The background of the entire page is a close-up, slightly blurred photograph of dried, golden-brown grasses and seed heads. The seed heads are prominent, showing their intricate, feathery structure. The overall tone is warm and natural.

NATIVE PLANT NURSERY GUIDE

2024

*We would like to acknowledge the
work and contribution nurseries make
to the preservation and continuity of
biodiversity for our indigenous habitats.*

CONTENTS

| | |
|----|--|
| 2 | Acknowledgements |
| 4 | Kaupapa |
| 6 | 1: Your Kaupapa & Organisation |
| 8 | Checklist for starting a nursery |
| 10 | Types of nurseries |
| 12 | Types of nursery organisational structures |
| 14 | Setting a kaupapa & purpose |
| 16 | Tāngata |
| 18 | 2: The Physical Nursery |
| 20 | Whenua |
| 22 | Physical infrastructure |
| 30 | Materials & equipment |
| 34 | Para kore |
| 36 | Suppliers |
| 38 | 3: Production, Planning & Practice |
| 40 | Nursery production schedule |
| 42 | Whakapapa planting & rākau whenua |
| 44 | General principles for harvesting |
| 45 | Propagation material |
| 48 | Seed processing |
| 58 | Potting up through to delivery |
| 60 | Biosecurity prevention and mitigation planning |
| 64 | 4: Telling your Story & Sustaining your Nursery |
| 66 | Building your communication plan |
| 68 | Defining your market |
| 70 | Opportunities for collaboration |
| 72 | Financial forecasting |
| 74 | Funding |
| 76 | References & further links |
| 77 | Image credits |

KAUPAPA

The purpose of this document is to guide potential and existing native plant nurseries in their planning and capacity building. The guiding kaupapa of this initiative is to support healthy and effective growing environments and those that work in nurseries to achieve quality biodiversity outcomes.

BACKGROUND

Auckland Council is committed to increasing native canopy cover and biodiversity outcomes. This can, in part, be achieved with a healthy, sustainable network of native plant nurseries.

Current support requested by iwi and community entities in the Auckland region range from wanting to upgrade outdated or below biosecurity standard operating procedures in their nursery, to full management guides and business case planning. Some entities have available land and market demand for local authentic eco-sourced plants but lack clear direction on how to get started and plan staged development for a new nursery.

The Native Plant Nursery Guide serves to help nurseries' decision-making in getting started and advise new staff on nursery production, infrastructure and running requirements.

Currently, there is a lack of consistent nursery information suitable for the Auckland region. The guide is an accessible open-source resource that covers all elements of a native plant nursery.

The broad-ranging information in the guide reflects the scale of iwi and community nurseries across the Auckland region, from the backyard to the schools, through to larger social enterprise models.

This guide reflects the role nurseries have and their potential to make long-term positive impacts in the area of career pathways, employment and education outcomes for practitioners in nursery production. Overall, our native plant nurseries support environmental, social and economic outcomes for iwi and the community locally.

1. *Te Tauroa - Ngāi Tai ki Tāmaki, Motutapu*
2. *Ngauteringaringa Community Nursery, Devonport*



1

Your Kaupapa & Organisation

- 8 Checklist for starting a nursery
- 10 Types of nurseries
- 12 Types of nursery organisational structures
- 14 Setting a kaupapa & purpose
- 16 Tāngata



CHECKLIST FOR STARTING A NURSERY

Before starting on the nursery planning journey, there are some fundamental questions to ask. For a nursery to be successful for the purpose it is being set up, the following will need to be considered. Any major gaps in the below considerations will need to be resolved before in-depth planning can go ahead.

KAUPAPA

What is your nursery's kaupapa? Why are you or your organisation starting or expanding a nursery? Your kaupapa will guide your decision making over time, so it will need to reflect the focus of your intention.

WHENUA

Where will your nursery site be located? How close is your nursery to your potential project/market and workforce? What is the allowable activity on your site? What is the size and growing capacity available or required for your nursery? What infrastructure exists on site - water, access, driveways, drainage?

RESOURCES - SET UP & RUNNING COSTS

While the kaupapa, people and site might be right, how sustainable is it to set up and manage the cash flow? Can you access external help with setup from partners, funders, grants or sponsors? It may be up to a year before there are any returns from sales and for project-only based nurseries this may require a combination of funding, grants, sponsors and voluntary help. Do you have assistance to manage this while growing the plants?

TĀNGATA

Do you have access to knowledge and experienced native nursery expertise? Who will run the daily nursery operations, manage plant production and the nursery staff and/or volunteers?

RĀKAU

The types of species you grow will inform what infrastructure will be required. How many plants, over what time frame and what grades will your end products be? Where will the parent plant material be sourced from for propagation? For eco-sourced plants, this will affect which market you are able to grow for.

PROJECT / MARKET

If you have a site already, how far away from the project or potential markets is your site? Do you have an existing market / clientele? Is this something you need to identify? Who else is in the same market space as you? What size and longevity does your project or market have?



Tools out on the potting table at the Kaipātiki Project Nursery

TYPES OF NURSERIES

When considering setting up a nursery, it is important to define what type of nursery you will have and what purpose the nursery will serve. This will include understanding whether your nursery will sell plants or be project specific, as well as whether your nursery will be run by staff only, staff and volunteers, or volunteers only.

IWI

Iwi nurseries in the Auckland region include Pourewa Native Plant Nursery (Ngāti Whātua Ōrākei), Makaurau Marae Nursery (Te Ahiwaru), Te Tauroa (Ngāi Tai ki Tāmaki), Te Māra ō te Kōtuku (Ngāti Tamaoho) and Te Ārai Native Nursery (Te Uri o Hau). All of these nurseries are managed by kaitiaki, set up for the purpose of growing indigenous biodiversity within their rohe. They are social enterprises which support environmental outcomes while creating education and employment opportunities.



Pourewa Nursery - Ngāti Whātua Ōrākei, Ōrākei

COMMUNITY

Community nurseries start primarily based on a need to grow for a local restoration project. They have low to limited employment opportunities, and are heavily supported by volunteers. These nurseries are typically reliant on funding and grants, and sometimes supplement income with local community sales of their plants.



Volunteer day at the Kaipātiki Project Nursery potting area

SCHOOLS

School nurseries across the region have contributed to planting millions of trees into community and private restoration planting sites. Many schools have built their own independent nurseries to grow for localised projects within their school and community environment. Trees for Survival (Tfs) is an environmental education programme which involves students growing and planting native trees. There are currently more than 120 schools across the Auckland region engaged in the hands-on school based programme.



Ngā Ringa o Te Auaunga Friends of Oakley Creek nursery, Waterview Primary School, Waterview

PRIVATE (NON-COMMERCIAL)

Private nurseries are started by passionate members of the community in their own backyards. They are driven to contribute to their local environments on a purely voluntary basis. These nurseries are generally self-funding, primarily for the purpose of planting their own restoration sites or local public space projects. These nurseries rarely sell their plant stock. Some will trade seeds and plants with other private and community nurseries.



Robyn Dyer's nursery, Waitōtara, Upper Waiwera

REGIONAL PARKS

The primary regional park nursery in the Auckland region is the Auckland Botanic Gardens on-site nursery, which supports the regional park network planting programme. There are also a number of on-site nurseries situated within regional parks, set up for the purpose of supplying plants for the park itself. These include Ambury Regional Park, Whakanewha Regional Park, Shakespear Regional Park, Tāwharanui Regional Park, Duder Regional Park, Waitākere Ranges Regional Park and Ātiu Creek Regional Park. Regional park nurseries are run by volunteer groups and funded by Auckland Council and community donations. They are supported by community rangers with additional plant supply from the Auckland Botanic Gardens nursery. The Auckland Botanic Gardens nursery is the exception to this, with paid staff and volunteers that support across the regional park network.



Auckland Botanic Gardens on-site nursery, Manurewa

TYPES OF NURSERY ORGANISATIONAL STRUCTURES

There are several types of organisational structures. What structure you choose will be based on what is most suitable to the purpose and size of the nursery you are setting up.

Before entering into any organisational structure, it's good to understand what the compliance requirements are for operating that structure, including but not limited to:

- Health and Safety
- Employment law
- Charities obligations
- Incorporated society obligations
- Human rights

TRUSTS

Trusts can be set up to have a governing body representing multiple partners where the nursery and associated activity can have a common kaupapa. These may be individual or collaborative. Trusts can be set up as [incorporated societies](#) and registered as a [charity](#).

COMMERCIAL BUSINESS

Financially independent model of delivering on a product and service that aims to make a profit for the benefactors of the business.

COLLABORATIVE MODELS

There are a number of nurseries within the Auckland region who use a collaborative model. These include nurseries at Shakespear Regional Park and Tāwharanui Regional Park, in which the land is managed by Auckland Council and the nurseries are run by community-run trusts, and at Maungawhau where the land is governed by Tūpuna Maunga Authority and the nursery is run in collaboration with the Friends of Maungawhau group.

SOCIAL ENTERPRISE

They are focused on employment, education and community well-being outcomes, delivering on the kaupapa for which the enterprise is being created. Social enterprises generally create their income, rather than depending on funding and grants.

PRIVATE BACKYARD

Private 'backyard' nurseries are at the discretion of the owner and have no formal organisational structure required. Private nurseries do not need to be registered under any formal register. As long as they are not selling plants over a certain volume, they do not need to declare income.



Mana whenua nurseries hui for south & east Tāmaki Makaurau; held in December 2023 at the Auckland Botanic Gardens

SETTING A KAUPAPA & PURPOSE

Setting a kaupapa is the first step in designing and creating your nursery. This will help you lay down the foundation for what is important.

A kaupapa and purpose will define the work that needs to be undertaken. Having a clear kaupapa is good for your clients, collaborative partners, schools, volunteers, and all people involved with your nursery; it serves the nursery itself and also enables you to articulate for other people what your nursery is about. Keep focused on what your nursery intention is and let others know what you're hoping to achieve and how it might have synergies with their kaupapa.

A kaupapa guides the direction you're going to take and offers a way of checking in to determine if you're on track. It can also help guide what work you won't do or what plants you won't grow. When you are engaging volunteers, they are coming to give their time for the kaupapa; people like to understand what they're giving their koha, energy and time to. Finally, a kaupapa helps with nursery Monday-itis! If people clearly understand the kaupapa, it helps with the hard mundane physical work of running the nursery day to day - it's the kaupapa that keeps people going.

EXAMPLE KAUPAPA

The following is an example kaupapa, courtesy of Pūniu River Care at Mangatoatoa Pā, Tokanui, where their nursery is based.

“The kaupapa (purpose) of Pūniu River Care is to enable the local community to be involved in the environmental restoration and enhancement of the Pūniu River catchment while providing employment and work experience opportunities.”



Pūniu River Care - Mangatoatoa Pā, Tokanui

TĀNGATA

The relationship between nurseries and their people is a mutually beneficial one. You can't have a nursery without people, and a nursery provides people with a key connection point to contribute to the wellbeing of te taiao. Nurseries provide an opportunity to physically express kaitiakitanga and for those at any age to maintain their connection with te taiao. They are a repository of local knowledge - a place to grow and share knowledge.

The opposite page outlines the key roles and responsibilities required for running a nursery, as well as illustrating how a nursery can fit within a wider programme or umbrella entity providing other related services. The services shown are a selection of example services.

EDUCATION, TRAINING & PROFESSIONAL DEVELOPMENT

Quality investment in people is essential to be able to achieve quality outcomes, whether that be your plants or the biodiversity that you are supporting. This also acts as a long-term investment for the wider nursery community and growing our collective knowledge. Make space for nursery staff to connect with peers from other nurseries.

Education may be external formal qualifications that allow staff to achieve NZQA. This is important for career pathways when staff may choose to expand their knowledge in other work environments.

Options include: Primary ITO, NZQA horticulture papers and horticultural management papers. A multitude of governance training is also available. Some entities may choose to create their own training

programmes for their staff, incorporating cultural significance and practices aligned to specific nursery-based technical skills.

There also needs to be time for your nursery-specific internal training, e.g. health and safety, team communications and your nursery database. For the mutual benefit of your people and your organisation, your staff must be well-communicated with and trained to get the best overall outcomes from your nursery.

The other aspect of education and training your nursery may provide is community education, this might be one-off workshops such as seed harvesting and processing or ongoing knowledge sharing with regular volunteers' 'Plant of the week' events.

VOLUNTEERS

Look after your volunteers and make time for appreciation and celebration of volunteers. Volunteers should complete an orientation and there should be clear communication and instruction about what they are doing. See [WorkSafe](#) for health and safety guidance specific to volunteers.

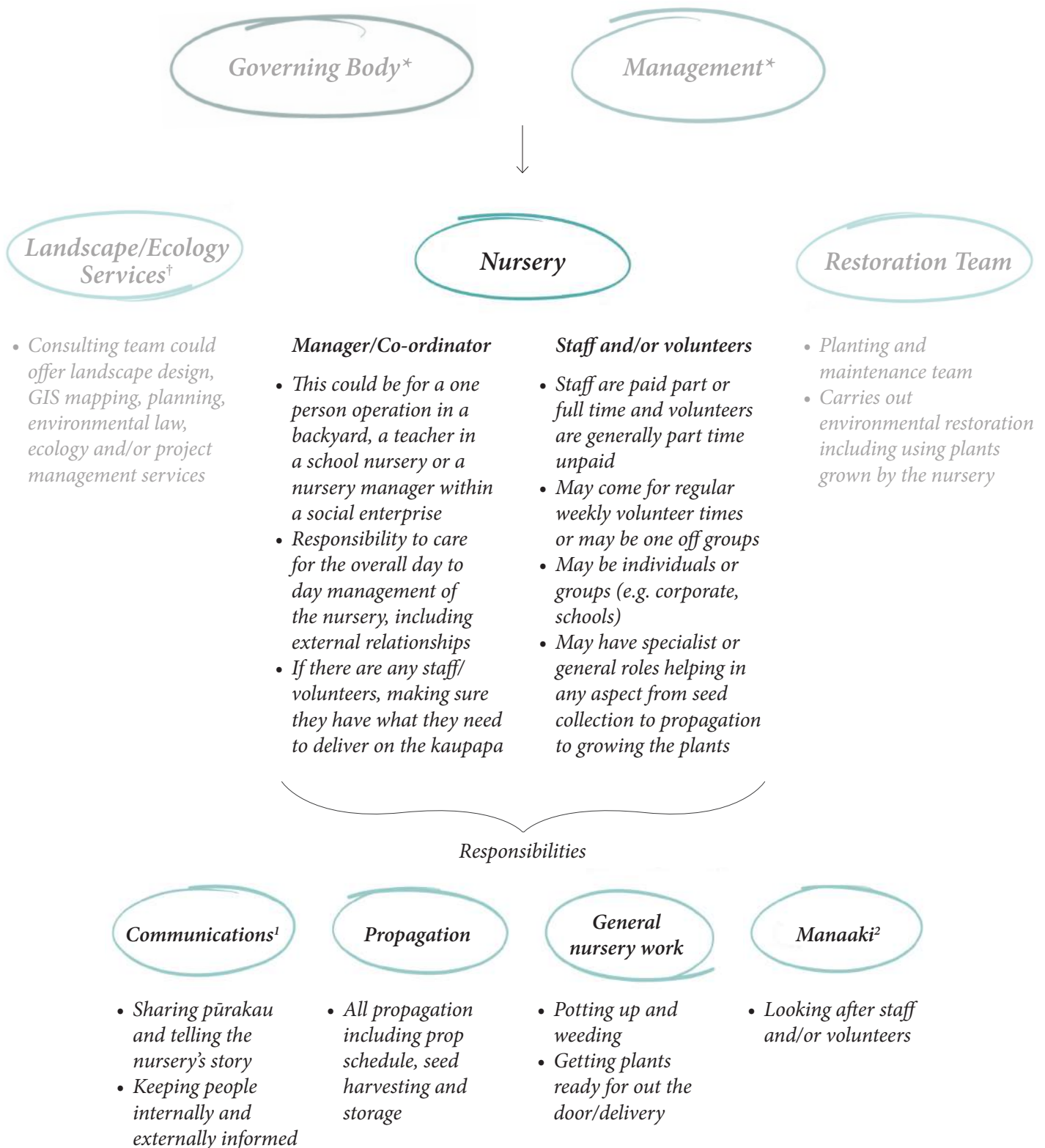
HEALTH & SAFETY

Put in place health & safety policies and practices for your nursery, including signage, orientation & incident follow up processes. See [WorkSafe](#) for more guidance.

