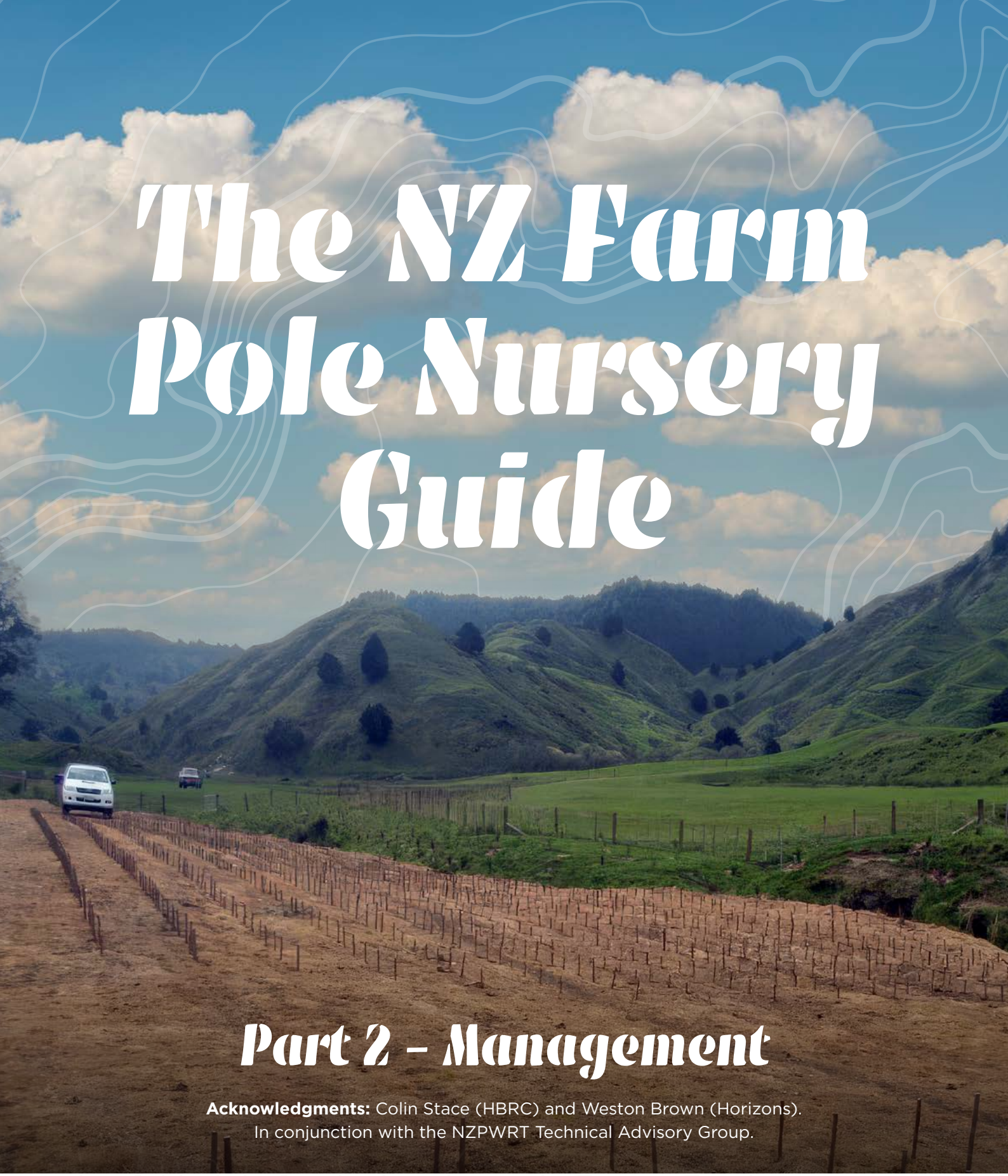

The NZ Farm Pole Nursery Guide

Part 2 - Management

Acknowledgments: Colin Stace (HBRC) and Weston Brown (Horizons).
In conjunction with the NZPWRT Technical Advisory Group.

