involved or not. The challenge is working out how to use and understand these methods so we can make the most of the research.

Les Dowling is a Research Consultant at M E Research. He is a member of the NZFFA Executive and is on the Forest Biosecurity Committee and NEFD Steering Group. 🌲



This shows the level of detail available for free from government-funded Lidar



The potential for a durable hardwood industry in Marlborough

Paul Millen, Euan Mason, Ning Ye, Clemens Altaner, Brian Cox and Harriet Palmer

In 2008 the New Zealand Dryland Forests Initiative was established at the Marlborough Research Centre as a tree breeding and forestry research project focusing on durable eucalypts. The aim was to substitute pine vineyard posts, which are treated with a compound of copper, chromium and arsenic, with untreated naturally durable eucalypt posts. Durable eucalypts are an opportunity to diversify for local dryland farmers and existing pine forest growers.

Over the past 15 years the focus has been on planting and assessing a network of over 40 breeding and research trials. Of these, 15 trials are in Marlborough, established with 11 land owners including forest owners, farmers and vineyard owners, the Marlborough District Council and Marlborough Regional Forests.

In 2020 the New Zealand Dryland Forests Initiative launched its aim for up to 60,000 hectares of durable eucalypts to be planted by 2050 in 12 regional wood supply catchments in northern and eastern New Zealand. This could create regional hardwood industries worth up to \$1 billion a year. Marlborough was identified as one of the regions where a durable hardwood industry would have potential.

New Zealand imports many millions of dollars' worth of hardwood every year, much of which could be substituted by timber grown here, including durable eucalypts. Logging in Australian native forests is becoming very restricted, with the closure of state owned eucalypt forests in Victoria and Western Australia reducing national supply by 40 per cent. This is a significant export opportunity for durable hardwood products.

The Marlborough regional case study

Marlborough's vineyards occupy over 31,700 hectares and use around 19 million radiata pine vineyard posts which have been treated with copper, chromium and arsenic. Industry estimates are that between three per cent and five per cent of these posts break during harvest, requiring half a million replacements annually.

The broken posts are a significant expense to the industry and also create hazardous waste.

The case study reports on the potential for 5,000 hectares of sustainably managed durable eucalypts to be established over the next 30 years in Marlborough and assesses –

- The potential for a sustainable regional supply chain of naturally durable posts and other timber
- The biomass which could be recovered to supply solid biofuel to the wine sector and other regional energy users
- The emissions the eucalypt forest resource could offset by sequestration of carbon
- The reduction in emissions if major fossil fuel users in Marlborough, including wineries, switched to bioenergy sourced from woody biomass including durable eucalypt harvesting and processing residues.

The science involved

The case study included research in three areas –

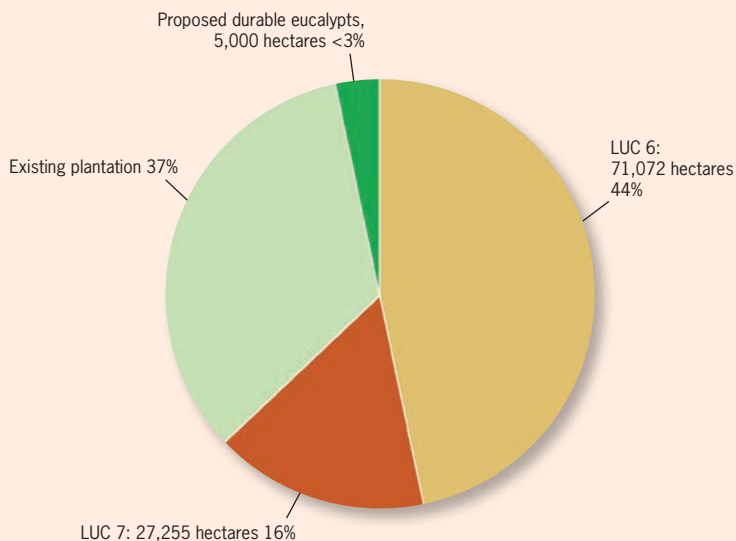
- Developing tree-level models of biomass availability and carbon storage for two main durable eucalypt species *Eucalyptus bosistoana* and *E. globoidea*. The aim was to improve growth and yield models and accurately estimate future carbon storage and wood production in Marlborough.
- Using drone based Lidar to produce more exact and efficient estimates of stem dimensions, biomass and carbon storage of forest stands of *E. bosistoana* and *E. globoidea* than can be achieved with ground based sampling

- Undertaking four Marlborough farm, forestry and vineyard property case studies to assess their emissions and investigate to assess the economic and environmental implications of growing durable eucalypts.

