



GROWING GUIDE

FOR ST HELENA'S ENDEMIC FLOWERING PLANTS



Boneseed *Osteospermum sanctae-helenae*

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'SUPPORTING CRITICAL SPECIES RECOVERY AND HORTICULTURAL NEEDS ON ST HELENA'

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All the images, photographs, diagrams and slides are the Authors' own unless otherwise stated.

We would like to make special mention of George Benjamin who is a living legend. Thank you for your direct, honest and enthusiastic presence. You have been a true inspiration and may your natural understanding of nature live on in spirit forever.

Introduction

This Growing Guide draws together the methods and techniques that we have found most effective and workable for growing St Helena's endemic flowering plant species during the OTEP Critical Species Recovery Project ¹. Technical, scientific and botanical terms have been kept to a minimum but are explained where used. Most important to keep in mind is that each person's ability and experience of growing plants will differ and thus influence their success rate. However, there is always room for improving our understanding of plants and how to grow them and hopefully this practical guide will assist you on your path growing St Helena's endemic plants.

This manual consists of two main sections: firstly, a technical section that explains various methods, stages and techniques that are used throughout the Growing Guide; and secondly, a section of 'Plant Pages' illustrated with diagrams and photographs to explain how to grow each endemic species. Plants are listed in alphabetical order by their local name.

Myths

When it comes to growing plants, sooner or later one is offered all sorts of advice on what will work, what won't and what is impossible. Almost all the myths, half-truths and misunderstandings about growing plants can be dispelled by observing the way plants grow by themselves in nature, if given half the chance. A useful approach to finding your own path through all the confused old wives' tales about growing plants, is to remember the saying: "There is no such thing as a plant that is difficult to grow; only one that you don't know how to grow yet!"

When we came to St Helena we heard quite a number of things about growing the island's endemic plants, some of which were 'substantiated by science': that False Gumwood germinates easily, but is very slow and difficult to grow; that Redwood cuttings won't take and trees sprout multiple leaders rather than the straight stems of old; that Gumwood grows very slowly and only gets to seven metres high; that Diana's Peak Grass is very hard to germinate; that Tea Plant seed takes hours to collect; and that Rosemary at Lot doesn't grow flat on the ground. However, our experience of growing these plants over the past two years has suggested otherwise. In conclusion, we would urge you to question what you are told about growing St Helena's plants unless you have found it to be so for yourself through close observation of plants in the wild and from growing them for yourself.

¹ From the period of November 2008 to August 2010 under OTEP Project 'Supporting Critical Species Recovery and Horticultural Needs on St Helena'

Technical Section

Vegetative Propagation

Vegetative Propagation produces clones ie. plants that are genetically identical to the mother plant². Methods of vegetative propagation include cuttings, layering, grafting & budding, division, micro propagation and variations on all of the above. In conservation we favour sexual propagation over vegetative when growing plants for use in habitat restoration work. This is because we want to encourage genetic variability within a species, and not the uniformity of clones.

There are a few exceptions where we could make good use of vegetative propagation techniques and maintain genetic variability: Tufted Sedge, Hair Grass, Neglected Sedge, Diana's Peak Grass and Jellico could all be usefully propagated from divisions. However, care should be taken to sample material from different plants across a population so that the divisions taken are genetically representative of the whole population.

Vegetative propagation should not be used if the population in the wild is impacted negatively. **RULE OF THUMB:** *Take no more than necessary and plant back double as much as you have taken*³

Sexual Propagation

Sexual Propagation means the production of a plant from seed, where the plant contains genetic information from both its parents and where each plant produced from a seed batch is genetically slightly different from its 'brothers and sisters'.⁴

Several advantages come with the use of seed rather than following the vegetative propagation route: it is quicker, cheaper and easier to produce numbers of plants from seed; you do not need special equipment and you only need the basic knowledge and a bit of patience.

There are also some ecological advantages in that sexual propagation encourages genetic variation and results in populations of plants that are better at adapting to environmental changes, thus being more resilient.⁵

² The plant from which the vegetative material comes

³ Limit the damage done to the mother plant by only taking a small sample

⁴ Seeds or seedlings from the same parent plants

⁵ Resilient meaning that the population can survive pressures and environmental changes like global warming for instance

Collecting Seed

It is illegal for members of the public to collect seed from the wild. If you would like to do so, join the Environmental Conservation Section as a volunteer seed collector on their seed collecting programme (contact ANRD on telephone 4724).

In order to grow anything from seed, you have to acquire some first. When collecting seed from plants in the wild, it is important to remember that the seed you take was intended to germinate and grow in the wild and you are in effect robbing the plant of its offspring. The only way we can justify doing this is if we grow the seeds on, and plant the seedlings back into the wild.