GOVERNANCE

This is relevant for trusts and charities that require a governance board, or any nursery that reports to a governance board. Their role is to set down the strategic direction for the entity - they hold the kaupapa. The board continues to advise and support the staff and management.

Management and staff deliver the strategic plan for the entity and manage the day to day operations of the organisation.



* For iwi and social enterprise organisations

† Examples of potential additional services that could compliment a nursery

¹ The amount of communications required will depend on the scale and purpose of the nursery

² For when a nursery comprises of more than a one person operation

2

The Physical Nursery

| | |
|----|-------------------------|
| 20 | Whenua |
| 22 | Physical infrastructure |
| 30 | Materials & equipment |
| 34 | Para kore |
| 36 | Suppliers |



PB3

THREE

WHENUA

Whenua is central to why and how we can have a nursery. Most native plants are grown to repair, heal and regenerate whenua. In having a nursery one of the objectives should be to do no harm and improve the health of the whenua that the nursery is situated on.

Considerations for whenua will depend on whether you have a site for your nursery already or whether you are looking for one. Often nursery locations are chosen when an opportunity presents for available land adjacent to the restoration project a nursery is being set up for. If the land available for use is predetermined then make the best of what is available. Nurseries can be grown on the side of a steep area after drainage and terracing have been achieved. Work with the site's nature as much as possible - minimising infrastructural changes to your site will keep infrastructure set-up costs down.

CONSIDERATIONS FOR YOUR NURSERY SITE LOCATION

- Is the land big enough?
- Is the site located in close proximity to your desired market?
- Will two sites be required to achieve your nursery aspirations?
- Timeframe of land availability? If the land is only available for a short or intermediate period, with a long term site available at a later date, do you require a temporary set up with a transition later to the permanent site?
- Will you lease your site or will you have to buy it?
- Will your nursery be a temporary nursery or for an adjacent restoration project only?

These considerations will impact the sustainability and profitability of your nursery.

KEY ELEMENTS ACROSS YOUR NURSERY SITE TO CONSIDER

Whenua has to be fit for the purpose of the nursery and the nursery needs to be kind in its impact on the whenua to achieve this. It's important to understand all of the elements that affect the growing conditions of your plants.

- Water accessibility - where would your water be coming from?
- Does your site have existing infrastructure - how can you build and adapt to existing infrastructure?
- Are there any neighbouring biosecurity issues to be addressed?

WORKING WITH THE CONDITIONS OF YOUR SITE

Regardless of the scale of the nursery, be it a private backyard, on school grounds or space for 1 million units, work with the land form available to you.

- Consider the aspect, the slope of the land and how it naturally wants to drain (or not).
- Work with the contours of the land,
- Study where your light is coming from.
- Look for the opportunities the whenua provides.
- Consider the seasonal environmental conditions such as frosts which may affect which plants you can grow and your nursery layout.

- How windy is your site - what shelter is required?
- Is there an existing bush block and planting - could this provide shelter?
- Is there existing shade that can be retained?
- Are parts of your site only accessible for part of the year (some slightly sloping sites may not be accessible during wet weather).
- For nurseries that close over summer such as schools and community nurseries, a roster will need to be set up to ensure the nursery is looked after and can be accessed over the shut down period.

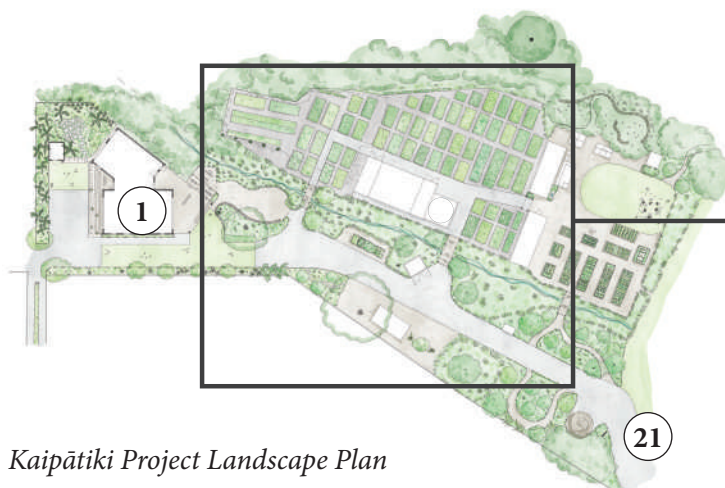


Pourewa Nursery - Ngāti Whātua Ōrākei

PHYSICAL INFRASTRUCTURE

The following plan shows an example layout of the infrastructure elements that are needed in a nursery.

- ① Space for manaaki - kitchen, toilet & handwashing facilities in the EcoHub building
- ② Space for working - nursery potting area, storage of pots and trays in constant use and centrally located first aid station
- ③ Propagation house
- ④ Full sun hardstand
- ⑤ Propagation and shade covered areas of nursery (indicated within shaded area)
- ⑥ Outdoor storage space for pots and trays excess to weekly requirements
- ⑦ Tools storage - walk in containers
- ⑧ Space for experimentation and innovation - e.g. space for growing along the bush margin
- ⑨ Central hose and place to wash hands
- ⑩ Pathway through nursery with compacted gravel and timber edges - accessible for all users with diverse physical needs
- ⑪ Water source - tank located behind timber screens (providing opportunity for educational signage)
- ⑫ Centrally located irrigation control
- ⑬ Clear, dedicated pedestrian access into nursery
- ⑭ Riparian planting of harakeke and rautahi creates shade for the stream and treats runoff from nursery
- ⑮ Functional access into the nursery for movement of plants & materials
- ⑯ Separate access to adjacent community māra
- ⑰ Covered potting mix bin on a concrete base for separation from soil below
- ⑱ Community resource drop off point located outside of the nursery
- ⑲ Welcome, health & safety and biosecurity signage points
- ⑳ Adjacent educational space for gathering and large groups
- ㉑ Vehicle access for deliveries



Kaipātiki Project Landscape Plan

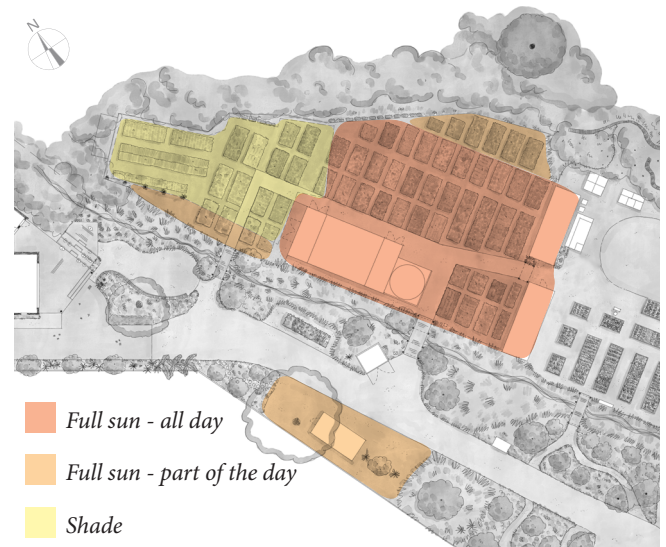


- + First aid station
- X Kauri dieback cleaning station

DEFINING ELEMENTS FOR NURSERY LAYOUT

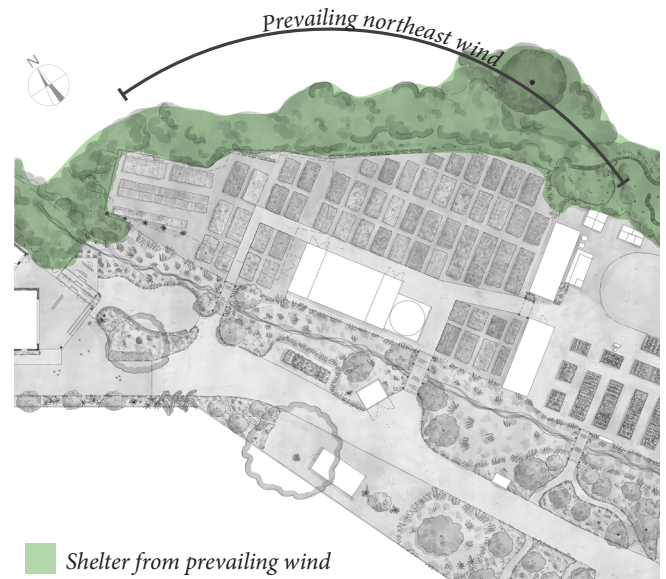
RAMA - LIGHT

Create a light map of your site with immovable elements indicated such as sheds, buildings and driveways, and indicate which way is north. Work with the available light and existing shaded areas to layout your site activity. Predominantly full sun areas may be in shade at certain times, so it's important to indicate if they receive morning or afternoon sun as well as winter or summer sun. Some plants may require full sun but not necessarily high temperatures, so it is good to overlay a temperature range map e.g. heavy frost areas to high heat on an asphalt hardstand. Temperature zones may become defined after a year of being on site and as you get to know the micro climates around the nursery.



HAU - WIND

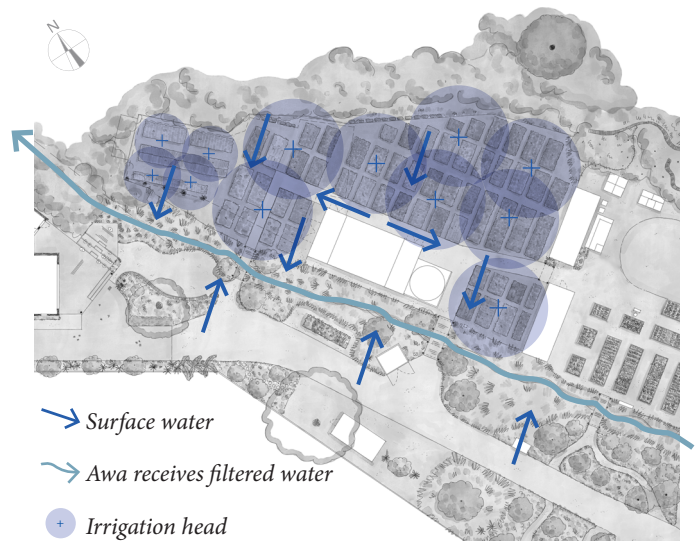
Wind: how much is too much and is it possible to not have enough? Nurseries require areas of wind protection to get plants started, sheltered areas for working (no one wants potting mix blowing around the tables!), along with exposed hardening off space to reduce shock for natives being planted out in exposed places. If you have a very exposed site you may want windbreaks and hedges to reduce the impact. For the prevention of animal pests and disease it may be beneficial to keep air flow around plants. Wind and irrigation need to be considered together. Increased wind periods can dry out plants. Irrigation running during windy periods will disperse water that may not make it to the pots.



WAI - WATER

There is no life without water. Most nursery activity is based around small volume containers that hold media (potting mix), so there is a high risk of plants drying out without planning water mapping and irrigation. This requires staff to know what is going on across the site and to have all staff and volunteers trained to look for signs of watering efficiency and issues to resolve.

Wai occurs in various states of wellness: wai ora, wai māori and wai mate. To understand our impact we need to see how it moves through these states on site. Water from rain, groundwater, streams and mains water (including from irrigation all moves through soils and vegetation and returns to awa and moana via overland pathways and drains. Nurseries have a responsibility to always return wai in a healthy state.



INFRASTRUCTURE REQUIRED

EARTHWORKS

Minimise the need for earthworks by working with the topography of the land. Earthworks may be required to undertake drainage, smooth hardstand areas and for preparing land for additional buildings such as a potting shed. Depending on the scale of the nursery, you may need planning, staging and consents for the earthworks. This may include having a process in place for accidental archaeological discovery.

DRAINAGE

Create a water flow plan for your site that shows where the water is coming from, flowing through and exiting by identifying the water source and how water moves through the site. This will help with decisions about possible reuse and filtration. Whether it is used again or not, water needs to be able to be captured to periodically test it and see that it is as clean or cleaner leaving the site than when it enters. If you are able to estimate the volume of water, you can then plan for adequate drainage for the amount of water that you have moving through your site.

Water should be captured and reused where possible as well as filtered through planting before entering any drains or awa. Avoid flooding aggravators such as placing infrastructure in overland flow paths which might cause future flooding. Schedule maintenance to keep drains clear and always recheck before weather warning events.

IRRIGATION

Irrigation should be designed to meet the requirements of the site in accordance with your water plan. Adjust settings, such as areas and quantity, with monitoring as the nursery stock levels and seasons change. Check if water is getting through to the base of the pot and adjust irrigation run times to suit the layout of your nursery.

- A propagation house will have different requirements than a hardstand e.g. an overhead sprinkler releasing fine mist, rather than an irrigation head with a larger throw for coverage and set at a height that isn't interrupted as the plants grow. Plant grades over 45L generally require individual drip lines.
- How many irrigated zones you need will depend on your water pressure and the area needing irrigation.
- Irrigated areas should be sectioned so that irrigation can be turned off when an area of hardstand or propagation house isn't in use.

- All irrigation should have a water sensor which will automatically turn irrigation off until the sensor dries out again.
- Best time to irrigate is in the morning to reduce the occurrence of fungal disease.
- Always water early enough to have at least 2 hours before the sun can evaporate moisture off.
- Be mindful of neighbours when deciding what time to irrigate, as irrigation can be noisy.
- Lay plants out in blocks to maximise the coverage of water so that water is not wasted on paths.
- Do not run irrigation during the heat of the day as this can cause damage to foliage.
- Sprinkler heads or misters need to be selected for the purpose. For example, a hard stand might need a heavier droplet spray where there are winds that would blow away a finer droplet.

Irrigation elements to consider when designing your irrigation system:

- Tanks, bores and dams require a pump.
- Best to lay irrigation on the surface where possible for ease of repair. Protect parts that are buried under paths and driveways from impact. All pipes crossing on top of paths should have a ramp cover to protect it as a trip hazard prevention measure.
- Filters may be required to prevent the blocking of sprinkler heads.
- All irrigation requires a control box which you can set run times with.
- Hoses should be placed to be able to reach all areas of the nursery.
- There needs to be a hose at all times at the potting tables / potting area for watering plants before they move to the hardstand.
- Your hardstand and propagation / shade house plant layouts should take irrigation coverage into consideration.



Overhead sprinkler

MANAAKI

Ensure you have space for manaaki to gather people together - a place for lunch and tea. This includes fridge, stove, kitchen sink, hand basin, toilets and a place to hang wet weather gear and get cleaned up at the end of the day. Depending on the size of the nursery, you may require a place where people come and sign in.

Consider your neighbours in the design of your nursery layout e.g. ensure water does not run onto neighbouring sites and avoid placing visual barriers in viewshafts. Also consider any environmental weeds coming from or spreading to neighbouring sites.

POTTING AREA / SHED

Locate your potting area centrally in your nursery so that it's easy to move plants from the potting area to the propagation house and hardstand. Also ensure the potting shed and drop off point (for potting mix) are located adjacent to or in close proximity to each other so manual carrying of potting mix is minimised. Reduced movement of potting mix reduces muscle strain, accidents as well as reduces potting mix loss.

Set up your potting area/shed with all of the elements you need for it to flow smoothly and allow movement in and out of the area without causing tripping hazards- prioritise health and safety. The potting area should operate on a clean and clear as you go basis to avoid a build up of old pots/weeds etc and to prevent pests, diseases and fungal growth.

Potting benches should be built to meet the needs of the various staff and volunteers. Build for the height of the tallest person as you can always provide a raised platform for others to stand on.

Treat the potting area as a central hub for being able to communicate past, current and upcoming activity. Good signage and instruction boards for volunteers.

POTTING MIX

Construct potting mix bins or holding areas with a solid floor base that reduces contact between the sterilised potting media and the soil. Contain and cover potting mix to prevent exposure to the elements as rain will activate and leach the slow release fertilisers in the potting mix. This ensures potting mix isn't activated until it's used in potting up plants. This also prevents weed seeds blowing in. Make sure to

position the potting mix bin in a location that allows a truck to back in to unload. For health and safety, never stand at the back of a truck while it's being unloaded.



Covered potting bin at Kaipātiki Project, Birkdale

SHADE/PROPAGATION HOUSE, GREENHOUSE & BENCHES

When choosing what type of structure for your nursery, considerations will include cost, the type of growing conditions required (e.g. full cover or enclosed, consistent light, high shade density) as well as size needed (driven by growing needs and/or space availability). For example, adaptable polyhouses (a type of greenhouse) can be ventilated and the light can be shaded depending on the requirements throughout the seasons.