Developing a supply chain

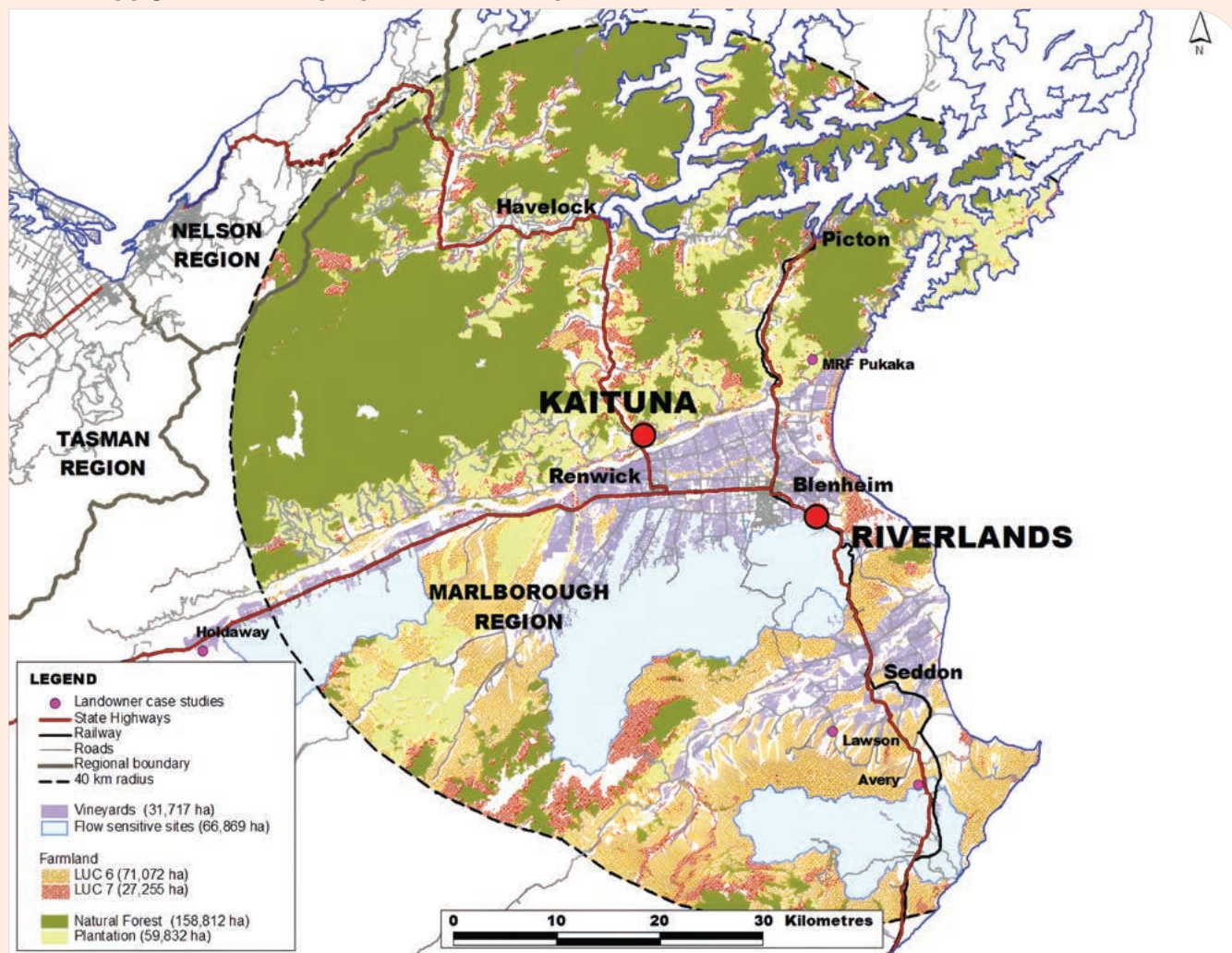
The establishment of 5,000 hectares of durable eucalypt plantations across the Marlborough region between by 2055 could create a post and log supply for two regional processing hubs producing vineyard posts, other solid wood products and veneer for engineered wood products. Harvesting and sawmilling residues could also be processed and used along with essential oils from tree foliage. The proposed location for these two future processing hubs are Kaituna in north Marlborough and Riverlands in the south with a 40-kilometre radius wood supply catchment around each hub.