There are a number of rules that we should follow to make sure our seed collecting activities do not affect the wild populations negatively, but genuinely benefit the wild populations in the long term:

- **When a plant is critically endangered and there is no regeneration⁶ in the wild, collect as much of the seed as possible and grow these on *ex situ*⁷ to aid the recovery work for the species concerned** eg. False Gumwood (Critically Endangered) has no regeneration in the wild. All seed should be collected and seedlings have to be grown in the nursery for planting back into the wild. Compare this with Large Bellflower (Critically Endangered) which germinates freely in the wild, and now and again, one of the seedlings makes it to maturity. Do not collect all the seed but allow to seed freely as well.
- **Collect no more than 20 percent of the seed from a plant that produces all its seeds in one flush** eg. He Cabbage, Whitewood and Black Cabbage for instance flower and seed in a short space of time and will not do so again till the next flowering season. From these plants you should leave most of the seed to set naturally. Incidentally, the best available seed collecting methods cannot capture anything near 20 percent of these seeds as most of it blows away in your attempt to collect.
- **Always collect from as many of the plants in a population as possible.** This ensures a greater diversity and brighter future for the species. If you only collect from the same few plants every time (or from the same few populations, if there are many) you are not including the genetic diversity that is held within the other individuals (or populations). For example, collecting Hair Grass from only High Hill is not a good idea, if you grow these seeds and plant High Hill provenance everywhere ignoring collecting from other sites. There are populations in many other areas and some of them might hold the genetic secret that could save the species from severe drought or some other catastrophe.

⁶ Regeneration here means the growing up of seedlings, which then get established and grow on to maturity and a stage where the 'regens' produce their own offspring. Regeneration should not be confused with germination which on its own, is no guarantee of establishment

⁷ *ex situ* means not in the wild, but in a nursery, garden or botanic garden, for example

- **From certain plants that seed continuously, you can collect as much as is available on any single visit, as long as you don't damage the plant in any way.** Annuals like Boneseed, Salad Plant, Goosefoot, French Grass, Neglected Sedge and perennials like Tufted Sedge, Lobelia, Small Bellflower, Hogweed, Tea Plant and Scrubwood, will not be disadvantaged by stripping them of their ripe seeds on any one particular visit. Make sure that you do not damage the plants or their flower heads, so that they can continue flowering and seeding for as long as they live. In this way you will get a constant supply of seed, enough for you and leaving enough in the wild.
- **Limit the amount of damage you cause to the habitat by your activity.** You can easily trample over endemic seedlings in your attempts to get to a seeding plant if you are not careful. Be observant where you are treading.
- **Look after the habitat and it will look after you.** Weeding invasive plants from an area whilst visiting for seed collecting will go a long way to ensuring that the plants will remain alive and healthy for years to come.

Sowing Seed

Soil

For seed sowing we had best results with dirt (topsoil) and compost (well broken down) mixed at a 1:2 ratio, unless otherwise indicated in the Plant Pages. The mixed soil was sieved to remove larger particles and any sticks or stones.

Regularly turn your compost and topsoil heaps to ensure that any germinating weeds are killed when incorporating them into the soil heaps as you turn them. Never allow weeds to seed on your compost, as this will just greatly increase the number of weeds germinating in your seed trays.

Filling trays

The larger particles could go into the bottom of the tray covered by the fine sieved soil on top. This creates a nice even surface for the seeds, and the rougher material in the bottom of the tray improves the drainage. Give the seed tray one good tap on a hard surface to settle the soil down in the tray. This fills air gaps within the soil and ensures that moisture will be distributed evenly throughout the seed tray. Fill seed trays right to the top as the soil will sag a tiny bit after watering. When you fill your seed trays make sure that you use moist soil.



Seed trays in the middle and right have been filled too low and waste space. This thin layer of soil will also dry out more quickly and doesn't leave much depth for root development

Sowing

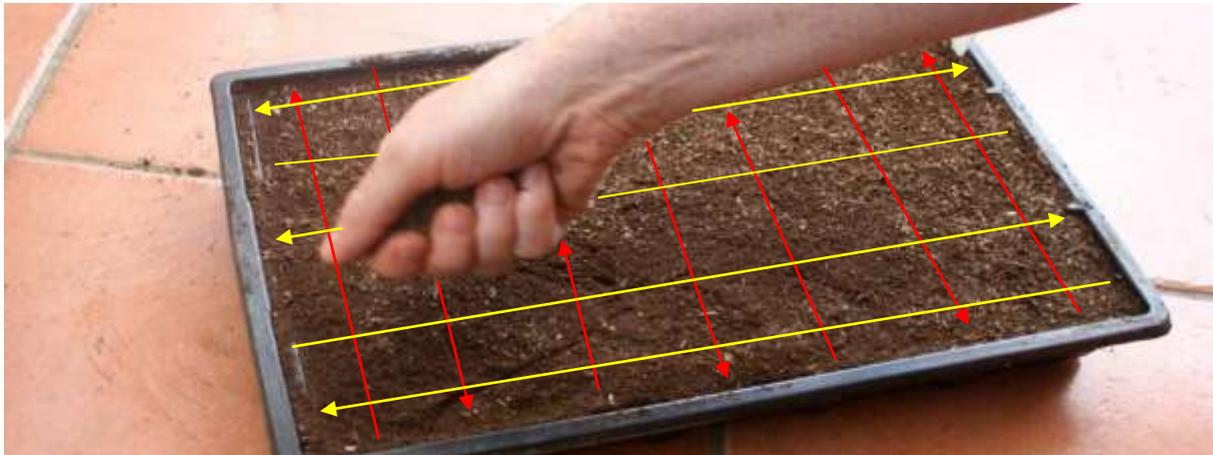
RULE OF THUMB: *Seeds should be sown as deep as they are thick.*

With finer seed like Bastard Gumwood and Dogwood it is easiest to mix the seed with fine soil⁸ to help with even distribution.