THE NEW ZEALAND
POPLAR & WILLOW RESEARCH TRUST

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Introduction

To establish and operate an effective on-farm pole nursery will require resources, management and above all, time. Rather than 'plant first and ask questions later' take a moment to consider the annual pole needs for the property and start with a basic planning exercise - refer NZ Farm Pole Nursery Guide, Part 1 – Planning.

Be aware that each harvest of poles represents a crop which needs to be managed accordingly, and time has to be allocated for a range of seasonal activities. Experience has shown that failure to allow enough time for managing on-farm nurseries will lead to decreasing productivity. The less management that is applied to a pole crop, the lower the yield of useable pole material.

While some poles can be sourced 'as found' from existing plantings, access is often difficult and the pole quality is likely to be variable. A well-managed farm nursery will require input, but will produce the quantity and quality of poles required for an annual planting programme. This guide outlines the actions and resources involved in developing and operating farm pole nurseries, to assist landowners wanting to produce a regular supply of 3 m A grade poles, suitable for ramming and planting with livestock.

1. Establishment

1.1 Selecting Varieties

When planning annual pole requirements, choice of poplar or willow variety can be determined in regard to site conditions. Seasonally dry hill country is challenging for establishment of poles, and shallow soils on upper slopes or north-westly aspects prone to drying out are marginal situations for planting unrooted material. Always seek advice from experienced Regional Council staff or other advisory sources about site limitations for pole planting, and be open to consideration of alternative species where appropriate.

Some examples of varieties:

• Veronese poplar and Tangoio willow are all-rounders that can cope with a range of site types.

• Kawa poplar has good form and possum resistance but is better suited to gully planting, or sites with some degree of shelter.

• Crowsnest poplar is a low vigour variety adaptable to upper slope sites but is slow growing in the nursery.

• Moutere willow is a high vigour hybrid willow, preferred for stream bank and watercourse stablisation as it is a male clone.

• There are a number of other P. euramericana hybrids of similar breeding to Veronese, offering some overlap between varieties in terms of site tolerance.

• Along with Kawa, there is an assortment of other balsm poplar hybrids, such as Shinsei, so plantings can be mixed for aesthetic and resilience (non-monoculture) purposes.

The NZ Poplar and Willow Research Trust website provides extensive information on willow and poplar varieties (see https://www.poplarandwillow.org.nz/farmer-guides/selection-of-poplar-and-willow-varieties), while Regional Councils have a number of publications describing varieties and staff available to give on-site advice.

1.2 Cutting Material

For farm nursery establishment use heavy cutting material, 50 cm long with a top end diameter of 25-30mm, cut to a bud. Source cutting material from pole nurseries or from a known variety in the field. Select cutting material from central leaders rather than lateral side branches. Cuttings can be stored in 10 cm of fresh water for up to three weeks before planting, or can be held in plastic bags in a cool store if longer storage is required.

1.3 Site Preparation & Planting

a. Site clearance – clear site of trash or weeds, and level if necessary

b. Pests - check for potential pests like rabbits: look for scrapes or borrows and spotlight a 100m perimeter on a moonless night, and organise pest control if required.

c. Soil test – it is highly recommended to check that pH is within neutral range (around 6.5 – 7.0) and check that base levels of P and K are within recommended ranges. Get professional advice regarding amendments, for example best use of sulphur to bring high pH within recommend range, or correct rate of lime to raise a low pH.

Planting lines can be sprayed out as 1 m wide strips, using glyphosate herbicide Mark out rows with pegs and use tractor mounted GPS or an off-set string line to follow the planting row. When vegetation has died off, use a similar set out method and draw a deep ripping tine along the row, to a depth of at least 400 mm.

Cuttings are then planted into the ripped lines, at least 700 mm apart and 300 mm deep. This is generally done manually, with soil pressed in around the base of cutting by foot as planters walk forward to place the next cutting. If irrigation is available, 10-15 mm may be applied to water in new plantings.

Figure 1. Example of a combined ripper and planter rig
(Photo credit: Ian Wilson)

Figure 2. Manual planting;
note white measuring rod for spacing
(Photo credit: Ian Wilson)

While ripping of planting lines is highly recommended, on sites where this may not be feasible and soils are of suitable (sandy loam) texture, cuttings can be planted directly with the use of a crowbar or similar to form planting holes. Other devices can also be used, such as drill operated augers, or purpose-built stake rammers – see Figures 3 and 4 below.