Land-use analysis shows there are over 100,000

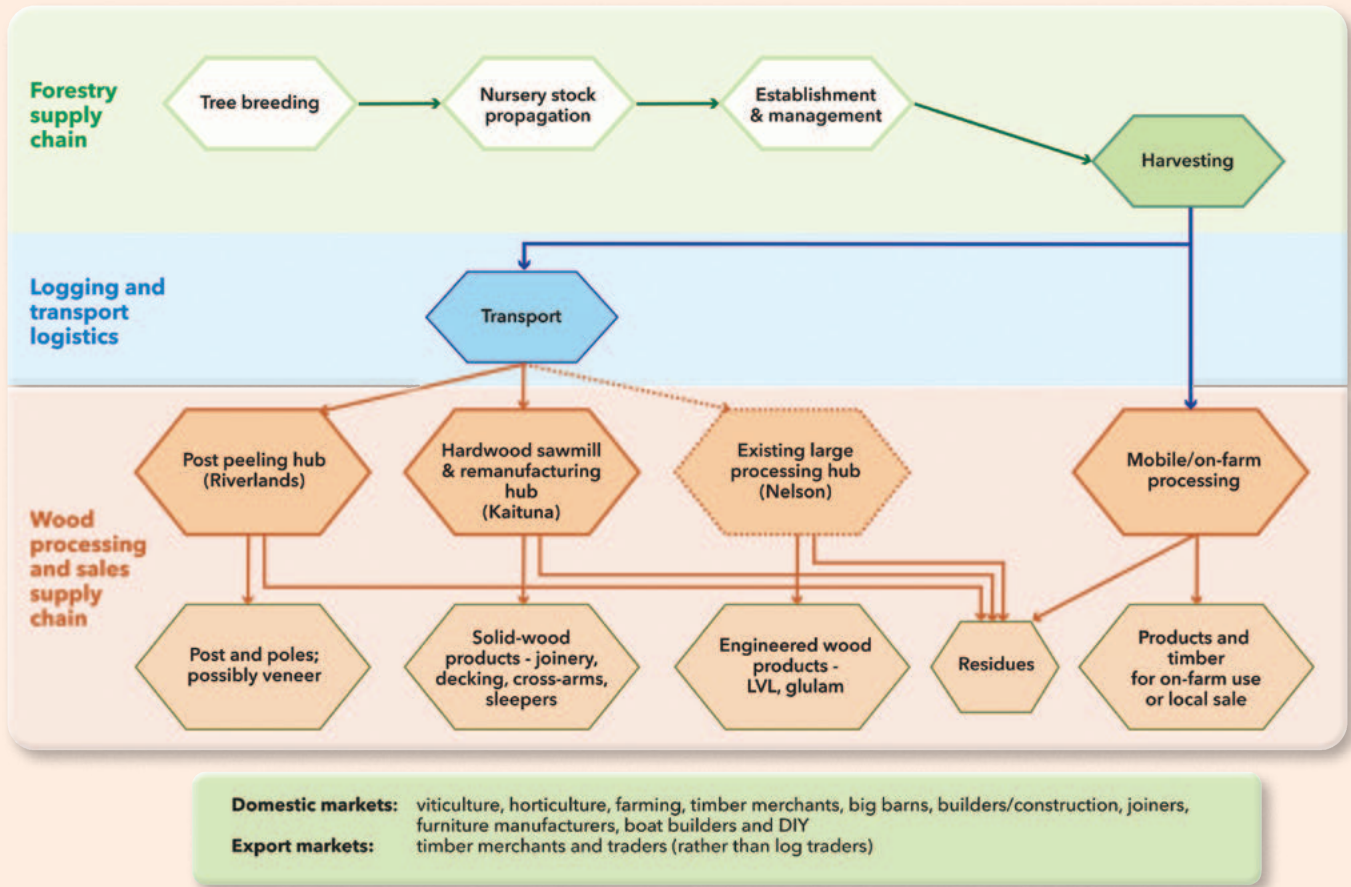


hectares of low productivity farmland in land use capability classes five to seven within a 40-kilometre radius of Kaituna and Riverlands. In addition, there are almost 60,000 hectares of existing forestry plantations.

Wood supply catchment proposed with two possible hubs



Durable hardwood supply chain in Marlborough



Five thousand hectares of durable eucalypt forests is only three per cent of the suitable land identified.

The case study assumes that Marlborough forest growers, farmers and other land owners can establish an average of between 150 and 200 hectares of new durable eucalypt plantations each year from now until 2055. This level of planting would ensure sufficient volume for a sustainable harvest and ensure that future investment in the two processing hubs is commercially viable. Developing a future durable hardwood supply chain is a multi-stage process, and one which requires a long-term strategy that starts with planting forests.

Species choice for Marlborough

Marlborough is a region of climatic and geographical extremes and species choice must be based on individual site characteristics. The three durable eucalypt species identified as most suitable for Marlborough are –

- *E. bosistoana*, coast grey box which produces a class one durable hardwood
- *E. cladocalyx*, sugar gum which produces a class one durable hardwood
- *E. globoidea* white stringybark which produces a class two durable hardwood.

The trials show that the adaptability and productivity of these three species can vary significantly depending on the site. Growers need to choose suitable sites and growing regimes accordingly.

E. globoidea is well adapted to north Marlborough’s higher rainfall where despite the low fertility and steep soils, it has recorded the highest regional productivity. Cut-over radiata pine sites are well suited for replanting in *E. globoidea*. Frosty, flat and easy sites with high fertility soils including alluvial areas prone to periodic flooding or waterlogging are more suitable for *E. bosistoana*.

In south Marlborough, *E. globoidea* can be grown on low rainfall coastal hill country but with only about 40 per cent of the productivity due to low rainfall. High fertility easy-to-moderate coastal hill country and frosty, flat alluvial sites will suit *E. bosistoana*. Finally, *E. cladocalyx* is suitable for exposed dry upper slopes of the south Marlborough’s coastal hill country where sites have little frost in winter.

Growing and harvesting regimes

The case study assumes that 3,000 to 3,500 hectares of *E. globoidea* forests planted in north Marlborough will supply the Kaituna hub in the north. In south

Marlborough 1,500 to 2,000 hectares of *E. bosistoana* and *E. cladocalyx* will supply the Riverlands hub. Two regimes have been developed for these two Marlborough sub-regions

Rotation between 28 and 35 years

A rotation of 28 to 35 years is a sawlog and peeler log regime which predominates in north Marlborough. The aim is to produce class two durable timber on north Marlborough's steeper hill country. Part is for sawing to produce a range of high-value durable hardwood including posts, cross-arms, decking, sleepers and outdoor furniture. The remainder is veneer for engineered wood, potentially at Nelson Pine Industries' Richmond plant. The forestry systems used will be similar to those currently used for radiata pine.

Rotation between 20 and 25 years

A rotation of 20 to 25 years is to produce timber posts and is mainly in south Marlborough. This targets production of class one durable roundwood for posts and poles. The regime is suited for easy-to-medium contour land where small to medium scale ground based harvesting is feasible and there is minimal requirement for internal access roads, landings and bridges. Sites need good road access and to be within economic transport distance of the Riverlands processing hub.

The feasibility of hardwood processing

Eucalypts can produce high quality hardwood but have sawing and seasoning problems which require well proved cutting and drying operations. These have been developed in Australia where native eucalypt forests have traditionally been harvested to supply logs to a wide range of medium and large sawmills.

The aim of regional wood catchments supplying a central processing hub is based on work by Scion on the potential for a new regional wood supply chain in Wairoa for Hawke's Bay Regional Investment Company Ltd. Scion used a model to undertake analysis of a regional hardwood processing hub.

The modelling requires a sustainable annual supply of 52,000 cubic metres of hardwood logs to a sawmill and remanufacturing hub. Producing this log supply annually would require harvesting around 110 hectares a year based on merchantable log production of 500 cubic metres a hectare. This could be from planting at least 110 hectares annually over 30 years and then harvesting each year.

Under Scion's model, the sawmill could produce 30,000 cubic metres of rough sawn timber with 24,000

Wood processing model assumptions for a small-scale processing hub

Small mill processing eucalypts on a five-hectare site	
Logs in	52,000 cubic metres a year
Timber out	30,000 cubic metres a year
Low value products out	6,000 cubic metres a year
Remanufacturing	24,000 cubic metres a year
High value products out	21,600 cubic metres a year
Residues out	13,000 cubic metres a year
Log price delivered	\$195 a cubic metre
High value products	\$1,950 a cubic metre

cubic metres further processed into higher grade products. The other 6,000 cubic metres of low grade timber can be sold without further processing. The higher grade timber could produce 21,600 cubic metres of high value hardwood products, and some 13,000 cubic metres of residues, predominantly slab wood, offcuts, shavings and sawdust.

The main assumptions used in the model were an estimated log price of \$195 a cubic metre delivered to the sawmill and an average product price of \$1,950 a cubic metre. Overall gross domestic product contribution to the regional economy was calculated at around \$82.5 million a year with an estimated return on capital employed of 25 per cent. Direct employment created was calculated at 200 full time equivalent employees, with additional indirect employment.