Seed mixed in with a bit of soil: this bulks out the fine seeds so that they are not sown too thickly and helps to distribute them more evenly; it also improves seed contact with the soil so germination is better as there is less of the seed that is lying exposed to drying out

Sow the seed by sprinkling it across the tray. This is done by moving your hand across the tray in one direction and then in the other to help with distribution. Keep sowing back and forth crossways, until the seed batch is finished and covering the whole tray.



Best way for sowing evenly - sowing crossways: follow imaginary lines first one way, then turn the tray 90° and follow imaginary lines the other way

Take good care not to sow the seed too thickly as the seedlings will crowd one another out; this can make pricking out more difficult resulting in damaging or wasting seedlings. **RULE OF THUMB:** *A few healthy seedlings every now and again are better than one magnificently crowded seed tray.*

⁸ Use the soil mixture that has been sieved



Very good spacing and good use of Gumwood seed



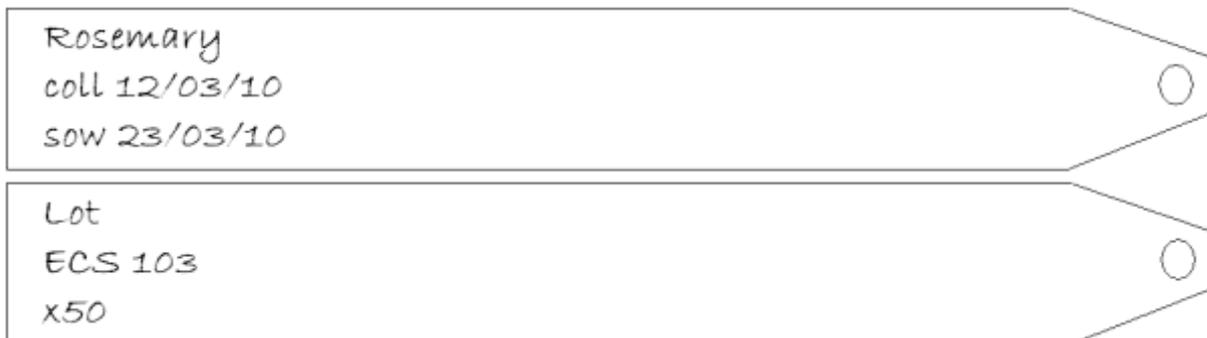
Very poor spacing and a wasteful use of Dogwood seed

If you do find yourself with a very full seed tray, like the Dogwood tray above, the seedlings can be saved by thinning out. This could be done in a number of ways: one would be to prick out the bigger seedlings to make space for the smaller ones. Another way would be to prick out clumps of seedlings (if they are too small to be handled individually) into another seed tray.

Tickling in

Extremely small seeds, like those of Tea Plant or Large Bellflower for example, will struggle to germinate if sown too deep. These seeds are better off being sprinkled across the surface of a seed tray, but they will lie on top of the soil, exposed and prone to drying out. 'Tickling' the surface of the soil with a 'twizzle stick'⁹ however, will help to loosen the surface slightly and bring the seeds into better contact with the soil as they are watered in.

Labelling



These are examples of how a label should be written with information on the back and front of the label. Use pencil rather than pen as ink degrades in the sun

Plant name, collection date and sowing date go on the front of the label. Provenance,¹⁰ collection number and the amount of seed sown goes on the back. Labels should be placed in the seed tray in such a way that the information on the label is clearly visible. **RULE OF THUMB:** *A plant that is not labelled correctly is absolutely useless for habitat restoration.* If you do not know where the plant comes

⁹ Pencil shaped stick that ends in an even tapering point, used to gently lift seedling roots out of a seed tray

¹⁰ The place where the seed was collected or where the original mother plants grew

from, i.e. Lot in this example, you might plant it out near High Hill. That would be a big mistake since Rosemary from Lot and High Hill should be kept separate.

Watering in

After sowing, the seed tray should be watered and placed in its final standing place for germination.¹¹ Seed trays should be put somewhere with good light but not in direct sunlight (unless indicated otherwise in the Plant Pages).

Covering

There is no need to cover seed trays apart from providing shade. If glass panes or plastic covers are used over seed trays, remember that it will heat up quite considerably in full sun underneath the covers and any condensation drips can burn off emerging seedlings. These covers should be removed as soon as germination takes place to allow for air movement over the seedlings: stale air will increase the risk of Damping Off disease.

Aftercare

This is the most important and difficult bit to get just right. You need to take very good care of your seed tray. Keep a close eye on it and monitor the moisture levels: as soon as the surface starts to dry, you will need to mist it to moisten the seeds. But place your seed tray in too dark a situation, and you will have mould and moss growing on it. Water it too much and you will have the same problem; but too little water and you will stand the chance of killing any emerging seedlings.