Figure 3. Battery drill and mini-auger
(Photo credits: Claire McCormick)

Figure 4. Spencer Stake Planter, spike and socket type

1.4 Weed and Pest Control

Weed control around new cuttings is critical to ensure a good take and even growth rates. Competition from uncontrolled weeds will cause suppressed and variable growth which will have an ongoing effect throughout the crop rotation. After irrigation or the first rainfall, weed control can commence.

Recommended practice, before bud break, is to band spray rows, at least 0.5m either side with a boom or knapsack sprayer, applying a residual herbicide - e.g. terbuthylazine at 7.5 kg a.i / ha, and ensure equipment is calibrated to apply the correct amount. If emerging grass or other vegetation is present, include a knockdown herbicide in the spray mix. When new shoots are 100 -150 mm high, follow up weed control may be required, using a contact herbicide - e.g. Glufosinate – carefully applied as a shielded or directional spray. For all weed spraying, air induction nozzles are highly recommended.

The alternatives to herbicide are

1. Mechanical weeding, using a walk-behind cultivator along rows and hand-hoeing between cuttings. This option requires special equipment and is more labour intensive.
2. Use of mulch or weed mats. This option requires extra materials and will be labour intensive where handling of bulk material, e.g. wood chips or shredded bark, is involved. Over time, weeds will tend to grow on organic materials.

Figure 5. Herbicide weed control

Figure 6. Weed mat weed control, avoid where flooding may occur
(Photo credits: Claire McCormick)

Pests like rabbits can cause damage to new shoots as they emerge from cuttings, so check for sign as part the initial site preparation, and maintain regular control such as night shooting until new shoots are well developed at around 300 – 500 mm high.

Make sure I talk to Regional Council staff to know what species are best suited to what I need.

Make sure the site for the nursery is set up for planting.

Ensure I get access to good cuttings to plant.

Have the layout and method of planting thought through.

Manage weed and pests

2. Crop Management

2.1 Ongoing Control of Weeds and Grass

For new cuttings and established stools, weed control through spring and summer is needed to maintain a clean strip along each side of the rows which reduces competition for moisture, nutrients, to optimise growth rate and limit variation within the pole crop. At least three herbicide applications are likely to be required, using a contact herbicide such as Glufosinate around new cuttings, or Glyphosate around the base of established, woody stools.

In a row layout, periodic cutting of grass is recommended to reduce pest cover and seasonal humidity. This can be done with a rotary slasher where there is machine access for new cuttings and first year regrowth on stools, and with sheep (lambs) for second year crop growth. In a 1 x 1 m compact block layout weeds and grass are fully controlled by knapsack spraying.

2.2 Fertiliser and Irrigation

Soil test every 3 – 5 years and adjust pH or base levels of P and K as required, based on professional advice. During spring, for first and second year growth, a side dressing of N is useful to enhance growth rates. As a general guide, use 20-25 kg N / ha in a readily soluble form such as urea, and apply just before light rain or irrigation. Foliar feeding is an option, especially where soil pH is outside optimal range, inhibiting root uptake of nutrients.

Irrigation can assist strike of new cuttings, and will support optimum growth during summer months. Under canopy orchard style systems such as driplines/emitters or mini sprinklers will use water efficiently and avoid excessive wetting of foliage, but will require capital investment and appropriate design advice. Irrigation can be scheduled using a water budget and pan evaporation figures, on by and automated controller system incorporating soil moisture sensors. Both approaches require rainfall data collection, and assessment of crop soil moisture holding capacity based on an effective rooting depth of around 800 mm. A sufficient volume of water will also need to be available. For example, assuming that weekly evapotranspiration may reach 35 mm during summer months, that would represent 350 m3 per ha per week.