Once you have decided on your structure's size and shade requirements, design your benches and irrigation layout in tandem with one another. Benches should be able to be cleaned for hygiene. Good layout will allow for movement around the benches while making the most of the space.

Set benches at a good working height and use single level benches to avoid disease spread.

You can place some plants underneath benches to germinate in the dark but be aware of where water is flowing to when watering plants on the benches above.

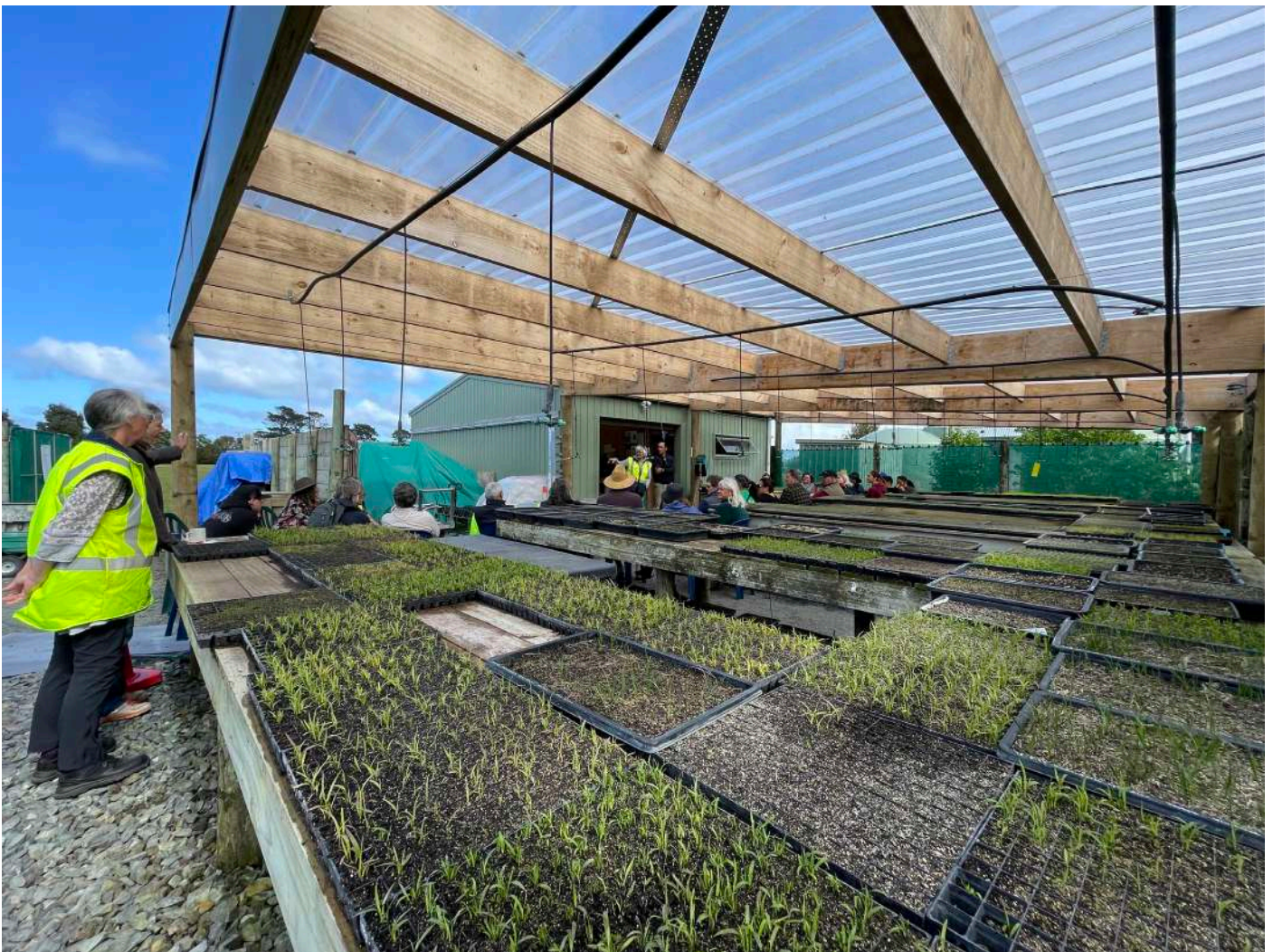
The ratio of hardstand, propagation house and shade house will depend on the main types of species you're aiming to grow and what they require through their life-cycle, from germination through to exiting the nursery.



Shade house at Herald Island Environmental Group nursery



Timber benches at Te Arai Native Nursery



The propagation house at Aawhitu Peninsula Landcare nursery

HARDSTAND

A hardstand should work with the flow of the land, and the hardstand layout will be determined by the requirements of the species grown, including levels of sun, shade, wind/shelter and drainage. Plant placement should occur in countable blocks of space species of the same grade. Access should be kept to central pathways with limited gaps in between blocks; this reduces both weeds as well as water wastage on paths, maximising the site capacity.

There are many options for preparing hardstands - scraped, compacted, mulched, drained, laid with metal, scoria or weed mat directly on soil. Set up may

occur in stages as your nursery grows/expands or it may be more cost efficient to have it all done at the same time.

Your hardstand surface material will depend on what resources you have available as well as how long the nursery will be located there. The medium you use to create the hardstand will also affect the temperature of your nursery, which in turn will affect how much water you have to use. If using mulch for your hardstand, track where it's coming from to prevent any pests and diseases coming into your nursery such as kauri dieback.



Hardstand at Te Tauroa Nursery, Motutapu

HEDGES, WINDBREAKS & FENCES

The functions a fence provides can include: windbreak, controlled entry and exit for biosecurity, health and safety entrance points for people entering into the workplace and protection from theft and vandalism.

Informal hedges may double as back up propagation material but should not be your only or primary plant material source. Be mindful that your hedges do not create refuge for environmental weeds.

Windbreaks may only need to be created on the side of the prevailing wind. Use windbreaks to create the level of shelter that you require for the production of robust plants. For example, if your plants need to be particularly hardy to wind, don't create a completely sheltered space. Plants will require different degrees of shelter at varying stages of their development, from seedlings, to hardstand through to ready to go to site. Enrichment species will need shelter throughout their life.

ENERGY

It is possible to operate a nursery without access to mains power. Essential elements that require a source of power include operating the irrigation and any human amenities such as putting on the kettle. If these can be sourced using alternative energy such as solar batteries for irrigation, then mains power access is not required.

ACCESS

Access points should be located with consideration given to distance to delivery and pickup. In some instances, where your access points are located may not be optional.

Within the site, remove barriers for moving things around the site.

STORAGE FOR POTS/EQUIPMENT

Pots can be stored outside in close proximity to your potting up area. Reserve dry storage for those items that need protection from sun and water. Utilise outside storage for plastic containers and non-perishables that can be stored outdoors. If you have pots returned to you, they need to be cleaned before being stored and coming back into the potting area. Be mindful not to isolate staff/volunteers who clean the pots from the rest of the people working in the nursery.

VEHICLE AND TRAILER STORAGE

Your nursery will need a weather protected area to store machinery such as vehicles and trailers and a place to clean them down.

SIGNAGE

Signage needs to be fit for the purpose intended with clear, factual information and situated where it can be easily seen and read. Consider language, tone, imagery and placement.

Biosecurity signage includes kauri dieback signage informing staff/volunteers to clean their shoes.

Health and safety signage includes: where the first aid kits are kept, hazard identification board, hazard storage for fuels and chemicals, out of use equipment tags on machinery to be repaired such as chainsaws, weed-eaters, potting machines, lawn mowers and spray packs.

Directional and plant signage includes signage for naming of hardstand plant bays (e.g. Bay 1, Bay 2) and signage for individual species.

Educational signage includes plant identification signage in adjacent planted areas and species information.

EMERGENCY & INCURSION PLANNING

Ensure pumps and bores on site have a backup power source for any times that you lose access to mains power. This is the key infrastructural element requiring a power source and therefore a high risk over summer months if power is lost.

MATERIALS & EQUIPMENT

For your nursery set up, decide what is essential and what are the 'nice to haves'. The following pages include all useful items but your nursery may decide not all items are needed, or you might build these up over time.

For small community nurseries, many of these items may be able to be found on community freecycle pages.

SEED COLLECTION KIT



Seed picker



Pen / pencil

Secateurs



Buckets



Bags



Phone

PERSONAL PROTECTIVE EQUIPMENT (PPE)



Raincoat



Sunscreen



Boots



Hat



Drink bottle

GENERAL



Hammer



String



Drill & impact driver



Scouring pad



Pliers



Rag for cleaning tools



Mallet



Screwdrivers



Sharpening stone



Methylated spirits



Brush for cleaning tools



End knippers



Oil for maintaining tools



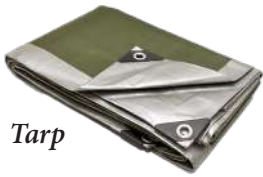
File



Hose



Watering can



Tarp



First aid kit



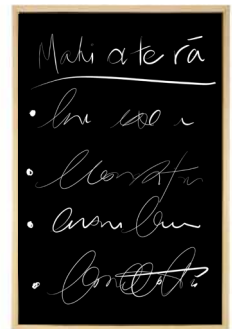
Potting scoop



Plug tool for propagating groundcovers



Trowel



Blackboard for nursery communications

Computer for recording data



Phone with good camera for comms, telling your story and for GPS locating seeds



Broom



Shovel



Spade



Dustpan

SEED PROCESSING KIT



Soil thermometer



Jars for storing seed



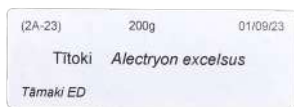
Kettle for seeds that require hot water & soak treatment



Bucket for seeds that require fermenting



Aluminium foil for storing seed



Seed batch labels



Plant labels



Sieve for seed sowing



Envelopes for storing seed



Fridge for seeds that require cool storage/cold treatment



Sieve for washing fruit off seed



Computer for recording data



Salt and pepper shaker for sowing small seed



Weighing scales for weighing seed

VEHICLES

- Vehicles may be required depending on whether your nursery is required to deliver plants.
- Consideration should be given for the size of orders going out and the distance you need to travel.
- Purchasing of vehicles should be married to the primary tasks required, such as picks ups, deliveries and taking staff and volunteers to site.

CONSUMABLES



MANAAKI



POTTING MIX

- There are multiple different types/recipes you can use depending on what suits the types of plants you grow
- Check with your suppliers the source of the materials; work with them to refine their recipes to your needs
- For backyard, school and other small scale nurseries, innovate and experiment with potting mix and have a go at making it yourselves

PARA KORE

Para kore is an overarching value to be incorporated from planning through to implementation and action. Enacting para kore is to be mindful of your impact on Papatūānuku through every aspect of your nursery. It involves understanding the origins or whakapapa of any of the materials used in your nursery. Three key principles for incorporating para kore into your nursery are outlined below.

REFUSE

Be discerning, only acquire what you need, and refuse or redirect unnecessary resources.

REUSE

Use and reuse what you already have to its full life expectancy.

REPURPOSE & SHARE

Have a plan for where your materials go next so they don't end up in landfill. Make use of suppliers that may be able to pass on secondhand quality materials such as [community resource centres](#).

INCOMING RESOURCES

- Track and trace - understand where your materials have come from (in terms of your suppliers and source of raw materials) and keep records for others.
- Secure supplies from local suppliers where possible to reduce transport miles.
- Working with the elements can reduce unnecessary purchasing or requiring of materials, for example using existing buildings as windbreaks.
- Utilise sensible planning and placement of your nursery site to make use of the elements. E.g. place your shade house in the shadier areas of your site so as to not 'use up' full sun areas.
- Where possible use second hand resources. For example, recycled timber can be used for shade tables; old plastic tunnel houses can be re-skinned as long as the structure is sound (also saving a lot of money), benches can be made from galvanised metal farm gates or coated pool fencing panels (which are both able to be scrubbed down between sowing seasons and drain well with good airflow).
- Form good relationships with your wider community and other nurseries - let people know your nursery is open to giving and receiving reusable materials. Link in with community recycling centres to take advantage of opportunities to use second hand resources.
- Refuse plastic wrap and other non-reusable materials.
- Keep your eye on the horizon for alternatives and innovations that reduce waste.

ENERGY USAGE

- Consider energy usage across each element of your operation (power, water, toilets, transport etc) and how it may contribute to a positive or negative effect on te taiao. Strive for sensible use of energy around your site. It's important to understand that growing plants does not 'offset' the environmental impact of nursery practices - reduction of impact needs to occur through action first. Consider implementing 'off grid' nursery practices, for example composting toilets (which reduce impact on city wastewater infrastructure) and power options such as solar or simple battery operated irrigation systems.
- Choose sensible transport options that are fit for purpose for the requirements of your nursery. Look at options with the lowest impact on the environment, for example electric vehicles or vehicles that can run on local biodiesel.
- Transport miles associated with your nursery can be reduced by carrying out full load deliveries to reduce trips per annum, planning your delivery trips for efficiency, keeping your market and nursery site at close proximity to one another and also the promotion of cycling to work amongst staff.

STEWARDSHIP OF RESOURCES

- Have a plan for materials that you aren't able to reuse or compost on site, to avoid them going to landfill. For example, some nurseries offer pots they no longer need out to the wider nursery network.
- Care for, respect and maintain your tools and equipment, including only using them for the purpose they're intended. Keeping equipment serviced, tools sharpened and everything in good working order makes things last longer.
- Handle and store consumables correctly to extend their life, e.g. fully covering potting mix reduces degradation from wind and water.
- Ensure excess spillage of potting mix doesn't happen when it is moved between potting bin and potting bench. This can be supported through good planning and smart placement of your potting bin

and potting benches so that they are close to each other. Reuse potting mix as compost for māra. For the nurseries that don't have māra, potting mix can be reused for any of the shelter belt or riparian planting or any planted areas that are on your nursery site.

- Provide ongoing teaching and training for your staff and volunteers on best practice for how to maximise efficiency and minimise wastage (which includes their own personal energy).
- Seasonal shelter that needs to be packed down and stored should be stored in a way that doesn't degrade the infrastructure - clean it first and store it in a protected environment.
- Reuse plastic pots and set up a return system for your clients to return their pots to you.



Cleaning pots for reuse & washing tools in a repurposed bathtub



Servicing and cleaning your tools should occur regularly

SUPPLIERS

Source supplies that are good quality and fit for purpose. Develop good relationships with your suppliers and your wider community. Make use of Para Kore ki Tāmaki, Trade Me, Freecycle groups and recycling centres as your first stop when sourcing supplies.

CONSIDERATIONS WHEN SOURCING SUPPLIES

SOURCE QUALITY SUPPLIES

Ensure your materials are of a high standard of quality, fit for purpose and will perform well in your nursery.

BUILD RELATIONSHIPS WITH SUPPLIERS

Build relationships with your suppliers and be clear in what you are asking for to avoid being delivered the wrong supplies. It's best to phone to talk through or have a face to face visit where possible.

UTILISE STAFF & VOLUNTEERS

Consider what supplies need to be bought or installed by external suppliers, and what can be achieved with staff and volunteers. E.g. for irrigation, you will need to invest in quality components but you may have staff/volunteers who are able to assemble your system.

USE QUALITY POTTING MIX

Always use good quality potting mix and know where it is sourced from. This helps ensure your potting mix won't be harbouring any unwanted pests. will contain fertiliser for the length of time that your plants require.

REVIEW YOUR COSTS

Review the cost of your supplies on an annual basis and work with suppliers that continue to deliver a good product/service and price.

KNOW THE SOURCE OF YOUR MATERIALS

When purchasing new products, where possible opt for products that use locally sourced materials.

ORDER IN ADVANCE

When setting up a nursery, have a Project Management plan outlining your suppliers, when you need what supplies, and always order well in advance. E.g. tunnel houses may take 5-6 weeks to arrive.

BE SELECTIVE WITH DONATED SUPPLIES

Community charities often receive offers of donated materials and equipment. It's best to have a clear list of what your needs are to avoid accepting donations that you either don't need or will become a liability, particularly if space is limited.

ENSURE IRRIGATION IS SET UP YEAR ROUND

If you want an irrigation service to assemble your irrigation system for you, note that November/December is the peak season and technicians may be hard to book during this time.