Bad aftercare: the tell tale signs are cracks in the soil, compacted surface, fungal mould spots, algae and moss and finally no seedlings

The good news is that you can learn how to look after your seed trays from practise and observing the signs. Following what plants do in nature can help a lot: Boxwood, for example, germinates in late summer to early autumn weather, it is no use sowing at any other time. Salad Plant grows in full sun in dry places, trying to grow it in a shady wet area will not work very well. Large Bellflower germinates well when there are a lot of soft rainy days and cool weather, allowing a seed tray of Large Bellflower to dry off would be disastrous.

¹¹ Refer to the Plant Pages for special germination requirements for each species

Pricking out

Pricking out is the task of planting seedlings out from the seed tray in which they were sown into another container, giving them more space for root development.

The seedling stage of a plant is when it is most vulnerable to damage. Even with the best intentions and technique, it is impossible not to damage the roots. As a result, pricked out seedlings are quick to wilt and can go into 'shock' and die if care is not taken.

To increase your chances of success select a cool shady spot to work in. Work as quickly as possible. The less time the plant roots are exposed, the better. Pricking out technique differs slightly from plant to plant but the basic rules stay the same:

- Water seedlings well the day before pricking out and make sure that the potting compost is moist too
- Prick out as soon as the seedlings are big enough to handle
- Don't let the seedlings grow too large before pricking out as the roots start to grow into one another and tangle up, making pricking out very difficult without badly damaging the roots
- Handle seedlings with care and avoid holding them on the stem or the growth tip, or even worse touching the roots; rather hold the seedling by the leaves
- Pricking out is best done in the mornings or on cool rainy days to reduce moisture loss from the seedlings
- Water seedlings as soon as you have pricked them out to prevent wilting
- Place newly pricked out seedlings in a shady spot for a few days to allow them to recover from the shock



Correct way to handle a seedling



This photo shows what happens if seedlings are not watered in time.

RULE OF THUMB: *If you don't get watered, you die!*

Filling a bag

Before pricking out a seedling, you need to prepare a bag that is filled with soil. Black polythene bags can be used, and are cheap and easy to use. However, filling a bag well takes a bit of getting used to and could make a huge difference to the quality of plant produced:

1. Open the bag up and flatten the folds in the bottom of the bag so that the soil can sit flat on top of the folds and doesn't fall in between the folds. Soil that has fallen in between the folds will cause the roots to grow into the folds and could make it difficult to get the bag off without tearing those roots off.
2. Half fill the bag with soil and tamp it down by holding the top edge of the bag, lifting the bag slightly up into the air and letting it fall down hitting a flat surface with the bottom evenly compacting. Do this about two or three times then fill to the top. Do the tamping down again to sag the soil into the bag and top up level with the top edge.
3. Make sure there are no air gaps or folds on the side of the bag. If so gently tuck soil into the gaps or start again and refill the bag.



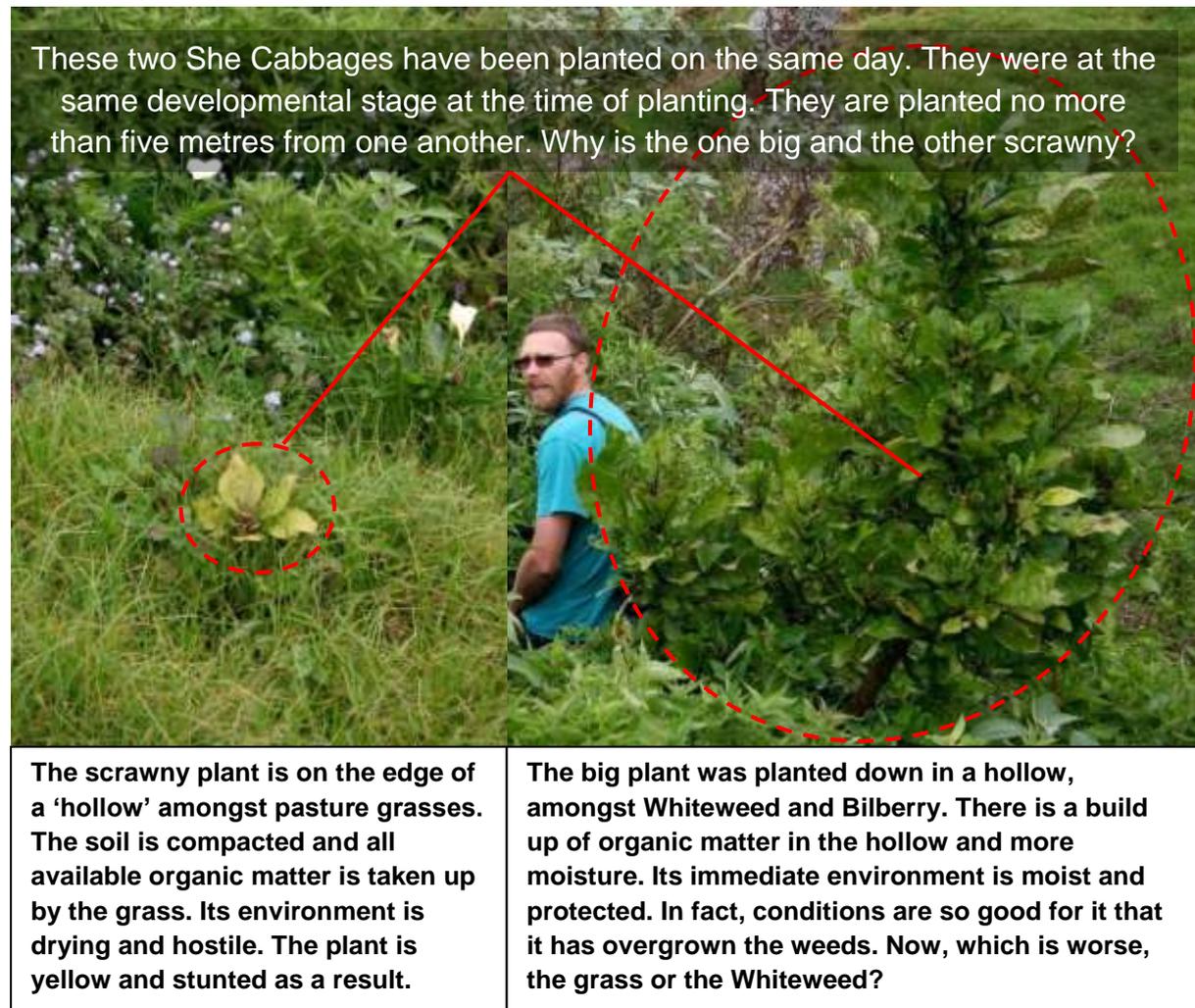
These seedlings are all the same age, pricked out on the same day. The bag on the left is filled well, middle has got a few folds. The right was filled too loosely with too many folds and air gaps. This caused the seedling to suffer and the soil to sag down leaving less room in the bag for root development. Healthy plant growth is a clear indication of the value of filling a bag well