The Marlborough case study is based on Scion's modelling but with the addition of a second processing hub at Riverlands to peel posts. Assumptions about rotation length, stocking rates and site productivity in terms of total recoverable volumes, along with piece sizes in north and south Marlborough are based on trial data and growth models. The Wairoa feasibility study was in 2020 so prices would need to be adjusted.

Validating post production

The School of Forestry has carried out considerable research into the potential for producing posts and the market opportunity. Manufacturing of round wood posts is a mature technology with existing machinery already operating in New Zealand and the suitability of two post-peeling machines was tested. The machines had no problem with the high density eucalypt timber but had mixed performance in removing thick fibrous eucalypt bark. De-barking technology for eucalypts is available and some species will need de-barking in the forest or at the hub before post peeling.

Retail price per cubic metre of wood posts or equivalent non-wood posts

Post type	Treated pine	Durable eucalypt	Steel	Concrete	Plastic	Wood and plastic	Wood and concrete
Price per cubic metre	\$741	\$890	\$1,749	\$2,029	\$1,202	\$1,006	\$1,470

In 2021 Scion estimated the wholesale value for durable eucalypt posts needed to be \$890 a cubic metre when the costs of growing and processing, including profit margin were included. Treated pine posts and non-wood post retail prices were researched for comparison. The treated wooden posts were the lowest price option identified. The costs of growing and processing durable eucalypt posts were calculated to be 20 per cent higher than treated posts when disposal costs are ignored, but cheaper than all the other non-wood alternatives.

Production from the two hubs

The case study provides details about the two different forestry regimes envisaged in northern and southern Marlborough, and the potential product streams from the two hubs at Kaituna and Riverlands. For the Kaituna hub’s operations, the wood would be predominantly *E. globoidea* sawlogs grown on a 28 to 35-year rotation, with forests producing a recoverable volume averaging 500 cubic metres a hectare. Sawn timber would be used for solid wood products with secondary processing on the same site, along with posts and veneer. Residues would be processed into solid biofuel.

The Riverlands hub would produce durable posts for Marlborough’s vineyards. The estimates for regional demand by grape growers is around a million posts each year. This is equivalent to around 22,200 cubic metres of posts, with a market value of \$15 million to \$17.6 million a year. The Riverlands hub could produce 11,000 cubic metres of posts a year based on an annual log input of 15,000 cubic metres. The Kaituna hub could supply additional posts if durable eucalypt posts come to dominate the local market and there is demand from other regions. Other items could include veneer, fuel such as chips and pellets, and essential oils from *E. bosistoana* foliage.

Low cost spindle-less lathe technology is extensively used in China for peeling non-durable eucalypts. Australian plywood manufactures have also replaced conventional lathes with spindle-less technology, and research has been carried out into the use of small diameter eucalypt logs for rotary peeled veneer production. Recovery of dry, graded and trimmed veneers is around twice as high as sawn timber for such a resource.

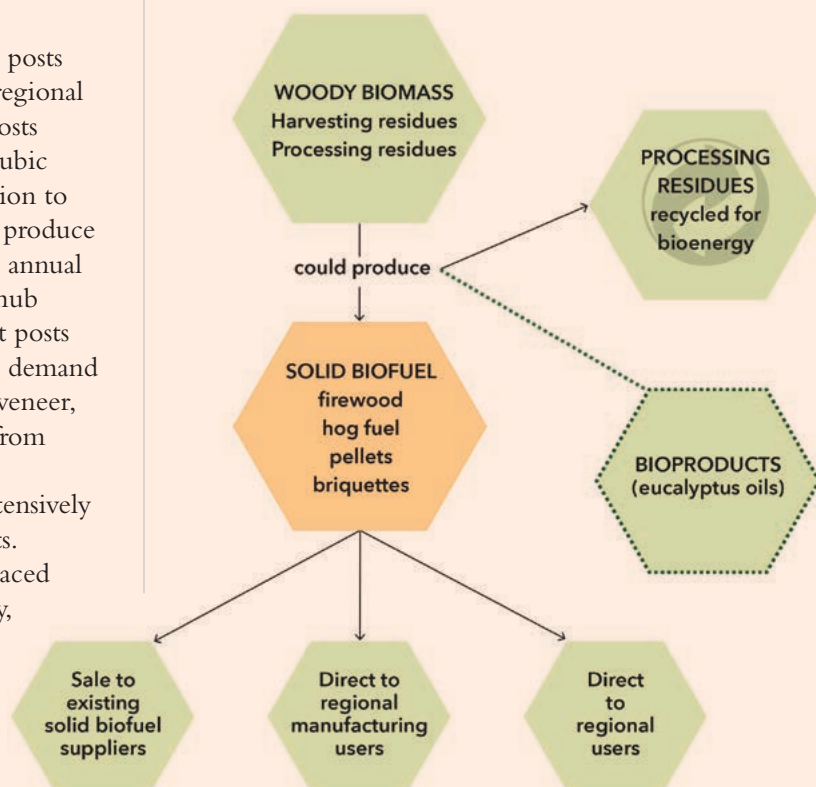
The potential for solid biofuel

Assessment of Marlborough markets for woody biomass by the existing regional biofuel supply chain, and the potential volume, use options and value of the resource arising from a durable eucalypt industry in Marlborough are all covered in detail in the case study. Because all eucalypts produce dense wood with a high energy density, they are sought after to produce premium solid biofuel.

General summary

These are the questions which were asked –

- How would a durable hardwood industry operate in Marlborough?
- Where could forests be planted?
- What species and regimes could be grown?
- How much carbon do they sequester?
- How much wood could they produce?
- How could they be harvested, transported and processed?
- What could be produced?
- Could such an industry be financially viable?





The final report provides full details. Overall, this case study highlights that developing a durable eucalypt supply chain will require long-term regional planning, collaboration and investment in planting genetically improved trees all the way to marketing durable hardwood products. The findings provide evidence that a durable hardwood industry could diversify the region's economy. There would be financial and environmental benefits for farmers, forest owners, grape growers and wine makers, as well as creating new employment in the forestry and wood processing sectors. The project provides confidence to establish new eucalypt forests at a scale that will support a future regional durable hardwood industry supply chain.