PROTECT PEST FREE ISLANDS

Supplies for pest free islands need to be checked off by DOC biosecurity. Use DOC's approved list of suppliers to ensure you are not bringing in any unwanted pests.

UTILISE PARA KORE KI TĀMAKI & YOUR LOCAL COMMUNITY RECYCLING CENTRE

Para Kore ki Tāmaki supports Māori communities across Auckland towards achieving zero waste. Contact them on [Facebook](#), [Instagram](#) or [email](#) as a first stop when sourcing your supplies. Contact your local [community recycling centre](#) to drop off unwanted items and materials for reuse and recycling. Utilise them when sourcing supplies, as most centres have an on site shop selling usable household and building materials.

LINKS TO SUPPLIERS

For general supplies, visit your local hardware supplier.

POTTING MIX



- [Daltons](#)
- [Bark and Soil Growing Media](#)

POTS & TRAYS



- [Daltons](#)
- [Growing Green](#)

STRUCTURES (TUNNEL/SHADE/PROP HOUSES)



- [Redpath New Zealand](#)
- [Harford Greenhouses](#)
- [Hunkin Garden Products](#)
- [Winter Gardenz](#)

IRRIGATION



- [Pro Irrigation](#)
- [Irrigation Express](#)
- [Think Water Auckland](#)
- [Waterworks Irrigation](#)

WEED MAT



- [Permathene New Zealand](#)
- [Redpath New Zealand](#)
- [Cosio Industries Ltd](#)

SHADE CLOTH



- [Permathene New Zealand](#)
- [Redpath New Zealand](#)
- [Cosio Industries Ltd](#)

WIND BREAK



- [Permathene New Zealand](#)
- [Redpath New Zealand](#)
- [Cosio Industries Ltd](#)

GREENHOUSE FILM



- [Permathene New Zealand](#)
- [Redpath New Zealand](#)
- [Cosio Industries Ltd](#)

3

Production, Planning & Practice

- 40 Nursery production schedule
- 42 Whakapapa: rākau whenua
- 44 General principles for harvesting
- 45 Propagation material
- 48 Seed processing
- 58 Potting up through to delivery
- 60 Biosecurity prevention & mitigation planning



NURSERY PRODUCTION SCHEDULE

Setting up a schedule for your nursery production is critical for understanding your production needs, planning and tracking your production against your orders/projects/planting days/sites and meeting the required quantities of plants.

Elements you need to include in a Production Schedule include:

- Species
- Grades each species is grown in
- Total in stock at any time
- Orders / projects / planting days / sites that plants are assigned to
- Balance of what is available

A Production Schedule should cover all the information you require and include a formulated column to let you know your running balance at any one time.

Your Production Schedule will vary depending on the requirements of your nursery set-up. Whether your nursery has multiple clients or is set up to grow for just one restoration project, it is best to tailor your schedule to your own nursery needs. Keep it as simple as you can - don't over-complicate it!

Whether your nursery's plants are assigned by orders, projects, multiple sites within large projects or across planting days, include these quantities in your Production Schedule and keep them updated.

Smaller scale nurseries will be able to use a spreadsheet to keep track of their Production Schedule. For nurseries that start to grow over 100,000 plants per year, you may want to look at using an inventory app.

ANNUAL PRODUCTION SCHEDULE

| Ingoa | Botanical name | Grade | Total in stock | Total assigned to orders / projects / planting days / sites | Balance against orders / projects / planting days / sites |
|----------|--------------------------------|-------|----------------|---|---|
| Kauri | <i>Agathis australis</i> | Tube | 200 | - | 200 |
| | | 2L | 390 | 825 | -435 |
| Titoki | <i>Alectyron excelsus</i> | Tube | 70 | - | 70 |
| | | 1L | 445 | 155 | 290 |
| | | 2L | 120 | 205 | -85 |
| Tarairē | <i>Beilschmiedia tarairē</i> | Tube | 94 | - | 94 |
| | | 2L | 43 | 125 | -82 |
| Rangiora | <i>Brachyglottis repanda</i> | Tube | 200 | - | 200 |
| | | 1L | 450 | 284 | 166 |
| Tī kōuka | <i>Cordyline australis</i> | Tube | 200 | - | 200 |
| | | T28 | 550 | 330 | 220 |
| | | 1L | 774 | 143 | 631 |
| Karaka | <i>Corynocarpus laevigatus</i> | Tube | 34 | - | 34 |
| | | 2L | 103 | 78 | 25 |

Below is an example of a 2024 Production Schedule in spreadsheet form, showing key information that would likely need to be recorded and updated.

The 'Total assigned to' column is formulated to show the sum of the figures entered into 'Quantities assigned to' columns, for each grade of plant.

The 'Balance against' column is formulated to show the resulting amount of 'Total in stock' minus the 'Total assigned to' columns, for each grade of plant.

DIGITAL RECORDS

Whether you choose to use a mobile or desktop based app, an Excel or Google Sheets spreadsheet, or another tool for your Production Schedule, make sure it is a **digital file** that is easy to access and update.

BIANNUAL COUNTS

Nurseries should carry out **two counts per year** to keep your 'total in stock' column in your Production Schedule up to date. This may need to increase depending on the size of your nursery. One of these counts should occur at the **end of planting season in Oct-Nov.** The other should occur **before planting season.**

| Order / project / planting day / site # | Date due | Order / project / planting day / site # | Date due | Order / project / planting day / site # | Date due | Order / project / planting day / site # | Date due | Order / project / planting day / site # | Date due |
|--|----------|---|----------|---|----------|---|----------|---|----------|
| 034 | 09/07/24 | 035 | 07/06/24 | 036 | 15/08/24 | 037 | 24/08/24 | 038 | 20/09/24 |
| Quantities assigned to orders / projects / planting days / sites: | | | | | | | | | |
| - | - | - | - | - | - | - | - | - | - |
| 200 | - | 580 | - | - | - | 30 | - | - | - |
| - | - | - | - | - | - | - | - | - | - |
| 30 | - | - | - | - | - | 125 | - | - | - |
| 65 | - | 105 | - | - | - | - | - | - | - |
| - | - | - | - | - | - | - | - | - | - |
| 105 | - | 20 | - | - | - | - | - | - | - |
| - | - | - | - | - | - | - | - | - | - |
| 42 | - | 210 | - | - | - | - | - | - | - |
| - | - | - | - | - | - | - | - | - | - |
| - | - | - | - | - | 330 | - | - | - | - |
| - | - | 45 | - | - | 70 | - | - | - | - |
| - | - | - | - | - | - | - | - | - | - |
| 23 | - | - | - | - | - | 55 | - | - | - |

WHAKAPAPA: RĀKAU WHENUA

Rākau whenua is an understanding of where seeds originate from. This tracing the whakapapa of plant material also encompasses eco-sourcing. Collecting from local native plant populations ensures the continuation of the genetic diversity of our native plants. This can be achieved by collecting seeds from a larger number of parent plants from healthy local populations.

ECO-SOURCING

Eco-sourcing sits within the principle and practice of rākau whenua. Eco-sourcing is the standard set for all harvesting of native plant material, whether that be seeds, spores, cutting or division material.

ECOLOGICAL DISTRICT

Ecological districts are areas of similarity based on topography, geology, climate, soils and land use. Each ecological district has unique plant and forest types growing within them. There are 12 ecological districts within the Auckland region.

ECOSYSTEM TYPE

Indigenous Terrestrial and Wetland Ecosystems of Auckland describes an ecosystem as: "... a biological community of interacting organisms and their physical environment... Ecosystems are defined by a degree of uniqueness in composition and processes (involving the biota and the environment) and a spatial boundary. In this regard they are synonymous with 'ecological communities', 'habitats', 'biotopes' and 'vegetation types'. Ecosystems may vary in size from small ephemeral wetlands to large tracts of forest."

SOURCING SEED FROM WHENUA

Before harvesting seed, understand where you are standing, where you intend to harvest from and ask the question: whose whenua is this? Which iwi or hapū is this whenua connected to? What ecological district(s) and ecosystem type(s) are you working within?

HARVEST FROM SAME ECOLOGICAL DISTRICT

Prioritise sourcing seed from the same eco-district as where your stock will eventually be planted. If sources are unavailable, look to the wider eco-region (Auckland).

HARVEST FROM SAME ECOSYSTEM TYPE

Prioritise sourcing seed from the same ecosystem as where your plants will be planted.

HARVEST WITH CARE

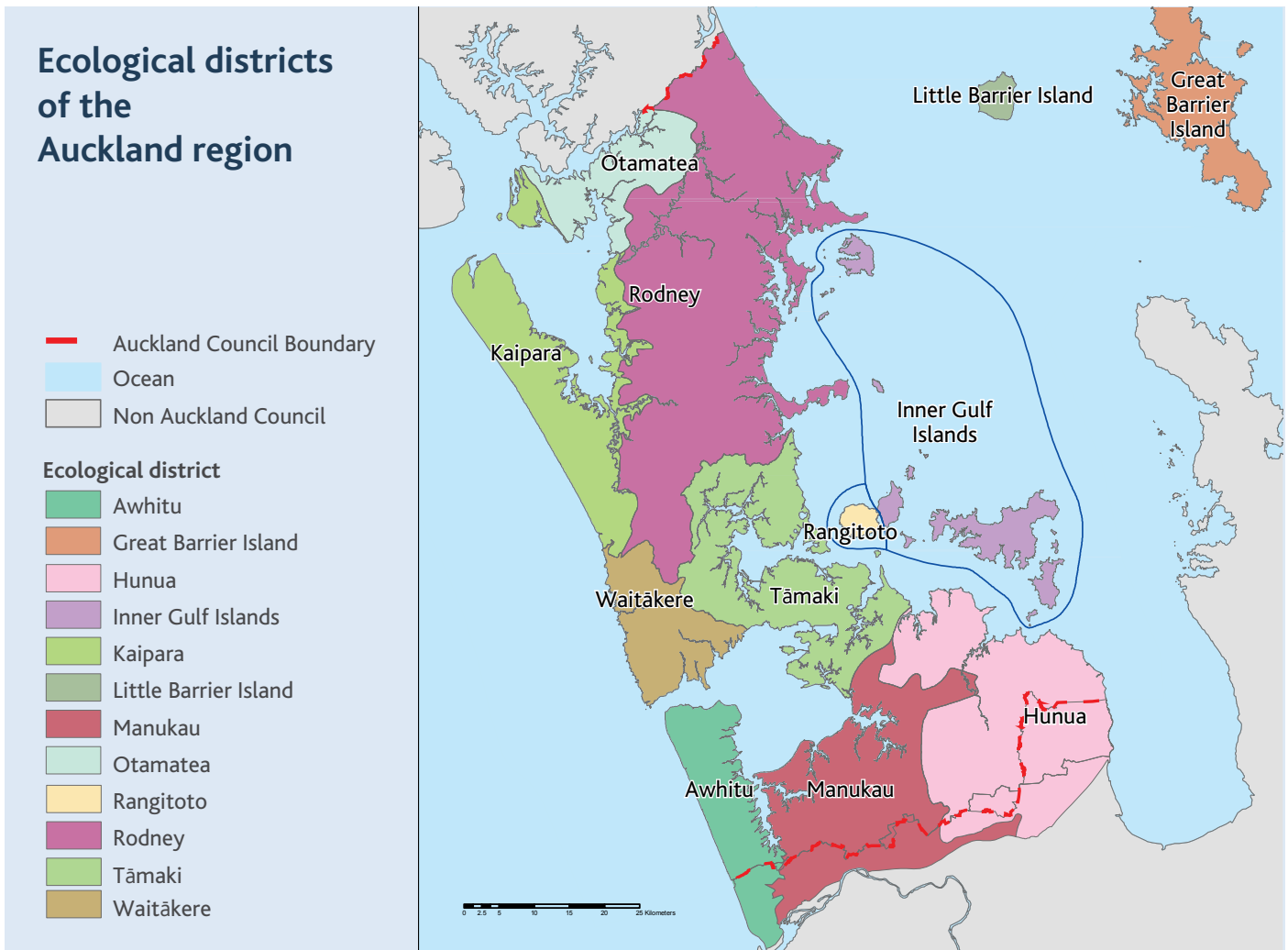
- For manuhiri, wāhi tapu should be avoided when sourcing seed.
- Avoid areas impacted by kauri dieback.
- Avoid closed reserves or sensitive off-track areas.
- Avoid areas that are closed due to rāhui for healing e.g. storm damaged areas.

HARVEST FROM DIVERSE SEED SOURCES

Collect from diverse sources, from plants of known origin and primarily from remnant bush blocks. Avoid from planted and cultivated areas, e.g. street trees.

RECORD KEEPING & BATCH NUMBERS

Maintain traceability of seed source through your nursery production practices and batch numbers (see p. 50-52 for more information). Ensure information recorded during harvesting is kept accurate on labels and records to allow for traceability from source material to planting site. A record of plants delivered should be held with the nursery and client, and should always include the source of parent material.



See [Mahere Tiaki Tāmaki Makaurau](#) to view the Ecological District and Ecosystem Extent (ecosystem type) map layers for Tāmaki Makaurau.

PERMISSION FOR HARVEST

Prior to harvesting seed, consider what permissions you need. Permission for harvest varies depending on the area you are collecting from and the purpose the material is being harvested for.

Areas such as public reserves and regional parks are administered by Auckland Council. The conservation estate is administered by the Department of Conservation. For all public space, permission to harvest is required from the administering bodies. Both bodies have a relationship with mana whenua, who equally have a guiding hand in the conditions by which permission is granted. All areas of cultural significance and pā sites should have permission also sought directly from mana whenua, as some of these may be protected no-harvest areas.

Private space harvest should only be entered into with the express permission of the land owner.

Commonly requested information required to gain permission may include: which species; how much material / seed is required; when and where will the harvest be undertaken; for what purpose e.g. community / commercial project, direct seeding or seed banking; and who qualified / experienced in harvesting will lead the harvesting process.

GENERAL PRINCIPLES FOR HARVESTING

- Growing your knowledge, identifying plants and understanding their life cycles will improve your practice and make good use of your time and resources. Read books, go to workshops and do some homework!
- Know the flowering and seeding times and harvest from plants when ripe and in peak season for maximum viability - record this information in your cheat sheet as you learn.
- True to form - harvest from plants that are in their natural form. Collect from a plant that is representative of how the species would naturally grow.
- Harvest from plants that are visibly healthy and disease-free.
- Correctly identify plants before you harvest - know what you're collecting from.
- Take a photo on site of the parent plant and record GPS coordinates for each type and/or species of propagation material harvested - bring a pen/pencil to label as you collect.

HEALTH & SAFETY AND BIOSECURITY

- When seed collecting by yourself, let someone know where you're going and when you're coming back
- Take a charged phone with you
- Check yourself (clean shoes and not carrying any pest plants or diseases), check your equipment (clean, disease-free and sterilised between use) and check the area is safe to enter
- Don't climb out onto a plant limb that won't support your weight - use a long extended pole picker instead
- Collection along a watercourse following heavy rain or high water volumes is not recommended
- When collecting from shore line ecologies, check [Safeswim](#) for contamination status and avoid collecting after heavy rainfall

SEED VIABILITY

Seed viability refers to the percentage of seeds that are able to be germinated in any given batch of seed. This affects how many seeds you may need to harvest and sow to achieve your desired numbers. Viability reduces over time.



PROPAGATION MATERIAL

There are two broad methods of propagation, sexual and asexual (vegetative). Each of these have their advantages and disadvantages.

SEXUAL PROPAGATION

Sexual propagation is growing from seeds or spores. It is the primary way to propagate plants in a native plant nursery.

ADVANTAGES

- Sexual propagation supports genetic diversity. This is because when you propagate from seed, the new plant has the genetic material of both parents.
- This method is sometimes necessary as some plants are only able to be grown from seed, e.g. large tree tap-rooted plants can't grow from cuttings.
- Large quantities of seed can be propagated cheaply and with less labour required than vegetative propagation.

HARVESTING SEEDS

1. Identify seed is ready and ripe for harvesting and from current year's stock.
2. Harvest seed from at least 10 parent plants to support genetic diversity.
3. Take a variety of containers for collecting small to large and dry to wet seeds (zip-lock bags, buckets, paper bags). Bring a pen to label as you collect.
4. Check seed viability before storage

DISADVANTAGES

- Seeds can have a limited period of the year when they can be harvested.
- Seeds may have low viability, or low seed or plant numbers available to collect from in the case of rare plants.