Potting on

Potting on is the term used when you put a plant into a bigger container, or remove the old soil from its roots and replace it with fresh soil. Either way, this is done to provide the plant with nutrients and extra space to grow into. When a plant gets too big for its pot it will become stunted and suffer.

Planting

Planting out of plants, if done correctly is very rewarding. The plants will respond to the treatment given to them at the planting stage and will respond to their new surroundings (environment)¹². You will be able to judge how successful your planting has been by observing the plants' response to their environment.



In the above examples, the weeds have provided habitat for the She Cabbage, but the grass habitat proved to be unfavourable, judging by the response of the plants to their environments.

Site selection

There are three criteria on differing scales of size, that each plays a crucial part in correct 'site selection', and thus the best placement of a plant. We use Redwood as an example to illustrate the three criteria on differing scales:

¹² A plant grows both above and below the ground, so its environment will be what we can see and feel above ground, and also the things going on in and around the root zone which we cannot see or feel, and often ignore or forget

1. Correct area of the island¹³ i.e. plant in the Green Heartland and away from Ebony and the hybrid, Rebonny.
2. Best site within that area of the island i.e. plant near or amongst other endemics where it could be part of an endemic ecosystem.
3. Best spot at the site for each plant i.e. plant where there is good drainage and deep fertile moist soil with good light, but not too exposed. Probably like the conditions down the sides of a lot of the guts where you see invasives and Forestry escapees doing well.

It is important to make good observations from your earlier plantings in similar situations and learn from your experiences.

Direction of the plant

RULE OF THUMB: *Leaves up and roots down. Leaves towards the sun and roots down under.*

All endemics will grow towards the light. If you plant behind a rock, or in the shade, it helps to place the plant with its growing tip facing in the direction where the most light will come from. This saves you time and the plant energy, considering it will grow towards that direction in any case.

On very steep slopes, like those at High Peak for instance, the plants will naturally tend to grow out and away from the slope to reach more light. In this situation it will be a waste of time to plant the seedlings upright. They will not grow into the shade as they would mostly be shaded out by the plants growing above them on the steep slopes. **RULE OF THUMB:** *Place your plant with its stem at a 90 degree angle to the soil, no matter the slope of the soil.*

Depth of planting

It is important to maintain a good depth of planting. Too deep and the stem can't breathe and may rot. Too shallow and the roots will be exposed and dry out or burn off in the sun.

Timing

The rain on St Helena is totally unpredictable and it is impossible to predict a best time of year to plant. It can be quite dry in winter even though it is supposed to be the rainy season. It can also be quite cold and wet in summer even though summer is supposedly drier.

Therefore it makes sense to spread your planting out across the year and plant at very regular intervals, ensuring that you are planting when eventually the weather conditions are perfect.

¹³ Refer to the Reintroduction Guidelines and check with the conservation authorities

Seedlings also benefit greatly from being planted out at the correct developmental stage. If they are allowed to sit in the nursery too long, their roots will bunch up and be constricted in the bags. They will slow their growth and the chances are greatly increased of them getting infested with pest and disease. If however, you plant them out at the correct time (see pictures below) you allow the plant to continue its root development, and good roots support healthy growth.