Over the last three years industry-wide support for the science team has been repeatedly sought to continue the tree breeding and research work that has been

running for 16 years. However, with the Marlborough Regional Case Study complete, much of the science team's work stops as no new funding has been secured. It is disappointing that there is a lack of resources to continue to advance the wide range of research and development which is still required. The best help farm foresters can provide is to order XyloGene seed or seedlings for 2025 and beyond.

Acknowledgements

The Marlborough regional development case study was undertaken by a combined team from Marlborough Research Centre, University of Canterbury School of Forestry and the Bioenergy Association of New Zealand, with funding provided by the Neil Barr Farm Forestry Foundation, the Ministry of Primary Industries Sustainable Land Management and Climate Change fund and the University of Canterbury School of Forestry. 🌲

NZFFA Conference North Canterbury

Tuesday 1 April to Friday 4 April 2025

Put these dates in your diary. The field visits will be hosted by past winners of the South Island Farm Forester of the Year, including the full day visit to the high country on the optional Saturday.

The conference will be based at the Commodore Hotel which is close to Christchurch airport. Full details will be available in December. 🌲

Forestry's role in the Emissions Trading Scheme

Mathilde Batelier-Belton and Ollie Batelier-Belton

At Carbon Forest Services we have been quietly working on improving our understanding of forestry's role in the Emissions Trading Scheme today and into the future. We have been working on carbon forestry for over a decade and currently manage around 10 per cent of the total Emissions Trading Scheme portfolio. We have a lot of data from our work and have come to compelling insights.

What is forestry's share?

The simple answer is that forestry's share is large. Our Emissions Trading Scheme is unique, with forestry comprising 4,200 participants versus around 120 emitters with obligations.

The total area of post-1989 forestry registered in the Emissions Trading Scheme is 598,840 hectares, an increase of 12 per cent since 2022. Of those 598,840 hectares, around 17 per cent are indigenous forest, with the remaining 83 per cent in exotic plantation species, most of which is radiata pine.

On one hand, most exotic forestry, about 74 per cent, uses stock change accounting. This means the forest earns carbon units as it grows and the carbon units are repayed when carbon is emitted, such as when the trees are harvested.

On the other hand, the remaining 26 per cent are averaging forests which means they earn carbon units only during part of the first rotation, until the long-term average carbon stock. Thereafter, no more carbon units are earned, but none have to be repaid at harvest. Around 11 per cent of the forests using stock change accounting are registered in the permanent scheme.

A major insight is that 81 per cent of the forestry participants own smaller forests of under 100 hectares. This jumps to 96 per cent if forests between 100 and 499 hectares are included. It means that woodlot owners, small forest investors and farm foresters a significant and influential group of stakeholders within the Emissions Trading Scheme. On the right above is a table which summarises this information.

Measuring is best

Another interesting point is that participants with under 100 hectares of forest are not able to measure for carbon units and have to use the Ministry for Primary

Total number of forestry participants in the Emissions Trading Scheme

Forest size in hectares	Number of participants	Percentage of participants
0 to 99	3,399	81 per cent
100 to 499	650	15 per cent
500 to 999	93	2 per cent
Over 1000	80	2 per cent
Total	4,222	100 per cent

Industries default carbon tables even though they represent the majority of participants. The data is clear – you are likely to earn more carbon units if you actually measure your exotic forest, and generally fewer if you measure your regenerating indigenous forest, compared to the default carbon tables.

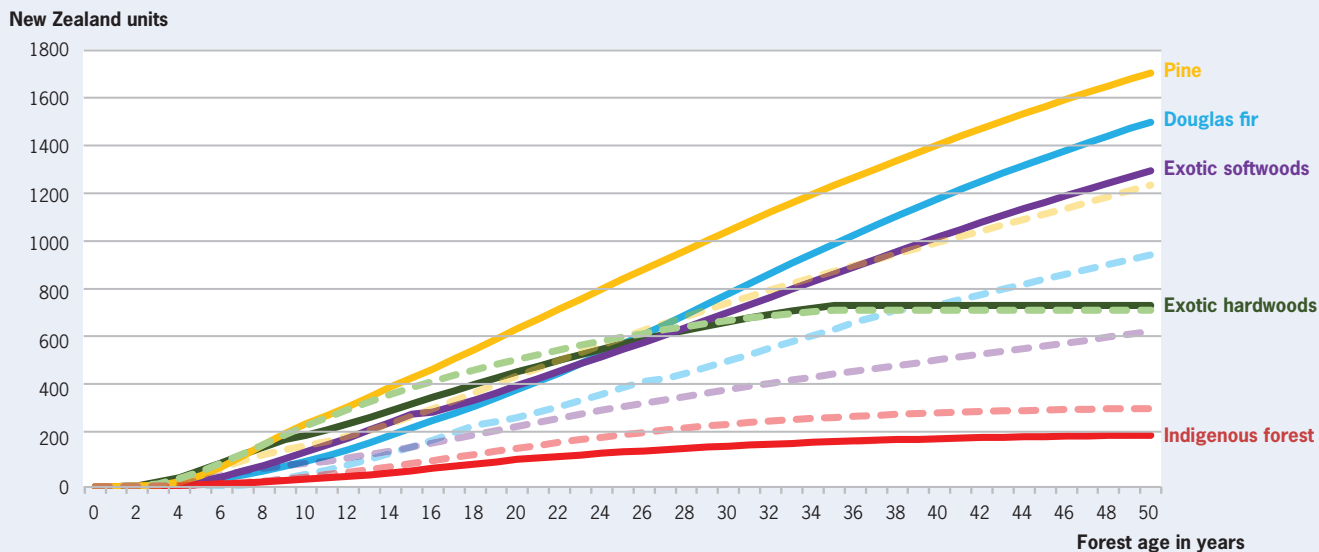
Measuring forests for carbon under the Emissions Trading Scheme is another area we specialise in. Since 2010 we have been measuring all types of forests across the country and observing how much carbon is stored in each type and where. The graph on the next page shows the difference, on average and for the forest type, between a measured forest and the Ministry for Primary Industries default carbon tables.