HARVESTING SPORES

1. Correctly identify ferns - sporing plants are classified according to the spore patterns on the back of their fronds.
2. Collect spores by the frond.
3. Understand the life cycle of ferns (see p. 46).
4. Ferns need a consistent, moist, sheltered and dark place for propagation by spore.
5. Spores can be stored for a long time in a fridge.



Toetoe seed not yet ready for harvest



Toetoe seed ready for harvest - light, fluffy and full

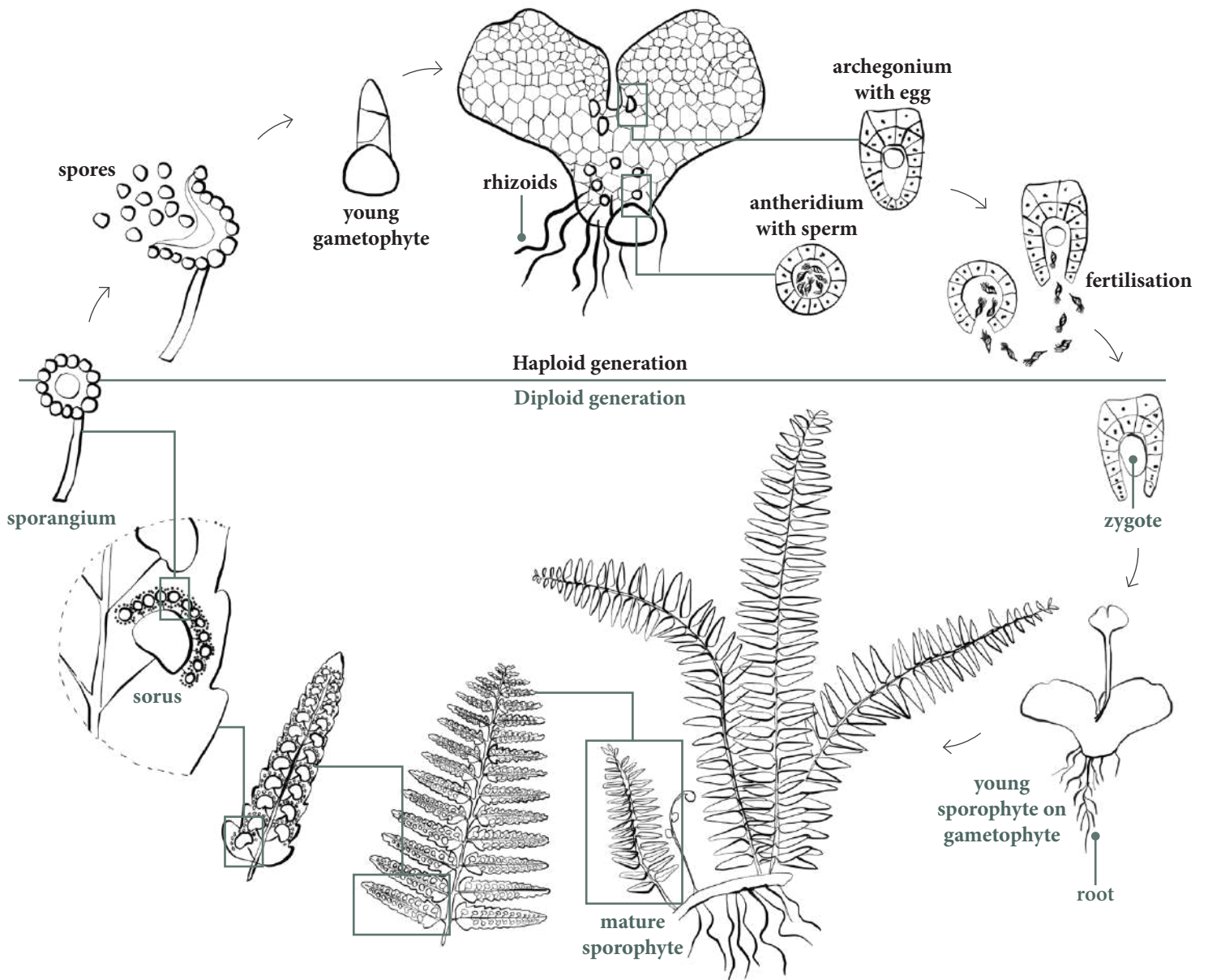


Diagram showing life cycle of a fern



Spore patterns can help with identifying fern species. From left to right: huruhuru whenua, mouku, tarawera, pukupuku

ASEXUAL (VEGETATIVE) PROPAGATION

Vegetative propagation is growing from the vegetative parts of the plant. This may be the leaf, stems or roots and the part must include a growth node or growing point. When plants are grown from vegetative material they have the exact same genetic material as the parent plant. Less than 5-10% of production would rely on vegetative propagation.

ADVANTAGES

- Vegetative propagation allows you to collect from plants that don't readily set seed.
- Allows you to take cuttings and start propagation outside of seeding season.
- Allows you to increase plant numbers without waiting for seed harvesting season.
- Allows you to select plants for the same characteristics as the parent plant, such as wanting a known variety of harakeke for its fibre qualities.
- Able to reach maturity sooner when taking from a mature phase plant.
- Able to skip the germination and emergence phase, reducing the growing time frame.

CUTTING MATERIAL

Growing from cutting material requires taking a cutting of a part of the plant that includes one or more growth nodes.

1. Know which part of the plant for your species works best for propagation i.e. leaf, stem or root.
2. Know when is the optimum time to take cuttings for your species and identify if the plant is ready to take cuttings from. It's best to take stem cuttings prior to active growth.
3. Material for cuttings can't be stored for more than 2 days.



Karamuramu cuttings for propagation

DISADVANTAGES

- Reduced resilience due to lack of genetic diversity, therefore an entire batch may be susceptible when disease hits.
- Can be time consuming compared to seed sowing, for the quantity of plants propagated.
- Not all plants can be grown from cuttings and/or division.

DIVISION

Division is when the parent plant is divided. For each divided part to be viable it must include both an aerial root and leaf growing point.

1. Correctly identify and label your divided plants.
2. Division is best undertaken in autumn to avoid flowering and seeding production times so the plant can put energy into growing roots and shoots.



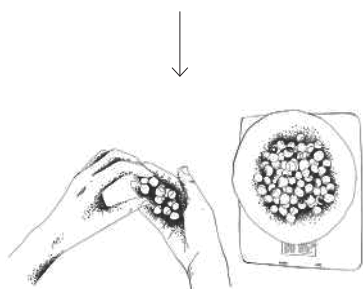
Division of rautahi; each divided part requires both a root and leaf growing point

SEED PROCESSING

Processing seed involves a series of steps to take the seed through to germination. The following pages detail each of the steps shown below.



ONCE HARVESTED



COUNTING & WEIGHING

Keep track of how much seed you have in stock

For seeds that don't require treatment before storage



TREATMENT

Choose your treatment to suit your seed type



LABELLING

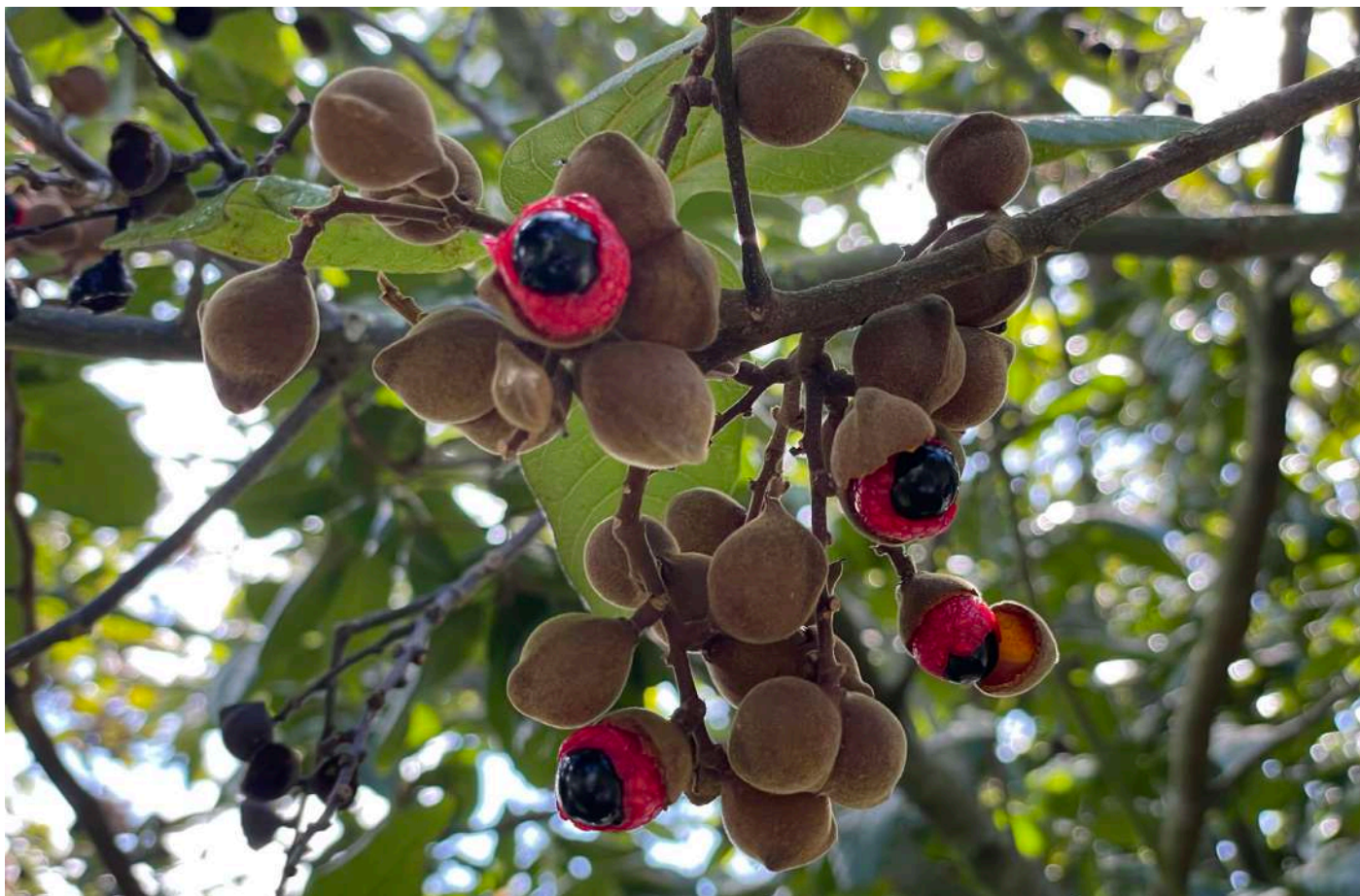
Clearly label each batch of seed - don't rely on memory!

For seeds that don't require treatment, before sowing fresh

For seeds that require treatment, before sowing fresh

HEALTH & SAFETY

Always wear gloves when handling seeds that cause irritation.



Ripe tītoki seeds, Westmere, Tāmaki Makaurau



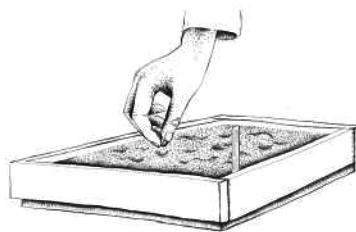
STORING

Store seed in a clean, cool, dry and critter-proof environment to optimise shelf life



RECORDING

Record every batch of seed and build your cheat sheet as you go - make it easy to access and shareable



SOWING

Sow evenly and place in an environment to maximise germination



GERMINATION

Water consistently, monitor for emerging seedlings and record emergence dates

MARAMATAKA

As with the harvesting stage, maramataka needs to be considered throughout the seed processing steps. Consider when the right time to sow each type of seed is, and use this to inform when you undertake each step before this.

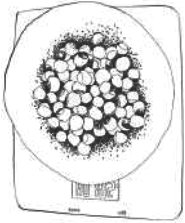
COUNTING & WEIGHING



Counting/weighing, recording, labelling and storing to be carried out at same time

After harvesting, count and weigh your seed to track how much seed you have in stock.

COUNT & WEIGH



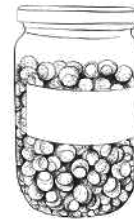
- Weigh 100 seeds for large seeds and 1000 for small seeds.
- Count seeds by placing in piles of 10.
- Do not do this in a windy environment as seeds can blow away.

RECORD



- Record the weight of each type of seed (weight per 100 or 1000 seeds) in your Cheat Sheet (see page 52).
- Re-weigh every season.

PLACE IN JAR



- Match the size of the jar to the amount of seed.
- Skip this step if you are sowing fresh.
- If you are treating with sand or fermentation and then storing, place in jar after treatment.

HYGIENE & BIOSECURITY

- Keep seed types and batches separate - only deal with one seed type at a time
- Use a clean, flat surface and clean down surfaces between different seed types
- Wash hands after handling seeds

TREATMENT



Most native seeds are best sown fresh. Others will require one of the below treatments before sowing fresh or storing. Choose your treatment according to what the seed requires.

FERMENTING



- Fleshy seeds naturally require the breakdown of flesh to remove inhibitors before germination, similar to seeds that go through the gut of a bird.
- Rot down in a bucket until fruit falls away easily from seed, then wash fruit off in a sieve with a hose.
- Sow or store after removing the fruit, depending on the seed.

SAND TREATMENT (SCARIFICATION)



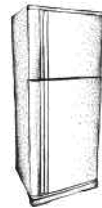
- To break the dormancy of a seed's hard coat, sand can be used to scarify the surface of the seed coat allowing water to soak through. Seed can be stored in the sand until sowing.
- Sand can also help when handling sticky seed. Add sand to a jar of open seed pods and shake until seeds come away from the pod.

HOT WATER & SOAK



- Soaking the seeds in hot water will soften the hard seed coats of native seeds, facilitating germination by immersing them in hot water for a specific period.
- Do this immediately before sowing.

COLD TREATMENT (STRATIFICATION)



- This is the same as cool storage (see page 55).
- Cold treatment for native seeds involves subjecting them to prolonged exposure of low temperatures, typically in a moist environment, to break dormancy which improves germination rates.

WHY DO SEEDS HAVE INHIBITORS?

Some seeds have in-built inhibitors to allow for ideal growing conditions to occur before germination. For example, seeds that require cold need to get through the winter to germinate in spring. Often seed types that are transported by birds need the fruit component to be broken down by digestion. These inhibitors often help them persist longer in their environment.

WHAT IS THE PURPOSE OF TREATMENTS?

In order for seeds to germinate they need three things: **air**, **moisture** and **warmth**. The best way to store seeds is dry, cool and sealed. Understanding the plant and seed requirements will help aid you in choosing the right seed treatment and storage.

Seeds with low viability are best sown fresh. Seeds that have an inhibitor, whether chemical or physical, may need a treatment to break dormancy in order to germinate.

Some seeds are best sown fresh but can also be stored and sown later if a treatment is utilised. However, this may result in longer germination times and reduced viability. Other seeds are best treated before sown, where treatment improves germination time frames and viability.

RECORDING



Counting/weighing, recording, labelling
and storing to be carried out at same time

SEED TRACKER

Record every batch of seed in a 'Seed Tracker'. This will allow you and/or your clients to trace the whakapapa of your plants (back to the source of parent material), and follows eco-sourcing protocol.

The following is an example Seed Tracker in spreadsheet form, showing two sample batches and the key information that should be recorded for each batch.

| Batch ID # | Ingoa | Botanical name | Collector | Date collected | Quantity by weight (g) |
|------------|--------|---------------------------|-------------|----------------|------------------------|
| 1B-2023 | Kauri | <i>Agathis australis</i> | Ariki Wyatt | 5/4/2023 | |
| 2A-2023 | Titoki | <i>Alectryon excelsus</i> | Ariki Wyatt | 1/9/2023 | 200 |

CHEAT SHEET

Build your 'Cheat Sheet' as you go by recording key information you accrue over time about the seeds you collect and grow. Your record keeping will help you learn and improve your own methodology.