2.3 Thinning and Pruning

Thinning is a key management action affecting the eventual yield and quality of the pole crop. For new cuttings, multiple shoots will emerge which can be left until mid-to-late December and then be thinned to single dominant leader with hand tools such as secateurs. For regrowth off stools following pole harvest, thinning of multiple shoots can be carried out from late December into early February, to retain the best two dominant leaders. Later thinning may incur larger diameter stems and require use of bypass loppers. For low vigour varieties like Crowsnest poplar, it is recommended that stool regrowth is thinned to a single dominant leader.

On second year regrowth of double leaders, if one is showing limited growth and has a <25 mm stem

diameter around 1 m above ground level, it can be removed to help maximise growth of the remaining leader.

Pruning involves removal of side branches, which can assist disease control and reduce the amount of pole trimming required at harvest. Pruning can take place between January and March, and can commence during second year regrowth but be limited to the lower 1/3 of stem height. Full pruning to 1.8m can be done in the summer preceding harvest.

Figure 7. Willow stool regrowth thinned to two leaders

2.4 Fertiliser and Irrigation

A reference guide to pest disease identification and management in pole nurseries can be viewed in **Part 4 – Disease and Pests**. In many farm situations, the siting and scale of nursery operations may help to limit disease risk, but the following common issues are likely to require some attention:

- **Poplar leaf rust** – if this becomes established leaf damage by late summer will start to have an impact on pole growth. Infestations generally develop in foliage near ground level and spread up the crown. Enhancing air flow under the crop and reducing humidity near ground level will stall rust infestation. Prune side branches on second year growth to remove vulnerable leaf area and control weeds / grass to reduce humidity at ground level. If the site is enclosed by shelterbelts, prune the at least 1m at the base of shelter trees to improve low level air flow. Avoid using overhead irrigation if growing rust susceptible varieties. P. euromerican hybrids have varying degrees of susceptibility (e.g. Veronese is moderate to low and Crowsnest is high), while balsm hybrids like Kawa are relatively resistant.
- **Giant willow aphid** – these form colonies on woody willow stems and heavy infestations can impact growth rates. Stems become blackened with sooty mould, which can also stain sheep's wool
- **Silverleaf fungus** – this is a vascular fungal disease that will infect and eventually kill poplar and willow stools. As opposed to poplar leaf rust, balsm poplar hybrids, such as Kawa and Shinsei, tend to be more susceptible while P. euramericana hybrids have less susceptibility.

Figure 8. Single leader poplar side pruned in second year

Make sure weed and pest control is done during establishment phase

Soil testing every 3-5 years and apply fertiliser if required

Watch for pest and diseases – read Part 3

Consider irrigation system if area is prone to dryness

3. Pole Harvest

3.1 Grading

Near the end of the final growing season, around early April, grade the pole crop. This will inform how many A and B grade poles will be harvested and facilitate planning for harvest, planting or potential sales. This will also provide an indication of crop performance and crop management issues, and provide records for future reference.

The national standard for the butt end diameter of a 3 m A grade pole is 55 – 70 mm. Grading can be done with a gauge made from plywood, with a 55 mm gap stepped into a 40 mm gap (see Figure 9). Checking pole diameters approximately 0.5m above ground level, poles that are a snug fit or larger than the 55 mm gap are graded A, while poles that are a loose fit in the 55 mm gap but larger than the 40 mm gap are graded B.

3.2 Harvest Method and Equipment

A chainsaw with a 10" or 12" bar can be used for cutting poles. Operators should be trained to appropriate standards and use full PPE. Minimum cut height is 400 mm above ground level to maintain stool height. Above that level poles can be cut at any height that matches the grade diameter range. A steeply angled slice-point cut at the base of the pole will pre-empt the need to cut a point when planting.

After a batch of poles have been cut, the operator should then trim remaining stems to around 400 mm above ground. Cuts should be slightly angled to shed water, and be sprayed with 3% a.i. Captan® fungicide within an hour to protect against risk of infection by silverleaf spores. Silverleaf fungi only release spores during rainfall, so as a further precaution do not cut poles when it is raining.

On the ground or on a trailer, poles can be grouped to be cut to length at 3 m, cut with a chainsaw or heavy loppers. Top end diameter should be around 30 - 40 mm and any side branches removed with secateurs, cut close against the pole.