If you have around 90 hectares of mainly exotic forest species, try to see how you could increase it to 100 hectares to enable measurement. It could make a big difference in your future carbon unit flow and income.

What the future looks like

The government has paradoxical objectives. It wishes to limit the conversion of farmland to forest, which would mean less forestry. On the other hand, it needs forestry to meet future emissions targets, which means planting more forests.

Carbon actually measured in each hectare is the solid line, the dotted line is from the default table



Rules on new forests

Participants in the Emissions Trading Scheme who have mid-sized forests will probably plant exotic species which generate more carbon units under proposed regulations. Exotic forestry will probably remain a large part of the Emissions Trading Scheme in the next decade. However, new policies, such as restrictions on how many exotic forests people can register each year and what type of land, could slow down this trend after 2025. This could mean a move towards indigenous forests or mixed land-use policies.

What we know about this policy so far is –

- On good farmland, only farmers can register 25 per cent of the farm in the Emissions Trading Scheme, no one else can
- On more marginal farmland, which is typical forestry country and sheep and beef hill country, the limit is to register a maximum of 15,000 hectares a year
- There are no restrictions on really marginal land, but this land has more physical limits to forestry erosion, altitude and the distance to a port.

The government has said it will release more information by the end of 2024.

New fees

Last year, the government introduced a \$30 a hectare annual fee for all Emissions Trading Scheme forests. Facing backlash from participants, including a judicial review launched by the Institute of Forestry, the current government has put this charge on hold while reviewing the policy. This fee has been deeply concerning, particularly for participants who either have no more carbon units to trade or for those who have indigenous forests where carbon returns are much lower than introduced species.

We have a number of clients who have paused registering more forests into the Emissions Trading Scheme until this problem is resolved. The good news is that the Minister of Forestry, Hon Todd McClay, has released the review and announced a forestry reference group of industry leaders to work through the question fees.

Effects of policy and market uncertainty

We have seen that uncertainty around governance, fees and the role of forestry in the Emissions Trading Scheme creates hesitation for new forest planting. We think this could slow forest planting after 2025. However, the government has so far been delivering on its promise to keep a stable carbon market with fewer volatile policy announcements.

Over the next decade we think the government will probably incentivise forestry outside the Emissions Trading Scheme, particularly with the recent failure of the He Waka Eke Noa partnership to address agriculture emissions. One example of this could be contracting directly with land owners to grow forests outside the Emissions Trading Scheme framework. As regulations evolve, particularly with the separation of incentives for emissions reduction and forestry, the supply of new forestry units could dwindle, affecting long-term market stability.

The Climate Change Commission predicts a drop in forest planting due to regulatory uncertainty and rising costs. This decline could lead to reduced carbon sequestration, especially in plantation forests. Indigenous forest contributions may increase but at a much slower pace. The slowdown in planting will reduce the number of low-risk forestry units entering the market, potentially increasing the cost of carbon units and putting pressure on gross emissions reductions. This would be good news for foresters holding carbon units to sell.

Future demand for forestry carbon units

In the past two years, there has been much talk about an over-supply of carbon units in the market and the risk of new Emissions Trading Scheme forests overwhelming the market. This has put downward pressure on the carbon price, but we believe we have good news for foresters.

We have modelled the supply of carbon units from an additional 800,000 hectares of new forest entering the Emissions Trading Scheme by 2040. Against an annual demand from emitters of 33 million carbon units, this new forestry only adds an additional seven million carbon units every year to the carbon market.

Even accounting for the current stockpile of units and existing registered forests, the market still appears to fall short in units after 2030. We do not believe New Zealand can plant its way out of this gap, especially with the proposed limits on Emissions Trading Scheme forestry on farmland. This leads us to believe that the only way to bridge the shortfall is a massive reduction in gross emissions.

What does it mean for you?

Forestry participants play a far more significant role in the Emissions Trading Scheme than many realise. The scheme is complex and often shaped by the priorities of the government in power, leading to frequent changes in the rules. Sharing our insights and being a voice in the carbon forestry sector is just one of the ways we hope to inspire you to keep being involved and help clear up some of the confusion because we believe that forest carbon removals have a big role to play in the future of mitigating climate change.

We encourage anyone with an Emissions Trading Scheme forest to engage a professional consultant to ensure they are maximising value while ensuring they do not end up with surrender obligations of carbon units. While the future shape of the Emissions Trading Scheme may be uncertain, one thing is clear. Forestry will continue to play a critical role.

Mathilde Batelier-Belton is a Director and General Manager at Carbon Forest Services. Ollie Batelier-Belton is the Managing Director of Carbon Forest Services. 🌲

Treefarmer free programme

Treefarmer is a free software programme designed to help land owners make good decisions for planning or harvesting a woodlot.

You can map several woodlots on your property at the same time.

Choose from any of five forestry species and three management regimes.

The model will generate the wood and carbon yields at any selected harvest age.



There is a checklist of requirements for site preparation, establishment, silviculture and harvest planning.

Treefarmer was developed with Forest Growers' Levy funds.

Access is from Forest Growers Research website at treefarmer.fgr.nz

Technical support is provided by Graham West at westlanduse@gmail.com



New Zealand Farm Forestry Association
Oranga Rākau Aotearoa



Trying to make life easier

Changing the membership management system

Howard Moore

There are enough changes going on such as redundancies, mill closures and cycle lanes without introducing yet one more. But here we are. We are promoting this change, like most promoters do, as an exciting chance to improve your life and enrich your soul. Just as we trust you will survive being knocked over by an idiot in lycra as you look for a new job, and end up on the waiting list for a hip replacement, we trust you will survive this change too.

In short, what we are doing is replacing the membership management system on the NZFFA website to make it easier for you to renew your subscription at the end of the year. Naturally we have other reasons for this change which are important, but they are administrative and possibly boring. The exciting thing that will improve your life is that the new system is easy to use, and simple to interrogate to see what you have signed up for. Easy is good. Simple is better.