Adjust the information held within your cheat sheet as you harvest and learn more about your local plant populations. The following is an example Cheat Sheet in spreadsheet form, showing six sample species and the key information that should be recorded for each species that you work with.

| Ingoa | Botanical name | Fruit / seed | Ripe times | Storage |
|----------|--------------------------------|--------------------------------|-------------|---------------------------|
| Kauri | <i>Agathis australis</i> | Cone/Winged | Feb-Mar | DNS, CM (10d) |
| Titoki | <i>Alectryon excelsus</i> | Black glossy seed (7-10) | Sep-Nov (P) | FIB, Dry (4-5mon) |
| Tarairē | <i>Beilschmiedia tarairē</i> | Drupe (30) | Mar-Nov | DNS, CM (1m) |
| Rangiora | <i>Brachyglottis repanda</i> | Aster | Nov-Dec | DNS, DC (3-5w), CM (4-5m) |
| Ti kōuka | <i>Cordyline australis</i> | Berry | Feb-Mar | SW, DC (1y @ 12-15c) |
| Karaka | <i>Corynocarpus laevigatus</i> | Drupe w/reticulum, single seed | Jan-Apr | DNS |

Key

Fruit then seed broken by comma
All measurements in brackets and mm

SW: stores well
CM: cold moist
DC: dry cool
DNS: does not store well
FIB: fresh is best

DIGITAL & SHAREABLE RECORDS

Whether you choose to use a mobile or desktop based app, an Excel or Google Sheets spreadsheet, or another method to record your seed data, make sure it is a **digital** record that is easy to **access** and **share**, but not easy to lose!

FURTHER READING & RESOURCES

We would like to acknowledge Auckland Botanic Gardens whose records the example Cheat Sheet below is based on. Email admin@uru.nz for their extended Cheat Sheet and/or for a digital file of the Seed Tracker.

| Quantity by # of seed | Storage | Treatment | GPS coordinates | Ecological district | Ecosystem type | Condition |
|-----------------------|---------|-----------|---|---------------------|----------------|-----------|
| 3000 | CM | None | -36.38672828688373, 174.28269842027285 | Kaipara | WF8 | Ripe |
| | Dry | Ferment | -36.85393729940107, 174.71753613775235 | Tamaki | WF11 | Ripe |

| Dormancy | Sow time | Germination time | Treatment & technique | Notes |
|---------------------------|---------------|-------------------------|-----------------------|---------------------------|
| - | Autumn/Winter | | Cool temp | Seed of lone trees poorer |
| - | Spring | 4w | - | |
| Flesh doesn't affect dorm | Winter/Spring | 2m+, rest follow | Press, light cover | Susceptible to rot |
| Strat can even germ | Spring/Autumn | 2-4w+, erratic | Sow thickly | Low viability |
| Strat | | 1-2m+ | SWF | |
| Dehusking breaks dorm | Winter | Up to 6m, 2-3w dehusked | Direct to cell/tray | May need drenching |

*d: day
m: month
y: year
strat: stratify
scar: scarify*

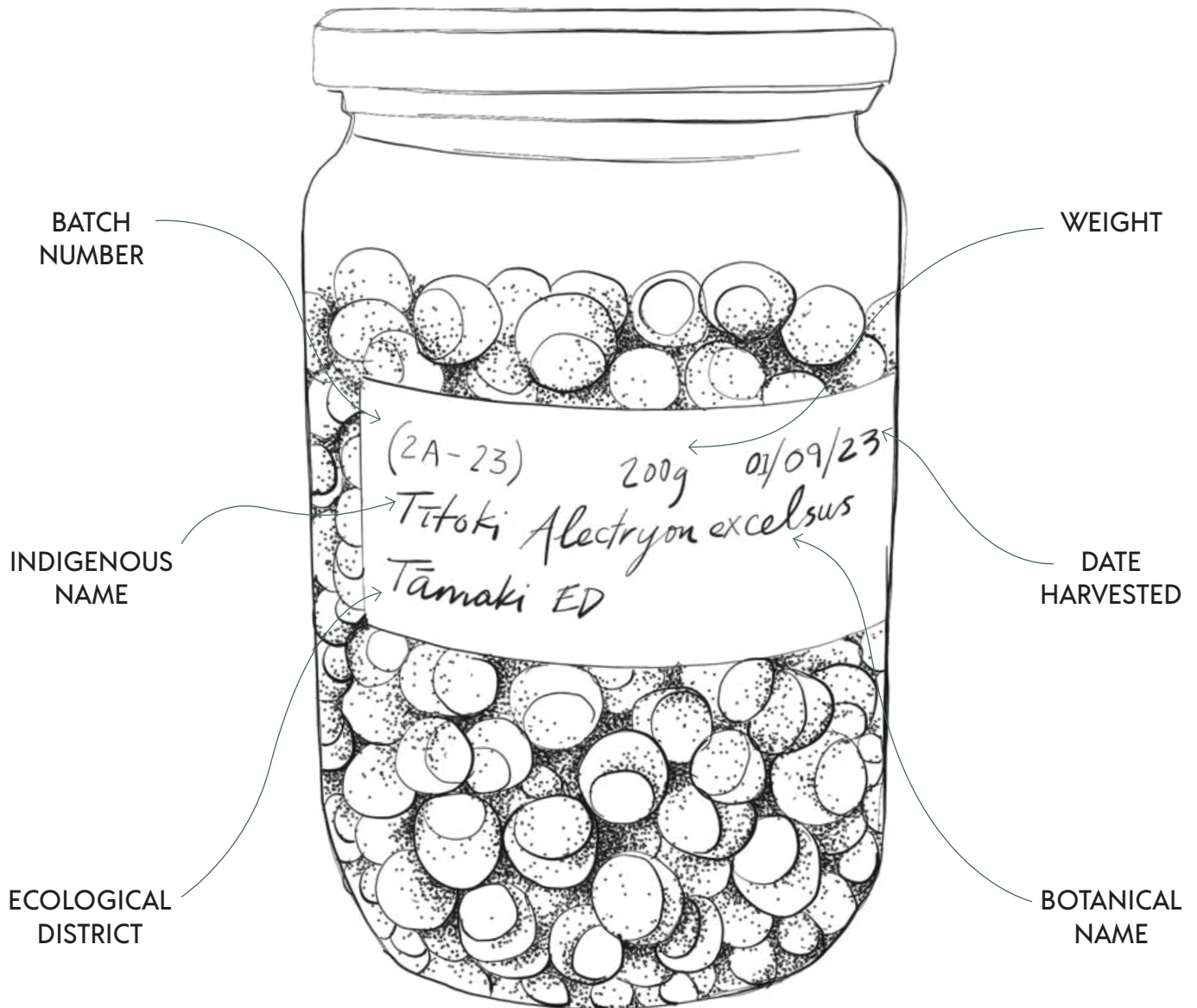
*Mainly reflects
preferred
germination
temperatures
and seasonality*

LABELLING



Counting/weighing, recording, labelling and storing to be carried out at same time

For every jar of seed, include the following key components on the label.



BATCH NUMBERS

Batch numbers can be created with any combination of numbers and/or letters, as long as each batch of seed harvested has its own unique code. This will allow you to trace the whakapapa of the seed and follow eco-sourcing protocol.

Run your batch numbers in series. For example: each species of seed harvested could be allocated a number (e.g. the number 2 for titoki), and each batch of that species harvested in the year could be allocated a letter, starting with A. Include the year harvested in your batch number. The above example “2A-23” indicates this is the first batch of titoki harvested in the year 2023.

STORING



Counting/weighing, recording, labelling and storing to be carried out at same time

Choose your storage type according to what the seed requires.

BEFORE STORING



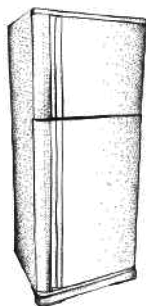
All fleshy fruit needs to be removed by cleaning before storing seed.

DRY STORAGE



Requires a clean, cool, dry and critter-proof environment to optimise shelf life.

COOL STORAGE / COLD TREATMENT



Requires fridge to prevent germination. Cool storage is the same as cold treatment (see page 51).

WHY STORE SEEDS?

1. Insurance

Seeds can be stored as an insurance so that if part of your batch doesn't germinate or you need to sow more than originally requested, you have some seeds of that species left in stock.

2. Production needs

You may need to store seed rather than sow fresh to time the germination in line with the planting season.

4. Timing with mast seeding species

Some species only seed every 2 or more years, e.g. rimu and tītoki. This is known as mast seeding. When there is a good harvest year, you may wish to bank more than you require to sow for that year.

SOWING



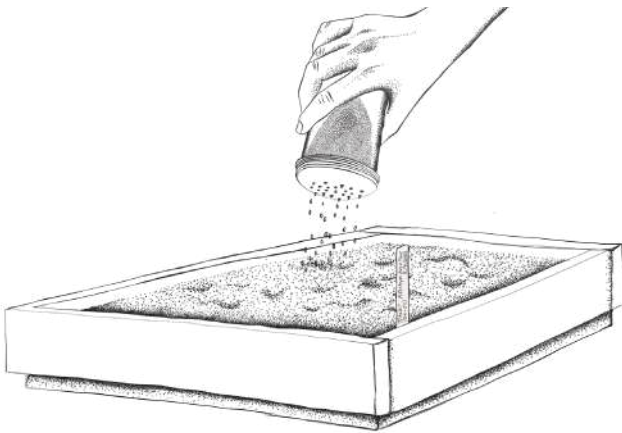
Choose your sowing method according to the size of the seed.

INDIVIDUALLY SOWN



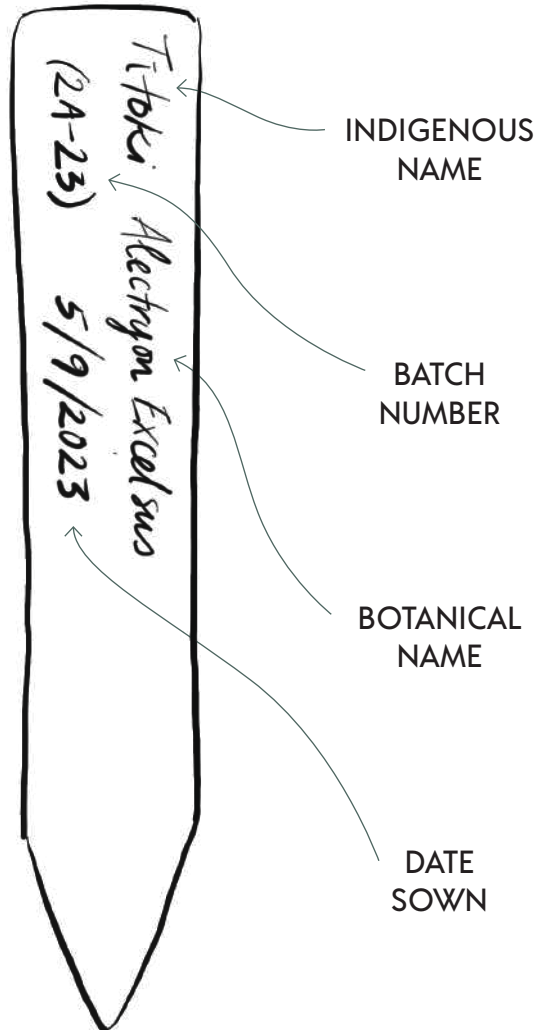
Sow evenly spaced and in rows.

SHAKER METHOD



For small seeds, use a salt and pepper shaker for sowing

For every seed tray, include a plant label with the following information.



CHOOSE THE TRAY TO SUIT THE SEED

Select a tray for the type of seed being sown. For example a large tap-rooting seed will require a deeper tray depth.

RECORD DATES SOWN

Remember to record the dates sown in your Production Schedule.

GERMINATION



Place seed trays in an environment to maximise germination. Water consistently, monitor for emerging seedlings and record emergence dates.

CONDITIONS FOR GERMINATION

For seeds to germinate, conditions will vary for different species. Some require dark (like the forest floor) until emergence, then an increase in shaded light. Others such as mānuka and pōhutukawa are able to germinate in full sun and bare ground - these can be sown direct to pots/trays. General conditions for germination include:

- Moisture - consistent, don't drown or drought
- Air - but not cold draughts
- Warmth - optimum temperature is between 15 to 25 degrees

Seedlings should be placed in an environment to maximise germination. The purpose of the propagation house is to be able to control the conditions that lead to a more consistent germination outcome. Temperature and light can be controlled with ventilation and shade cloth. Experiment to find out what are the conditions that best suit each of the species you are growing.



Example of propagation infrastructure where temperature, water and light are controlled to meet optimum germination conditions

WHAT WENT WRONG?

What to check for when things don't germinate well:

- When first germinated seedlings have no leaves or bark on the stalks, this indicates that slugs and snails have likely 'mowed' over the seedling. Species such as kōwhai are particularly vulnerable to this.
- Liverwort and moss in seed trays are an indication that the potting medium is too wet.
- Seedlings coming up overcrowded in the tray indicates over-sowing.
- Seed trays coming up patchy could either be due to the species of seed being one that naturally germinates patchy, or it could indicate that the particular seed batch had low viability.
- Powdery mildew on seedlings can indicate poor ventilation.
- Long and leggy seedlings indicate that they have been left in low light too long after emergence.



Powdery mildew

RECORD GERMINATION TIMES

Each species has their own germination period. Germination time varies from 1 week to several years. Record emergence dates in your Production Schedule and add the germination times for each species to your Cheat Sheet as you go.

POTTING UP THROUGH TO DELIVERY

Potting up is a time to consider all aspects of a plant's growth and what it may require next. Ensure plants that are leaving your nursery are of a high quality through maintaining good practice and looking after the health of your plants.

POTTING UP

When potting up, consider what the plant needs in terms of weeding, pruning and root trimming. Check in on the quality of the potting mix, whether the plant requires side dressing, what stage of growth it is in and whether it is ready to move from seed tray to seedling pot. It is the ideal time for grading as it avoids double handling plants (moving them at a separate time). Once potted up or on, set the placement for the next stage of growth in the nursery, e.g. possibly moving from shade house to hardstand.

Key principles to keep in mind when potting plants:

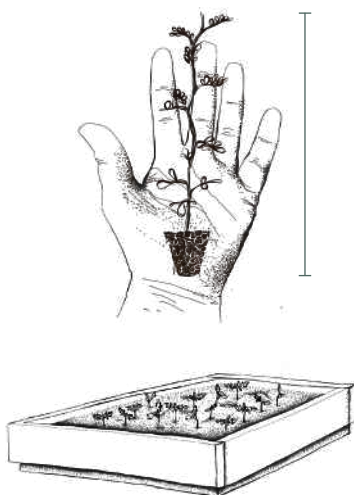
- Identify the optimal time in the plant's growth for potting on - this decision needs to be plant focused and may vary between species.

- Be consistent with having plants placed in the centre and at the right height and depth within the pot.
- Select pots for plant growth type. For example, tap rooted plants will require a tall narrow pot compared to a shallow fibrous rooting system of a ground cover.
- Weeding should occur away from the potting benches.
- Water plants before potting on and do not handle plants with dry roots.
- During hot weather, water in small batches without leaving for long periods unwatered such as before breaking for lunch and before returning plants to full sun locations.

Refer to page 26 for guidance on potting mix and potting benches.

POTTING UP: LANDSCAPE & ENRICHMENT PLANTING

When the plant gets to this size, transfer to the tube



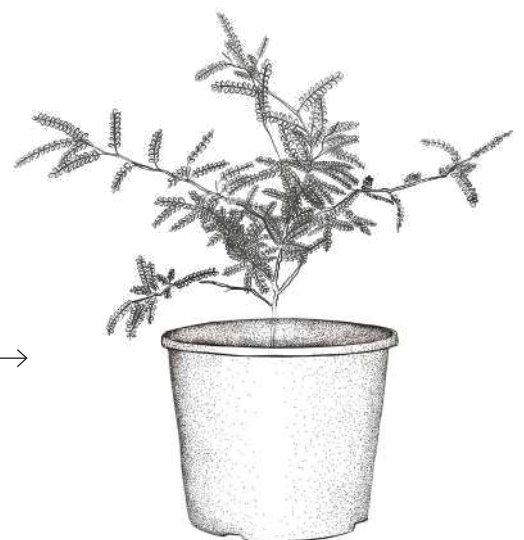
INDENT OR SEEDLING TRAY

When the plant gets to this size, transfer to the 1L or 2L pot



TUBE

Plant is ready for planting when roots are established & top growth is robust and true to natural form



1L OR 2L POT

OUT THE DOOR

Plants can be considered ready to leave the nursery when they have well established roots within the pots (but not root bound or excessively growing out the base) and when top growth is robust, true to natural form with even growth across the container. Plants should be disease and damage free, with all weeds removed. Plants should be labelled either individually

or labelled by each block of the same species. Keep a record of plants delivered and their batch number to maintain traceability of seed source. Plants should leave with soil still moist as there may be a delay before they get in the ground. See diagram on opposite page for an example of a koromiko in a 2L pot that is ready to leave the nursery.