Left: A Bastard Gumwood seedling at four weeks old. **Right:** the same seedling at eight weeks old, ready to be either planted out or potted on. The plant is as high as the bag is deep and the roots are starting to grow all round the bottom of the bag; perfect timing to allow continued development

Hole digging

RULE OF THUMB: *Loose soil will lose moisture fast. Compact soil will hold onto moisture.*

To assist your plant getting access to more moisture, it helps if the surrounding soil is disturbed as little as possible.

RULE OF THUMB: *Roots do not grow into air.*

Keep this basic rule in mind when filling the hole, ensuring that the soil fits around the root ball. Concentrate on minimising air pockets underneath and around the plant's roots.

RULE OF THUMB: *Weeds are encouraged to grow wherever you disturb the soil.*

These three basic rules give a clue to why digging very small holes (slightly bigger than the plant bag and root ball, and as deep as the roots are long), works so well. If the plant fits into the hole snugly, you will find that the roots can continue their growth directly into the surrounding soil, allowing the plant to literally 'chase the moisture and nutrients'. If you dig large holes, the chances are increased greatly that (a) the soil will dry out more quickly, (b) the surrounding soil will sag as it compacts exposing the roots, and (c) air pockets will prevent roots from growing into the surrounding soil, subsequently a root will have to change direction and look for a way around an air pocket.

Method for compacting the hole

Make sure that the bottom of the hole is levelled off. Place the root ball in the hole, observing the correct planting depth, and gently press it against the inside of one half of the hole. This is done to make sure that the roots make very good contact with the surrounding soil on that side and to create space on the other side for filling back with soil.

Use the finer topsoil that came out of the hole to fill in the gap. Do not fill the gap in one go but make sure to press down the soil with your finger as you go. This will ensure that the soil is compressed well enough and no air gaps remain.

Planting Checklist

The following is a checklist that could be used before you start planting to help improve your planting success rate. Check that...

- The soil holds moisture well at the planting spot – this could be checked by monitoring weed or bryophyte (moss) performance on that spot, compared with the surrounding soil
- Weeds have been removed from the planting spot – only weeds that will directly compete for nutrients, moisture and light should be removed. Weeds that are not a direct threat could be left until later¹⁴
- The plant is of good quality – correct developmental stage, healthy with no pest and disease present
- You are planting in the right area for that specific plant species¹⁵
- You have picked a suitable site within that area
- You have selected the best spot at that site

¹⁴ All plants perform a function, both weeds and indigenous plants: they hold onto soil and improve it by adding organic matter; they reduce moisture loss by shading the soil and reducing the wind's evaporative action on the soil; smaller plants prepare the way for larger plants; one plant can suppress any other plants underneath it, by overgrowing them (by stealing their water, light and nutrients) and even prevent weeds from germinating. Soil that is exposed will spring into life when there is available water, but due to the lack of endemic seeds in the soil seed bank, it will unfortunately be an overwhelming majority of weeds that germinate.

¹⁵ See 'Site Selection' above

- You have filled the gaps between previous plantings before you expand the site
- You have planted associated species – or make a note of what species are missing from the site that would normally be associated with that habitat and plant those on the next visit

Hardening off

This is a slightly misleading term and should be considered equivalent to ‘plant preparation for planting out in the wild’. Seedlings are very soft when they have germinated and need to be conditioned to allow them to develop in such a way that they adapt (prepare) for the conditions where they will be planted out. For example, if you have a Redwood seedling that is destined for a very warm and dry sunny spot, it should be ‘hardened off’ to be ready for that type of conditions. However, if you are going to be planting the Redwood in a moist and shady site, it should be ‘hardened off’ with that in mind.

Growing plants in the spot where they will be planted, gives you the distinct advantage of having the seedlings growing up already adapted to the conditions in which they will continue growing for the rest of their lives. However, if you are growing seedlings in a nursery with conditions different from those in which they will be planted, then you must make sure that the ‘hardening off’ process is done well.

Exposure to the elements (sun, wind, drought or wetness) equal or near to that of the plant’s final location will help the plant be prepared for growing unaided once it has been planted out in the wild. Thus, it is not a good idea for instance, growing dryland species inside the shadehouse where they will become soft and etiolated,¹⁶ considering that they will be subjected to very harsh conditions in the wild later on.

Watering

RULE OF THUMB: *Anybody can water a plant but not many people know how to do it well.*

In the plant pages we use terms such as ‘watering lightly’, ‘wet feet’, ‘on the dry side’ and ‘surface drying’ to help describe the special treatments that plants need at certain times through their development. Before we go into more detail on these terms, consider how the conditions of the nursery grown plant compare with the conditions of the plant in the wild. In the nursery the plant’s roots are constricted, air cannot penetrate the soil through the sides of the plastic container or bag, the air movement and light intensity will be different. In the wild the plant will have a much larger root system to help it through the dry times. As a result, the plant’s water use and its water needs will be different.

¹⁶ The term ‘etiolated’ refers here to a plant that is stretched and soft, as a result of receiving insufficient light levels

When to water

One should only water when necessary. Not before it's needed (when the plant is still wet) and certainly not after it was necessary (when the plant has started to wilt) but right on time.