Just winners

The cynics amongst you will point out that since this article is appearing in the November *Tree Grower* I must have written it before the new system was fully implemented. If so, my enthusiasm is fake and my claims are unproven. Fie, I say, fie. It is true, but fie anyway.

There is no progress in this world without the reckless investment of naïve enthusiasts who plunge all their efforts and miserable savings into heroic adventures. According to the books, these usually work out well, although the cynics would argue that of course they do, since the books are written about the winners, not the losers.

Testing and integration

Be that as it may, the plan is for the new system to entirely replace the existing membership system so that there is no chance of getting confused and filling in forms for both. That means it has to be tested and integrated with the website ready for the subscription renewal process later this year. That work is underway and fortunately our new office manager, Raewyn, has used the system before on the Institute of Forestry website. Any of you who are members will have used it too, if you paid your subscription.

Don Wallace is working with Raewyn to ensure the changeover is as smooth and error-free as possible.

To reduce risk and make searching easier, we are trying to standardise the format of name, address, email and so forth. As a result, we might amend your membership details to better match the common standard. For example, having first name in one field and surname in another, and perhaps changing an ampersand to the word and. That seems an acceptable liberty, and there should be nothing to get upset about. Of course, if you do not like our choices you are free to let me know but I do not guarantee to be sympathetic. This whole thing is a balancing act.

Important system

The renewal form for the new system should list the branches and groups you have signed up for, and allow you to add more or remove unwanted ones. It will sum up the total subscription based on your choices. I believe, although I have not tested this, that it will also recognise new members joining during the year, and adjust the subscription based on how far through the year it is.

Inevitably there are things we still need to work out, like how to handle free and discounted memberships, and how much we should pay to each branch in capitation as a result. Clearly if head office gets zilch, then it seems a little unfair to pay a capitation fee but these are accounting details.

The membership system is an important part of running the NZFFA and the website is really the only channel we have for accessing it. We are still hoping to refresh the whole website, but the project has stalled a little as we do not have a lot of volunteers with website development experience. If any of you out there know what information architecture means and have time to help, call me. For that I can guarantee to be sympathetic.

Howard Moore is the Treasurer of the NZFFA. 🌲



Hokotehi Moriori Trust plan to plant natives on the Chatham Islands

Levi Tchieki and Heidi Dungey

Rekohu is the Moriori name for the island group we know as the Chatham Islands. It is also the Moriori name for the main island in the group. The Hokotehi Moriori Trust has been working hard leading a One Billion Trees project to plant over 200 hectares of land in native trees.

The story began in 2016 when the Hokotehi Moriori Trust put the call out to New Zealand's Crown Research Institutes for help to create a sustainable Chatham Islands. The trust, then led by Maui Solomon, wanted to boost sustainability and restoration along with indigenous innovation, as well as to strengthen Moriori culture and heritage. The response took off in 2017. The project outlined here is only one of a number of

enduring projects and partnership with the trust and wider island community.

Remote and unforgiving

Rekohu is remote, 800 kilometres off the east coast of New Zealand with only 600 permanent inhabitants, unforgiving weather and challenging infrastructure. These Chatham Islands have a history which is complex and shocking. This is a story of trees and of beginning the healing of the land – by recloaking Rekohu.

Rekohu has unique plants and animals, with a large number of them endemic, meaning that they do not occur naturally anywhere else in the world. Many culturally significant forest species are also uniquely connected to the people. These include stands of kopi trees – karaka or *Corynocarpus laevigatus* – which used to shelter the people on island and provide a significant portion of the carbohydrate in their diet.

Much of the landscape is now bare of forests because many trees have become damaged by the incessant wind and are not recovering. When the wind gets into the trees it can break apart the protective structure of the canopy and cause dieback. While forests do remain on



Kopi flowering in one of the remnant forests



Stand of dead trees



Remnant stand of native forest



Hokotaka flowering in one of the remnant forests



Cypress seedling at the site shortly after planting

the island, they are only relatively small and at long-term risk of decline.

The project of re-cloaking Rekohu has involved learning to propagate and plant native plants at a reasonable scale. The ambitious aim is to establish trees over 200 hectares of land and this is well on the way to being achieved. Significant areas have been prepared, fenced and planted. Several trials were also established to investigate optimal growing environments for many species. This article is just a summary of the beginning of the project and we hope to give an update of progress in the future.

A learning process

Scion has been involved in helping to learn how to propagate plants. Planting and growing many of the endemic forest species at scale had not been attempted before. Everyone involved has learned how to do this and have then rolled the processes out.

Many species were successful early including *Olearia traversii* hakapiri, and its close relative, swamp hakapiri previously known as Chatham Island akeake. These turned out to be easily propagated. Tarahinau *Dracophyllum arboreum*, also known as Chatham Island grass tree, proved to be slow to germinate and propagate. Rautini, sometimes referred to as the Chatham Island Christmas tree, and *Hebe barkeri* were also propagated relatively easily. Hokotaka *Corokia macrocarpa* was added to the species list but has an extended period of

dormancy before germinating. Chatham Island toetoe *Austroderia turbaria* has also proved easy to propagate.

The nursery Southern Cypresses were contracted to grow a significant number of cypress seedlings. These were established in a single species stand with the aim of providing a future island resource of timber for use on farms.

Involving the community

Hokotehi Moriori Trust re-started and modernised their nursery at Henga. Plants were also obtained from small nurseries across the main island. In some cases it was cheaper to air-freight and grow plants at Scion in Rotorua than on the island. This was mainly due to the costs, particularly potting media and nursery consumables and the high freight costs through the port at Waitangi.

Planting sites were prepared carefully, with mulching being used at several peaty sites to give the plants a chance to survive. Remarkable survival was seen for native trees and the cypress. The scale of the planting on the island can best be seen from the air.