MAINTAINING GOOD PRACTICE

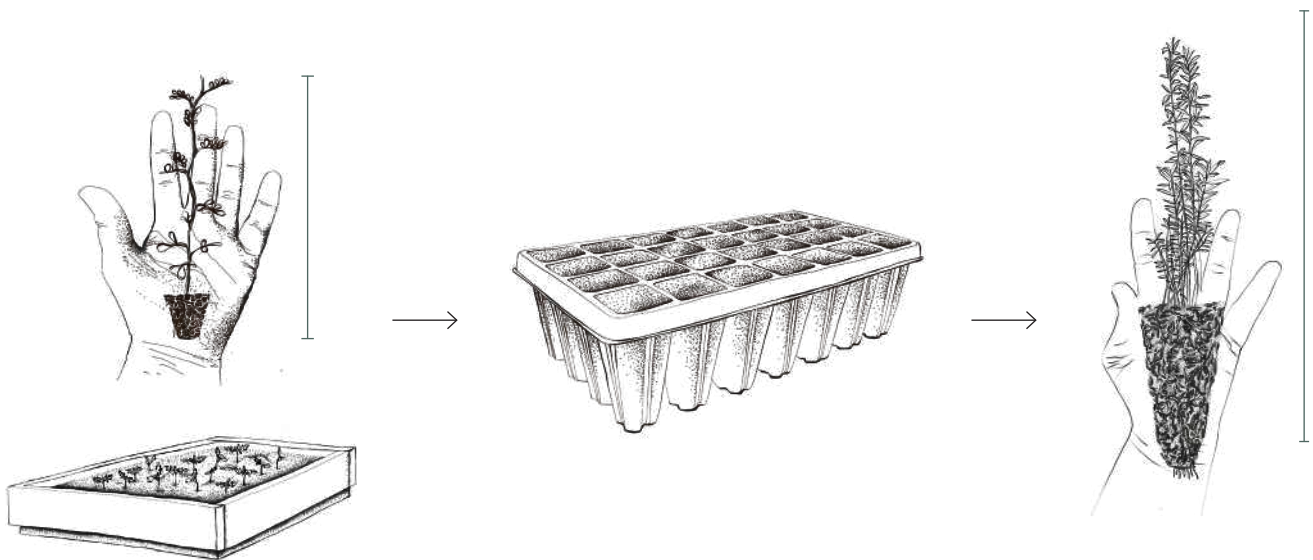
With every step in the growing process from planning, harvest, seed sowing through to potting on and out the door, maintaining good practice is required to achieve high plant quality for the receiving environment. Healthy plants establish better, have increased survival rates, are less likely to create canopy gaps in restoration programmes and reduce project costs. Good practice can be maintained through:

- A programme of works with seasonal, monthly and weekly tasks that are plant production focused. Resist the urge to create tasks for people before the plant requirement.
- Training for all staff / volunteers about quality standards, what healthy looks like and how to pot in the centre and at the right depth. Share why your nursery uses those methods as well as any innovative practices towards improvements.
- Instilling confidence, for example to avoid over-sowing trays (this can be a sign that people are not yet confident that they will germinate).
- Working with a volume of plants that reflects the nursery capacity to be able to grow all plants at optimal health.
- Weeding before the roots have a strong hold in the pot.

POTTING UP: RESTORATION PLANTING

When the plant gets to this size, transfer to the T28

When the plant gets to at least this size, it's ready to go out for restoration planting



INDENT OR SEEDLING TRAY

T28 (TRAY OF 28)

BIOSECURITY PREVENTION & MITIGATION PLANNING

A biosecurity plan will help to prevent plant loss, disease spread and will contribute to responsible practice within nurseries towards the control, mitigation and elimination of environmental pests.

BIOSECURITY / PEST MANAGEMENT IN THE NURSERY

Pest management is an ongoing activity for native plant nurseries and requires time and commitment to keep on top of (re)occurring issues. Prevention is always better than cure. For issues that are difficult to have 100% prevention, such as wind-borne rusts, it is a matter of early detection, containment and mitigation.

Some of the most common reasons for pest management are:

- Increases survival rate of plants grown
- Reduces waste - seeds, time, resources
- Increases quality of plants grown
- Increases ability to grow rare / threatened species through improved environments
- Distribution of knowledge and communication with staff and externally with other nurseries and biosecurity agencies
- Tracking our journey - a tool that lets you see how you are doing and can share insights with other nurseries

GOAL SETTING & TOHU

Set biosecurity goals for your nursery and tohu that will help with monitoring how you are tracking with your goals. Tohu can be signs of well-being that may be seen or felt. Goal setting at the beginning of your nursery journey will help keep your nursery operating safely and ensure your growing environment is as healthy and disease-free as possible. Goals can be adjusted and adapted as time goes on and learnings occur.

PREVENTION BY DESIGN

Equipment should be kept clean, well serviced and sharp as this will reduce running costs and prevent the spread of disease and damage to plant health. Placement of species should be organised according to what the best growing environment is for each species. This should take into account the amount of air flow required for species. Spent material including cuttings, weeds and old potting mix should not be dumped. Instead, have a designated area for composting treatment and reuse where and as appropriate.

Quarantine areas that are designated to receive plants that have come from other sites or for newly identified infestations. Ensure you have removed weeds from pots before bringing them into your potting area.

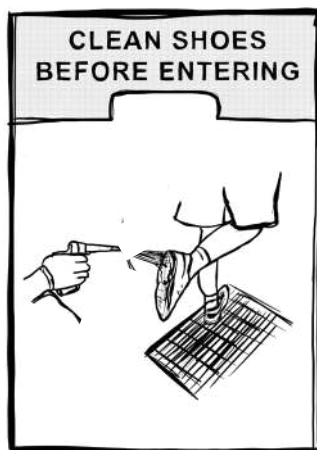
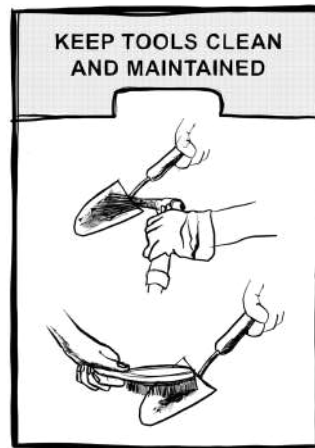
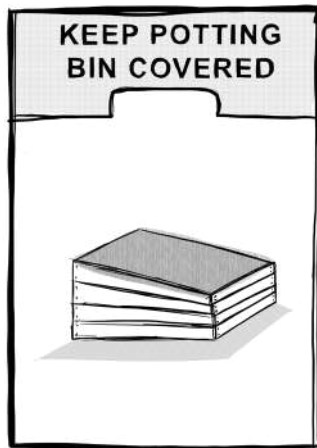
Urgent incursion planning is about understanding which disease and pests need to be reported. Ensure your nursery has enough space and bags and/or containers to be able to isolate the infested material away from healthy stock.

Good practice for all incoming materials and plants should include sterilising with spray e.g.. fungicide, and visiting your suppliers to discuss their biosecurity practices in regards to potting mix processes and transportation.

Reduce risk of issues arriving at your nursery by visiting your suppliers of living materials (such as potting mix and mulch) and checking that their materials are pest free. For island-based nurseries a Pest Free Warrant is required for your suppliers, or a biosecurity inspection of supplies will have to be arranged with the Department of Conservation.

GETTING THE MESSAGE CLEAR & INSPIRING PEOPLE

Use clear, visual graphics that provide explanations of biosecurity processes for your staff and/or volunteers. Signage should be inspiring, and motivate people to want to carry out good biosecurity practices and care for biodiversity.



MITIGATION

Mitigation may be as simple as adjusting the growing environment by manipulating air movement, light or temperature, through to an aggressive removal of issues such as 'burn and destroy' and 'bag, tag and dump'.

MONITORING

Early detection of issues reduces time required for correction and recovery time for plants to return to health. Monitoring could include monitoring for tohu - signs of wellbeing that are seen and felt. Record the initial observation of the issue, with annual monitoring to see changes over time. You may want to add in seasonal monitoring. Records should include: dates of monitoring; who undertook the monitoring (for consistency); action required now, this week and next week; a check-box showing monitoring has been completed and/or is ongoing; and any required notes. Report new signs of previously not seen species e.g. new weeds, rusts, cankers, bugs etc.

IN-HOUSE AUDITING

This should occur across all biosecurity processes and could be undertaken annually.

PLANT PASS

[Plant Pass](#) is a voluntary certification scheme for all New Zealand plant producers that recognises good biosecurity practices and provides assurance for plant buying customers.

Agencies such as Auckland Council have signed up as [Plant Buyers Partners](#). This means Auckland Council and other Plant Buyers Partners will procure from those nurseries that are certified or are working towards obtaining their certification in Plant Pass.

IDENTIFYING BIOSECURITY RISKS

The following diseases and pest animals are issues that can affect the whole nursery and the surrounding community. It is the responsibility of all people entering the nursery to be able to identify and understand these risks in order to avoid unnecessary damage to plant health. If left, management and elimination of these can be time consuming.

Nursery weeds that are left, while not necessarily killing nursery plants, can be time consuming to remove later, they can also inhibit water and food uptake of individual plants. Environmental weeds of note are mothplant, woolly nightshade, lilly pilly, and privets. Monitor the boundary for plantings that can't be eliminated such as hedges, and trim prior to seeding to prevent seed spread.



Cyperus eragrostis - nut grass

NUT GRASS (*CYPERUS ERAGROSTIS*)

Originating in North and South America, this exotic grass grows on the banks of rebo and awa, with seeds easily dispersed by contaminated machinery. It is a common invasive species in nurseries and needs to be eliminated when found.



Liverwort

LIVERWORTS

Algae, liverworts and moss will grow on the soil surface of containers and are usually associated with compacted soil or poor drainage. They inhibit growth of young seedlings by forming a mat which obstructs soil absorption causing the pots to dry.

As liverwort thrives in damp conditions, improve drainage in containers, greenhouse and nursery facilities and avoid over-watering. Drip or micro irrigation can reduce the spread of liverwort when compared with overhead irrigation systems.



Phytophthora agathidicida - kauri dieback

KAURI DIEBACK (*PHYTOPHTHORA AGATHIDICIDA*)

Phytophthora agathidicida is a fungus-type pathogen which damages the tree's root system. It reduces the tree's ability to take water and nutrients from the soil and transport it throughout the plant. This is sometimes referred to as kauri disease. Prevent by ensuring clean shoes before entering areas with kauri present, isolating kauri plants in nurseries, not entering rāhui designated areas, providing clear signage, and reporting to local regional council.

MYRTLE RUST (*AUSTROPUCCINIA PSIDII*)

Myrtle rust is a wind-borne fungal disease that can infect taonga species such as mānuka, pōhutukawa and rātā. The disease causes bright yellow-orange powdery pustules on young leaves, shoots, fruits and flowers of plants in the myrtle family. Microscopic spores travel by wind, machinery, insects, birds, and people.

If you think you have detected myrtle rust, photograph it and upload it to [iNaturalist](#) for confirmation. Label it “myrtle rust” and note what host plant species it was found on. Follow these [guidelines](#) for removal.



Austropuccinia psidii - myrtle rust

APHIDS

Aphids are small sap-sucking insects. Common names include greenfly and blackfly, although individuals within a species can vary widely in colour.

No external reporting is required, however internal reporting is important. Record frequency and intensity of infestation as well as what was affected and how you controlled it. Reducing or eliminating pesticide use will promote the presence of natural predators, and in turn help control aphids.



Aphids

RAINBOW SKINKS (*LAMPROPHOLIS DELICATA*)

The plague or rainbow skink is native to Australia. They look similar to mokomoko (native skinks) but are smaller, and have one large scale on the top of their head, whereas mokomoko have two smaller scales. The rainbow skink is brown with an iridescent rainbow sheen.

Plague skinks reproduce rapidly - competing with mokomoko and other native fauna for food and habitat. Ensure there are no eggs when plants leave the nursery, particularly when plants are going into restoration projects for the establishment of mokomoko habitat.



Lampropholis delicata - rainbow skink

SNAILS & SLUGS IN THE PROPAGATION HOUSE

Slugs and snails are an issue in the propagation house with new seedlings and also with small soft barked trees. They can damage both seedlings and mature plants.

They hide from the heat and sun during the day under plants, in decaying leaves, areas with weeds, piles of timber or rubbish. Keep weeds under control and remove any hiding places i.e. rubbish piles. Non-chemical slug and snail traps are a good control when strategically placed.



Slugs and snails

4

Telling your Story & Sustaining your Nursery

- 66 Building your communication plan
- 68 Defining your market
- 70 Opportunities for collaboration
- 72 Financial forecasting
- 74 Funding



BUILDING YOUR COMMUNICATION PLAN

Know your pūrākau and share. Clients, community and beneficiaries are all interested in both the origin or whakapapa of your nursery and the journey. Articulate your kaupapa with staff and volunteers; understanding your kaupapa is required in order to be committed to it. Early communication on biosecurity issues helps prevent and mitigate larger issues as they occur. Your communication plan should be linked to your organisational strategy as a tool for delivery.

MANAGING YOUR COMMUNICATIONS

Consider who are you talking to; there may be many different groups you communicate with, such as volunteers, staff, donors, plant buyers and funders. Different groups may require different messages, tones, information, calls to action, or channels etc.

Record your 'customer' or volunteer database to capture their engagement with you. It may be useful to use customer relationship management software (CRM) for this. Record contacts such as your volunteers so that you can invite them to events or record their hours, and plant buyers so that you can send them your plant list and encourage them to buy plants before the planting season. Also consider security and privacy issues concerning your CRM.

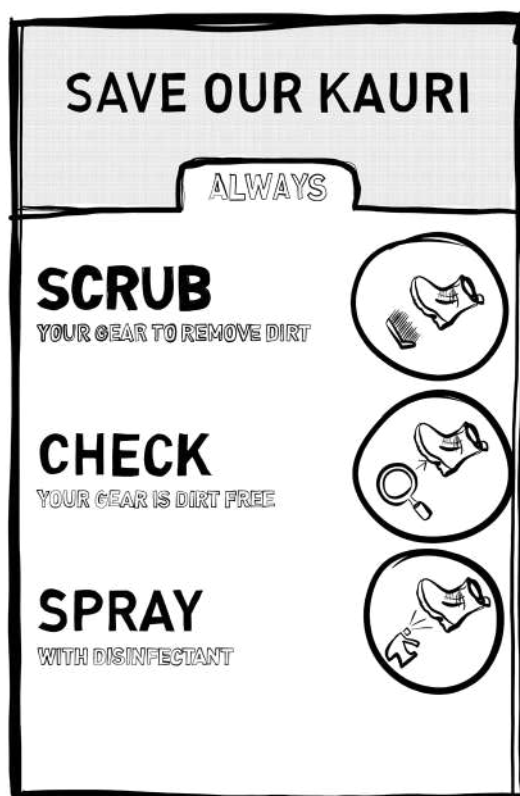
Use a consistent name and brand look (colours, logo, font etc) to make it easier for you to build awareness of your nursery. This helps your 'customers' to recognise you when you communicate with them. Link it back to your kaupapa, which will guide your brand development.

INTERNAL COMMUNICATIONS

Internal communication involves clear reporting of activity within your organisation so staff and/or volunteers are well informed. Your kaupapa should be clearly communicated out to staff and/or volunteers.

Key instructional processes should be documented and communicated internally e.g. policies, health and safety, signage - these are all part of your internal communications.

Having communication processes in place is important so that everyone has consistent expectations and is kept safe. This includes what and who to communicate to when an accident happens, guidelines for what and how to post to social media, as well as informational signage such as hazard ID boards, biosecurity signage or instructional signage.