You can test the moisture content of the soil in two ways: you can lift the bag to feel its perceptive weight (wet soil is heavier than dry soil), or you can stick your finger in through one of the bottom holes to feel if the soil is still wet. The first method works well for very light compost mixes, but the soil we use in St Helena is very heavy and this method is not very effective. Poking your finger just under the surface of the soil won't work because the top of the bag might have dried out completely while the bottom half of the bag still has more than enough moisture. Just looking at the soil definitely won't be enough as you can only see the surface. Method two however, works well because you can tell for certain if there is still moisture in the bag or not. The right time to water would be when the soil has dried off but before the plant has started to wilt.

How to water

Watering will differ slightly from plant to plant and from soil to soil. You will notice that some plants always dry out sooner than the others. If you water all the plants on the bench in equal amounts, you will either drown the plant that needs less water, or dry out the plant that requires more water than the rest.

When watering, always fill the bag and keep watering until water is pouring out through the bottom of the bag. This allows water to soak into the centre of the root ball instead of just watering the surface and the sides of the bag, where water might just be running between the bag and the root ball.

When the soil has dried out

Even with the best watering in the world you will find a plant now and again that has dried out completely. Dried out soil shrinks, and the bag normally sits loosely around it. When you water now, all that will happen is that the water will run down the sides of the bag and very little of it will soak into the soil.

To solve this problem you can either place the plant (in its bag) into a bucket of water to soak it through (but be careful as the soil might drift off or the plant fall over and lose some soil), or fill the bag with water to the brim; continue with your watering of other plants and then return to top up the dried out plant to the brim again and again, returning every time you have watered a few others. This interval between filling the bag allows the soil to absorb a little more water each time, and eventually it will be soaked through to the middle.

Watering 'lightly'

Lightly refers to watering the soil surface and allowing it to dry between water applications. To water lightly one should not see water running through the bottom of the tray or container. The aim is to moisten the soil surface but not soak it.

Keeping it 'on the dry side'

Imagine a soil moisture scale with 'bone dry' at one extreme, 'absolutely soaked' at the other and 'lovely and moist' in the middle. Near the middle of the scale but on the drier side of middle, would be 'on the dry side'. In other words, keeping a plant on the 'dry side' doesn't mean you are keeping it dry, it means you are keeping it on the drier side of moist.

'Surface drying'

When attempting to germinate seed that goes through dormancy,¹⁷ you could mimic natural conditions by drying off the surface of the seed tray. This is a risky business and you could kill any emerging seedlings if they dry out. The technique is used when your seed trays have been kept moist for eight weeks or so, and germination of the seed batch has stopped or too many green algae and mosses have started to grow on the surface. You should place the seed tray in the full sun and allow the surface to dry off quickly. The top 5mm of the soil can be disturbed to bring some of the remaining seed nearer the surface and break up the compaction that is favoured by moss and algae.

Once the surface is completely dried out, you can soak the seed tray and dry off the surface again while disturbing the surface. Repeat this about three times and continue normal watering. Monitor the seed tray for germination and repeat surface drying after four weeks if the seedlings have not germinated yet. We found this a useful technique in the case of dormant Boxwood and Hogweed.

'Wet feet'

The drainage holes of plastic plant bags tend to block from time to time. Less drainage means that the plant will eventually stand in waterlogged soil. In horticulture we refer to this as having 'wet feet'. The same thing will happen if a plant stands on the nursery floor for too long. Either the plant will block the drainage holes with its roots or the finer particles in the soil will settle out and may slow the drainage. Standing plants in troughs where they are watered by flooding could have the same effect.

¹⁷ Dormancy refers to seed that has a natural mechanism for staying in rest even if the conditions are right for normal germination eg. Boxwood. This has the effect that only a percentage of the seed will germinate at any one time and the rest (which is still dormant) will germinate after the dormancy has been overcome.

Plants that have wet feet can show signs that look like the wilting associated with drying out. Do not be fooled when this happens. You could find yourself killing a plant by watering if it is wilting because of wet feet. Plants that wilt because of drying will show a dull colour and the tips of leaves can go brown. Plants that wilt because of wet feet (too much water and too little air in the soil) will show discolouration to the leaves as if they are rotting. The quickest way of telling the cause of wilting is noting what happens after you have watered. Dry plants will perk up whereas wet plants will stay wet (even wetter after watering!) and not recover.

Composting

For most seedling and potting mixes a 1:2 mixture of dirt (eg. topsoil removed from building sites) and compost can be used. Composting green material (leaves, weeds, grass clippings, chipped or shredded woody material etc.) is quick and easy provided you keep the heap wet and turn it over as soon as the heat is starting to go down in the centre of the compost heap. **Myth:** *You need to put muck on your compost to make it good.* **Myth Dispelled:** *Plant material is good enough on its own.*

The higher you can build your compost heap, the more heat will be generated. However, if you keep your heap a metre wide, gaseous exchange can still take place quite easily which will in turn keep the composting activity, aerobic¹⁸. When the heap goes cold, activity slows down and anaerobic¹⁹ organisms take over. Anaerobic activity requires high amounts of nitrogen to fuel the activity, and this will rob your compost of its nitrogen leaving you with 'poor' compost.