The project also involves the community, including the forestry and farm manager Levi Tchieki. He is an eighth generation Chatham Islander and proud to be part of a talented team and project. He said that farming had always been his passion and growing up on the Chathams meant you always had conservation values at heart, and now the first thread of Rekohu's new cloak has been woven. 🌲



Protecting trees from wild deer and pigs using organic methods

Stuart Chaney

New Zealand has an unenviable history of having introduced many animal species which have caused havoc to plants and animals on farms and in forests. This article offers a new way of preventing of tree and crop damage from pest animals – in particular, protecting recently planted tree seedlings from deer and pigs.

A range of organic wild animal deterrents has been introduced by a Swiss-based company PENERGETIC International. One of these is specifically designed to protect young trees, pasture and crops from wild deer and pigs. Other deterrents are for rabbits, rats and mice, with the newest release for wallabies and kangaroos.

The wild deer and pig deterrent mentioned here has been available globally for several years and has been extensively tested. Over the past 12 months we have tested it in New Zealand identifying where and how it best fits.

The benefits of the wild deer and pig deterrence include the following points –

- It is organic and non-toxic
- It is effective even after rain
- It can be applied with fertiliser or herbicide
- Only a very low dosage is required such as two kilograms a hectare
- It is effective for up to nine months
- It can be applied from helicopters or drones.

Feeding behaviour patterns of wild deer and pigs

When wild animals are feeding where you do not want them, they are building up habits. It is preferable when deciding how to use any deterrent that the target pests do not establish habits in the first place. There is safety in numbers, so members of a larger herd of deer will feel safer than a solo deer or a small herd. The larger the herd the more risks the deer will take. In winter wild animals can get desperate for food because their natural food source is in short supply and consequently these animals are prepared to take on more risk. Each side of the winter months is a good time to apply deterrents.

Because of the movement habits of some pest animals, it can help to leave untreated areas as pathways skirting the area to be treated. This leaves the animals an option to travel around treated areas without being forced to cross them because, if an area has been crossed without being shot at, then they may take more risks in the future. For very-high value crops or trees which





need protection, leaving a lower value sacrificial cropped area can be useful to keep the animals off the high value plants.

Treatment options

Treatment options depend on whether you require prevention or cure. The ideal situation is to apply deterrents to newly prepared land before seeding or transplanting and before deer or pigs start feeding which is when lower dosages will work.

If applying a deterrent to pasture crops or seedlings which are already being attacked by deer or pigs a heavier dose will be required, and in extreme cases, a second dose in quick succession may be needed to fully deal with the problem. All this can be supported by hunting and surrounding animal management plans in surrounding areas.

Pre-assessment

A comprehensive pre-assessment of the area to be treated should be carried out, and should include –

- Documenting and taking pictures of the area and the plants to be protected
- Estimating the pest animal population by type in the surrounding areas
- Making a record of the existing pest animal management plans
- Noting the history of previous season pest animal incursion and damage
- Determining the stage of growth of the plants
- Finding out what the owner is trying to achieve with deterrence

Understanding this will form the basis for assessing treatment areas and dosage, as well as providing a comparison for the effectiveness.

Treatment options

Depending on some of the variables identified above at the time of treatment, recommendation may be applied across the entire area, around the perimeter only or a combination of full-area treatment along with an additional application around the perimeter.

The treatment is best applied by spray on a windless day, to ensure even application because any application gaps will be exploited by the pest animals. The perimeter is the most crucial area for consistent coverage and it is often best to apply the perimeter dosage in two passes, once in each direction. When applying by helicopter or drone then the lower limit for water application is 50 litres per hectare.

Treating on bare soil prepared for sowing or transplanting is the most effective method. Pest animals are not attracted to bare soil because there is no food available. At the other extreme, a maturing swede crop for example is attractive to deer and if they are already feeding, they will prove very difficult to keep off the crop.

The ‘active ingredients’ of Penergetic, although this is not a strictly comparable term in the context of the more common chemical or biological additives, is a range of frequencies from substances that naturally deter pest animals. Further information is available from www.penergetic.co.nz

Stuart Chaney is the owner of Penergetic New Zealand. 🌲

Branch and action group contacts

All the branches and action groups now fall into the same category in the NZFFA rules. This should not make a lot of difference but it does make it easier to set up new action groups. Contact names are listed below for branches and action groups.

Northland

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Action groups

AMIGO

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Eucalypt Action Group

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Farm Forestry Timber

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Poplar Action Group

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Sequoia Action Group

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Are you a member of the NZFFA?

The New Zealand Farm Forestry Association has been around for over 50 years and has around 1,500 members. There are 32 active branches and special interest groups.

If you are reading this issue of the *Tree Grower* you are probably already a member, but could well just be a casual reader or subscriber. If you are a member of the NZFFA, you could make a gift membership to a friend or relative. You are welcome to join even if you have no trees.

Why join the NZFFA? Tree Grower



You will get four copies a year of the *Tree Grower*, the best source of information about growing trees in New Zealand.

Field days



Your branch will hold regular field days where you can see what other farm foresters have grown, where they may have made mistakes, and what trees grow well. This is an opportunity to mix with other like-minded tree growers.

Action groups

If you want to know more about cypress, eucalypts, redwood, blackwood or indigenous trees, then you can have the opportunity to join one or more of these groups. Many are involved in field trials that you can join and help with.

Annual conference



This is held in a different region every year. The conference is mainly field days and gives attendees the chance to visit farm forestry properties, QE II Trust covenanted areas, logging sites or other places of interest. It is also an opportunity to attend the AGM, meet up with up to 200 other members of the NZFFA and have a good time.

How to join

Joining is very simple.

Copy the form below, complete the details and send it to: NZFFA, PO Box 10 349, The Terrace, Wellington.

You will get some free back issues of *Tree Grower* and all your membership privileges. If you have have no trees or have up to 10 hectares of trees the membership cost is only \$134. For 10 to 40 hectares the cost is \$192 a year. For over 40 hectares of trees the cost is \$270 a year.



I would like to join the NZFFA \$134 a year \$192 a year \$270 a year

Please debit my credit card: Visa Mastercard

Number:

Expiry date: /

Name on card: _____ Signature: _____

Address: _____

Email: _____ Phone: _____ Postcode: _____