In row layouts, poles can be cut to length and trimmed in the 3 m access between rows where a tractor mounted mulcher can later be used on slash. In a compact block layout, poles need to be manually hauled to headlands for cutting to length and side trimming.

3.3 Materials Handling and Storage

In row layouts, poles can be loaded on to trailers for transport to a storage area, or directly to a field site if planting within 24 hours. Poles piled in headlands can be loaded into trailers or be directly piled on to front end loader forks as they are being cut and trimmed.

For storage prior to planting, poles can be stacked on 100 x 100 mm bearer blocks and be watered with a sprinkler twice a day to keep them wet. Alternatively, they can placed upright in at least 300 – 400 mm of fresh water for up to three weeks before planting.

3.4 Slash Management

After poles are cut to length remaining tops will require mulching in situ, or removal to stockpiles for chipping or burning. Slash can also be sorted for cutting material or 1 m stakes for planting in stock excluded areas.

If burning slash, ensure that it is well away from other vegetation and in accordance with local rules. There might be an opportunity to involve the local fire brigade to ensure everything goes to plan.

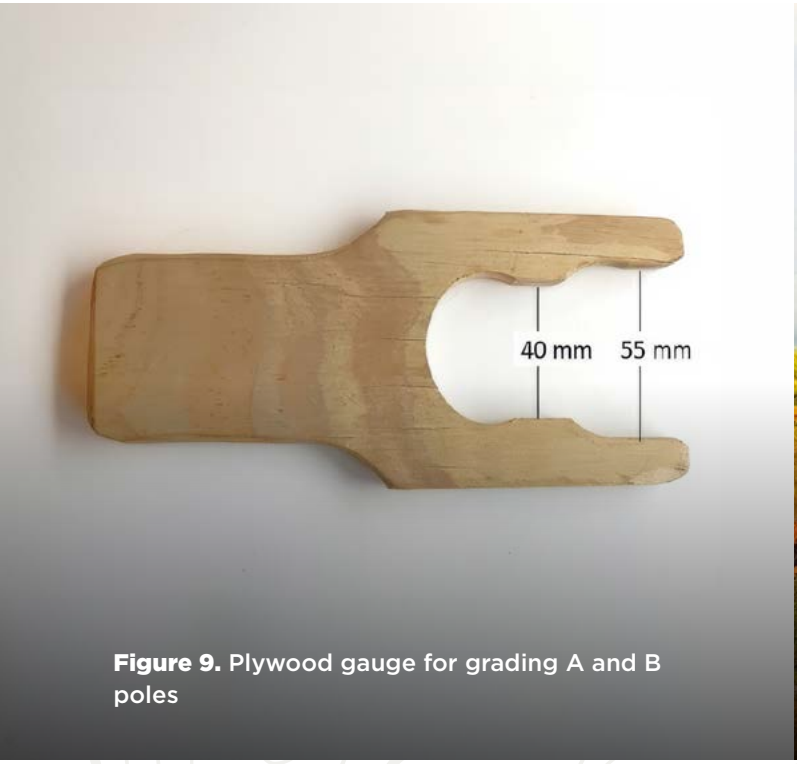

Figure 9. Plywood gauge for grading A and B poles

Figure 10. A suitable fire pile area will be required for controlled burning

More Information:

NZ Farm Pole Nursery Guide
Part 1 – Planning

NZ Farm Pole Nursery Guide
Part 3 – Annual Work Plan

NZ Farm Pole Nursery Guide
Part 4 – Disease and Pests

Who We Work With...

Northland Regional Council – Te Kaunihera ā rohe o Te Taitokerau
Waikato Regional Council – Te Kaunihera ā Rohe o Waikato
horizons Regional Council
Environment Canterbury Regional Council – Kaunihera Taiao ki Waitaha
Bay of Plenty Regional Council Toi Moana
Greater Wellington – Te Pane Matua Taiao
Hawke's Bay Regional Council – Te Kaunihera ā-Rohe o Te Matau-a-Māui
Taranaki Regional Council
Te Kaunihera o Te Tairāwhiti Gisborne District Council
tasman district council – Te Kaunihera o te tai o Aorere
environment Southland – Te Taiao Tonga

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