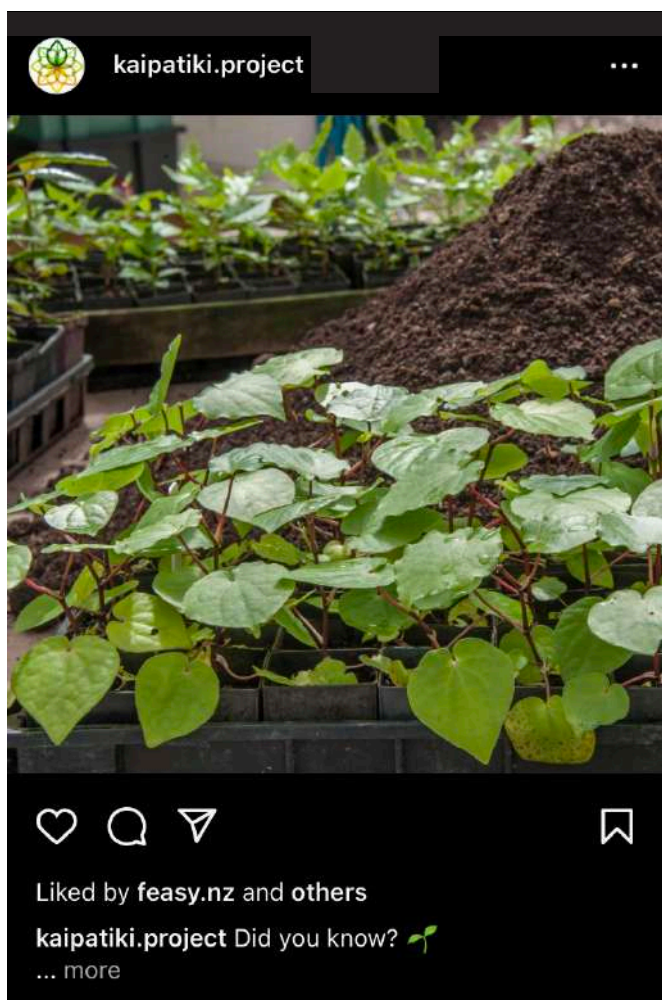


Example of informational signage

EXTERNAL COMMUNICATIONS

TELLING YOUR STORY

Sharing your story and reporting are key components of a good communications plan for your nursery. It's always important to let people new to your nursery know about your organisation and who they're engaging with, for example new volunteers or corporate volunteer groups. Updates and events posted on social media and a website, take time, resources and skills to keep current and keep people engaged with your story. Websites, social media and newsletters require a skill set in and of itself - there are tricks and tips to make this aspect of running a nursery easier. Seek help if this isn't a skill set you hold! There are places to go to gain these skills or watch out for community engagement and comms workshop opportunities.



Kaipātiki Project Instagram post

EVENTS & ACTIVITIES

Events and activities are ways to communicate and share your story and bring people in, whether they be calls for help, Christmas do's or volunteer thank yous. Events and activities require robust communication built around them. How well you communicate the purpose of events and the activities taking place will draw people into your kaupapa. The level of clear and articulated information reduces worry and gives confidence in how well you run your organisation, which in turn attracts more people to engage with your organisation. There are multiple mediums you can utilise - video, print and word of mouth. There are plenty of free and paid channels that can be used for promotional activity to reach a wider audience.



Hui and events

DEFINING YOUR MARKET

Who is your market for the plants your nursery will grow? Is it the restoration project(s) you are looking after, the parks officers of the public reserve your nursery is situated in, a private landowner, a restoration project of a lifestyle block dweller, farmers, your local school, stream, or an infrastructure programme - lasting one year or several? Whichever it is, or if it is a combination of any of the above, it is important to understand the needs and requirements of that market – species, quantities, grades, the total area plants are required for and if you will be supplying for more than one ecological district.

IDENTIFYING & UNDERSTANDING THE MARKET

As a first step, it's best to understand what capacity you have and your current skill and knowledge level for growing plants. Then identify your market, and seek to understand their requirements for types and volumes of plants.

Understanding the market requires identifying potential clients, and surveying those potential as well as any existing clients. Find out: species, grades, and quantities required as well as for where (which ecological district and when plants are required).

MARKET DEMAND

Market demand is the quantity and types of species required over a set time frame. It's important to have an understanding of this to help you decide which species to focus your energy on.

MARKET REQUIREMENTS

Whether it is for your own project or gifting or selling plants for a contract, the receiving environment requires plants of good health and free of disease, weeds and non-native stowaways. Plants should be true to form and have a traceable whakapapa (especially important for projects that require eco-sourced plants). Plants should have a well established root system but not be root bound. Top growth should be true to the character of the species (not all species are abundant and robust however there should be no stem rot or crown rot).

Plants should arrive on site on time. When clients are ordering ahead, it's good to let the client know how the growing season is going for their order, for example whether all the seeds sourced and sown germinate as well as whether you will have the expected quantities in the required grades by time of delivery. Communicate early about any issues that can't be resolved so substitutes or back up suppliers can be organised between you and the client.



All plants grown by Te Tauroa nursery on Motutapu are grown for the restoration of Hukunui Pā

OPPORTUNITIES FOR COLLABORATION

With no nurseries currently growing for all the ecological districts in any one rohe, there is room to collaborate with new and existing nurseries to increase the plants available without competing in the same market. Collaboration can allow nurseries to complete a plant order that they may otherwise not have been able to do alone or source and supply components such as seeds, plants, resources, shared training and workshops.

Good collaborations start early with each partner identifying what they can bring to the table and agreement on who is able and responsible for what elements of the collaboration.

Work out if the collaboration is defined by a project or a time frame, and what aspects of your kaupapa are overlapping, and share resources and knowledge. Nurseries and clients may collaborate to achieve greater social outcomes. For example a client may pay upfront to secure an order, with the deposit paid going towards the set up of a new nursery or nursery expansion.

EXAMPLES OF TĀMAKI MAKĀURAU NURSERY COLLABORATIONS

FRIENDS OF MAUNGAWHAU & TŪPUNA MAUNGA AUTHORITY

Friends of Maungawhau volunteers grow and maintain planting while Tūpuna Maunga Authority provides the space, maintenance of infrastructure and resources to grow the plants. The Authority also provides guidance on planning what to plant as well as manages those contractors who play a supporting role in the restoration of the maunga.

TREES FOR SURVIVAL SCHOOLS & PRIVATE LANDOWNERS/FARMERS

Trees for Survival works with over 120 schools and communities across the motu to grow native plants for the restoration of awa and vulnerable sites. The organisation provides project coordination between schools and landowners of restoration sites to achieve both education and environmental restoration outcomes.

NGĀ RINGA O TE AUAUNGA - FRIENDS OF OAKLEY CREEK & WATERVIEW PRIMARY

Ngā Ringa o Te Auaunga - Friends of Oakley Creek operate a nursery at Waterview Primary School for the purpose of planting Te Auaunga - Oakley Creek. The school provides space and Ngā Ringa o Te Auaunga provide the materials and volunteers.



Aawhitu Peninsula Landcare nursery open day, hosting nurseries from around the Auckland region to share knowledge

FINANCIAL FORECASTING

Planning ahead for your nursery should include financial forecasting. In the first couple of years this may be difficult and you may require additional advice to be able to forecast accurately. The following outlines some of the general areas to consider, however a more comprehensive list of costs may be required for your nursery or organisation's needs.

SET UP COSTS

The amount of start up or expansion resourcing you have available will dictate how much can be undertaken in the first year or stage of your nursery. It is not wise to enter into set up or expansion mode without securing the funding through either income from sales, community funding or grants that cover the ongoing annual costs for the following year. You can not commit to growing plants and taking deposits for plants that you can't guarantee to be able to cover associated costs through to delivery. For simple, small scale nurseries this may be just covering volunteer time to care for plants, to pot up, water and weed plants through to delivery.

Set up costs may include some or all of the following:

- Design, planning and consents
- Earthworks, driveways, drainage, irrigation infrastructure, tanks and bores (many of these items may be staged over time)
- Shelter belts, hard stands and access paths
- Buildings, potting sheds, staff facilities, fridges and signage
- Machinery and vehicles
- Office and administrative systems, health and safety, pest management plans, production planning, nursery inventory system, computers and phones
- Initial staff time - this may increase as the nursery grows

SETTING YOUR PRICES

Prices for your plants should cover the following:

- Potting mix, pots and all associated annual material costs
- Wages and cost of human resources to produce the plants
- Overheads of the business to produce the plants for delivery - this may be a percentage of overheads if the nursery isn't the sole enterprise occurring as part of the business

ANNUAL RUNNING COSTS

Annual running costs are those that reoccur every year, rather than one off costs. Overheads include essential costs such as keeping the lights on, the irrigation running refreshments stocked and a place to boil the jug. Don't skimp on valuing people - costs associated with this may include staff wages or volunteer recognition, training opportunities, collaboration with community partners and working in year-round healthy and safe conditions for your team.

Annual running costs may include some or all of the following:

- Human resource compliance, personal protective equipment (PPE), wages, KiwiSaver and professional development / training
- Communication activities and marketing
- Leases, insurances and accounts
- Power and water
- Consumables for the office and nursery
- Potting media and pots
- Maintenance of infrastructure and machinery
- Annual fees for nursery inventory software

Some of the above costs are directly associated with the nursery's operations, while the other costs may be shared across an entity's other activities such as communications costs, power, water and office overheads.



Kaipātiki Project nursery relies on a combination of funding, grants, contracts, donations and volunteers to cover costs

FUNDING

Your kaupapa, your nursery organisational structure, the scale of your nursery and the number of plants grown will all inform your funding model. Funding is available for iwi, hapū and community nurseries for either your whole entity (untagged funding for any costs such as organisational overheads and management across the organisation) or for nursery components (for example for tools, potting mix, irrigation, a new shade house etc).

Generally speaking, funding, grants and donations are helpful for different aspects of nursery costs:

- Grants or funding agreements may be available for materials, community education and nursery coordination of volunteers.
- Contracts for services may be available to deliver on a product or service such as plants, planting implementation and maintenance.
- Donations, sponsorship or discounted materials/tools/equipment/services may be available in a combination of options. However, donation-based nursery operations can be hard to forecast income and donations may be difficult to secure annually.
- Cash donations for untagged expenses are more flexible in use and require less in reporting time compared to grants, funds and contracts.

For new nurseries, it may be difficult to secure funds for set-up. A collaborative partnership model may be more workable, e.g. an established organisation may be an 'umbrella' organisation which holds the funds for a smaller or newly established group.

FUNDING STRATEGY

A funding strategy helps identify and plan the work ahead for sourcing funding. The following information needs to be considered:

- Fund criteria - who can apply for it and what purpose the fund is for
- Frequency of fund - when do rounds open and closing dates
- What information do you require for the application?

When seeking funding to expand, support or start up a nursery, you will be required to provide the following:

- What types of activities or materials do you need funding for e.g. potting mix, infrastructure, administration, wages?
- Why should the funder choose to support your organisation?, What is your nursery's purpose or kaupapa e.g. growing plants, teaching, workshops, restoring local environments, protecting endangered species?
- Key contact person
- Quotes for equipment or external services and often letters of support are required for large applications.

- Expected outcomes/benefits of the project
- When seeking funding partnerships towards a specific purpose or project, set reasonable outcomes and clear timeframes that are achievable
- Who will be responsible for writing the applications, administrating the funding and reporting on the outcomes and financial accountability back to the funders?

Additional supporting documentation often includes:

- Competitive quotes for materials and subcontracted services
- Letters of support, e.g. from Council if you lease the land from them, other respected environmental groups or community organisations, or community parks rangers/officers if your nursery is located on a public park
- Total project budget and the amount you are requesting from the funder; break-down of costs i.e. materials, wages, operational costs, mileage, sub-contractors, volunteer time (this is often calculated at the current Living Wage rate)
- Any other sources of support e.g. your own contribution, in-kind donations and other confirmed or pending funding

- Charitable status or incorporated society number
- you may be able to be umbrellaed by another organisation until achieving charitable status

It is important to keep clear financial records and ensure all funds are only used for the purpose they were intended. Also avoid 'double-dipping', e.g. taking funds for the growing of plants for a specific project and then charging for those same plants.

GRANTS

Grants are a type of funding with their own criteria and accountability reporting required, often with a timeframe for delivering key milestones. They have a timeframe in which both the delivery of outcomes and use of the money must be uplifted by.

CONTRACTS FOR PRODUCTS & SERVICES

Contracts for services are often similar to funding in that there will be criteria for accountability reporting often with a timeframe for delivering key milestones and aligned invoicing. Nurseries or enterprises may enter into contracts to deliver a set number of plants over a set period of time with associated services.

REPORTING

Reporting against funding agreements/grants will have accountability criteria sent through as part of the funding confirmation or signed agreement. It is best to actively collate the required information for reporting at the time of occurrence during the project (do not wait until the end!). This may include the number of workshops, number of participants, feedback forms, quotes for how the workshops or plants have benefitted participants or receipts for costs incurred to be reimbursed.

Supporting information includes photos and videos of activities, such as workshops, planting days or any newly built or upgraded infrastructure. If you have received funds for communications or events, you may include social media posts and communication plans or strategies in your reporting.

DONATIONS

Donations require acknowledgement and, like with all funding, it is good to be able to say what the donation contributed to e.g. the new propagation house, materials for an education display or a new tractor. Donors like to know how their donation is being used, unless it is given untagged for any purpose. Bequests/ gifts in Wills are another form of donation that an individual may make either with specific guidelines or for any purpose.

SPONSORSHIP, VOLUNTEERS & IN-KIND DONATIONS

The most variable type of support is often the hardest to forecast but a vital contribution. People, knowledge, expertise, materials and physical help in the form of volunteers and in-kind contractor donations. This support may be requested via social media events and regular working bees. How many people will depend on timing availability, seasonal, weather and any local or national health crisis (pandemics).

All form of support should be acknowledged and may have conditions to be met- manaaki, suitable volunteer facilities, public acknowledgement and in the case of sponsorship this may be in newsletters, social media, signage, annual reports and event advertising.

FUNDING LINKS

- [Auckland Council Grants Calendar](#)
- [Community Matters \(Lottery, COGS, Oranga Marae and other funds\)](#)
- [Foundation North](#)

REFERENCES & FURTHER LINKS

- [The Propagation of New Zealand Native Plants - Lawrie Metcalfe](#)
- [Te Haumanu Taiao - Te Kaunihera o Tāmaki Makaurau | Auckland Council](#)
- [Collecting and propagating seeds - Department of Conservation | Te Papa Atawhai](#)
- [Native seed weights - New Zealand Tree Seeds](#)
- [Plant identification and logging plants - iNaturalist](#)
- [Plant Pass producers](#)
- [Te Aka Kōtuia | Kaitiaki & Community Nurseries in Tāmaki Makaurau](#)
- [Training - Primary ITO, Te Pūkenga](#)
- [New Zealand Plant Producers Incorporated \(NZPPI\)](#)
- [New Zealand Plant Conservation Network | Rōpū hononga Koiora Taiao ki Aotearoa](#)
- [Ministry for Primary Industries | Manatū Ahu Matua](#)

IMAGE CREDITS

All imagery and graphics in this guide were produced by Uru Whakaaro for the purpose of the guide, excluding the below.

- P. 5 *Ngauteringaringa Community Nursery* - Supplied by Lance Cablk
- P. 15 *Pūniu River Care* - Supplied by Sam Judd
- P. 21 *Pourewa Nursery* - Supplied by Mike Bhana
- P. 22 *Kaipātiki Project Landscape Plan* - Produced by Zoe Carafice Landscape Studio
- P. 25 *Overhead sprinkler* - Retrieved from [Nelson Australia](#)
- P. 35 *John Cambridge at Te Tauroa* - Supplied by Alex Mcvinne
- P. 43 *Ecological Districts of the Auckland Region* - Retrieved from [Auckland Council](#)
- P. 47 *Kāramuramu cuttings* - Supplied by Sabine Pollack
- P. 57 *Propagation infrastructure* - Retrieved from [Pūniu River Care](#)
- P. 57 *Powdery mildew* - Retrieved from [Planta](#)
- P. 62 *Liverwort* - Retrieved from [iNaturalist](#)
- P. 62 *Kauri dieback* - Retrieved from [NZ Geographic](#)
- P. 63 *Myrtle rust* - Retrieved from [Department of Conservation](#)
- P. 63 *Aphids* - Retrieved from [Kings Plant Barn](#)
- P. 63 *Rainbow skink* - Retrieved from [Department of Conservation](#)
- P. 63 *Slugs and snails* - Retrieved from [Kiwicare](#)
- P. 67 *Kaipātiki Project Instagram post* - Retrieved from [Kaipātiki Project](#)
- P. 69 *Motutapu planting day* - Supplied by Alex McVinnie
- P. 73 *Kaipātiki Project nursery* - Supplied by Maddy South