RULE OF THUMB: *Compost that smells nice is good, foul smelling compost is anaerobic and turning sour.*

The best way of telling if your compost is ready is to feel it, smell it and look at it. It should feel like a soft sponge, the smell should be earthy not stinky, and it should be dark in colour, with the visible bits like small twigs crumbling when rolled between the forefinger and thumb. If there are a few twigs and tough bits that need more time to break down, you can sieve these out and put the rougher materials at the bottom of your next heap to continue breaking down.

Pest and Disease

Plants should never be planted out into the wild if they have any pests or disease (P&D) on them. You may put the wild populations at risk and cause more harm than good. We do not like to use chemicals and therefore it is important to prevent P&D

¹⁸ Aerobic means in the presence of oxygen. This process results in compost with a high nitrogen content and is very good for potting mixes

¹⁹ Anaerobic means without oxygen. This process uses up a lot of the nitrogen in the plant material to break down the plant material, and will not result in as good as compost as with the aerobic composting.

from ever getting a hold on your plants. This however will not always be possible and we have to spray in some cases.

RULE OF THUMB: *Prevention is better than cure.*

There are a number of cultural actions that can minimise the occurrence of P&D:

- Plant out your plants as soon as possible. The longer they stand on the nursery floor, the higher the chances of picking up P&D
- Eliminate ants or prevent them from getting to your plants. Ants are known to farm sucking insects and will bring these into your nursery infesting your plants before you know it. Ant Powder²⁰ could be spread along the edges of the shadehouses to block the points of entry
- Remove sick or infested plants from the others as soon as they are spotted. Place sick plants far away from your other plants and treat them to prevent the P&D from spreading
- Remove dead leaves, empty pots, loose dirt and debris from your plants on a regular basis to minimise the places where P&D hide and breed
- Rotate your plants on a regular basis i.e. move seedlings out of shadehouses as soon as ready, move young plants on from hardening off areas asap, and ready-to-plant plants from the standing out area. Clean in between moves to disturb any P&D that was trying to get settled in
- Space your plants well. Air movement between the plants discourages insects. Still air and soft plants encourage insects
- Do not use dirty pots and trays. P&D could be hiding under the rims or in the cracks or among dirt
- Weed out all weeds at a very young age. Weeds tend to attract P&D
- Keep the areas surrounding your plants clean and clear of weeds and tall grass. Otherwise they will harbour P&D
- Don't allow infested plants to enter your nursery
- Do routine checks on all your plants every day to scan intensely for any signs of sickness, damage or discolouration that might give away the presence of P&D
- If you have to spray against P&D do it straight away. Every moment you delay, P&D will weaken your plant and spread to other plants
- Keep records of chemical spraying to monitor what, when, how much or often and at what strength (dilution) the chemical was applied. Also worth noting who has sprayed and what the conditions are at the time of spraying. This is all useful information that will help you to fine tune your spraying and work out how to improve or adjust future treatments
- If you notice one species of plant that seems to be very susceptible to certain P&D and always gets this certain P&D before the other plants, you can keep a

²⁰ A chemical in powder form that deters and kills ants and crawling insects, normally contains Pyrethroid

few specimens of this species near your other plants as an indicator of things to come. This way you can spray preventatively and timely in order to keep the majority of your plants P&D free

- Natural enemies of P&D can be introduced onto your plants. Ladybirds (and their larvae are prolific insect hunters), lacewing larvae, predatory wasps, and fungal pathogens that kill insects are all present on St Helena. These 'Biological Control Agents' could be a useful addition to improve the health of your plants. Beware – spraying chemicals will also kill the good biological control agents.

RULE OF THUMB: *A healthy strong plants is less likely to get P&D and more likely to survive P&D attack than weak struggling plants.*

There are many P&D on St Helena that can affect your plants and we cannot list them all. Below is a selection of pictures of P&D with notes on what to look out for. For help and advice on treating P&D, contact the Pest Control section at ANRD (telephone number 4724).



Ebony cutting being attacked by (possibly) Sciariid fly larva. Sciariid flies seem to be attracted by overly wet compost and could be seen sitting on wet trays. They will agitate their wings when you get near them but not fly up



Whitefly can be found hiding on the underside of leaves and will fly up when disturbed



Root mealy bug can be identified by their white 'mealy' covering and the two long attachments pointing straight out from their backsides. They are very difficult to get rid off and are actively farmed by ants. Plants that are infested can be cleaned by removing the soil from the roots and washing the whole plant with soapy water (one tablespoon of dishwashing liquid in a 20 litre bucket of water). Make sure to wash the soapy water off thoroughly before replanting into clean soil in a clean pot



Aphids are sometimes difficult to spot because they tend to blend in with the colour of the plant leaves. They can breed extremely fast. Eventually they grow wings and fly. You should kill them before this happens, because once they spread by air, they can rapidly infest your plants

A small black Ladybird, recognised by the shiny black body & orange shoulder markings (possibly *Scymnus* sp.), the larva (left) could be mistaken for root mealy bug



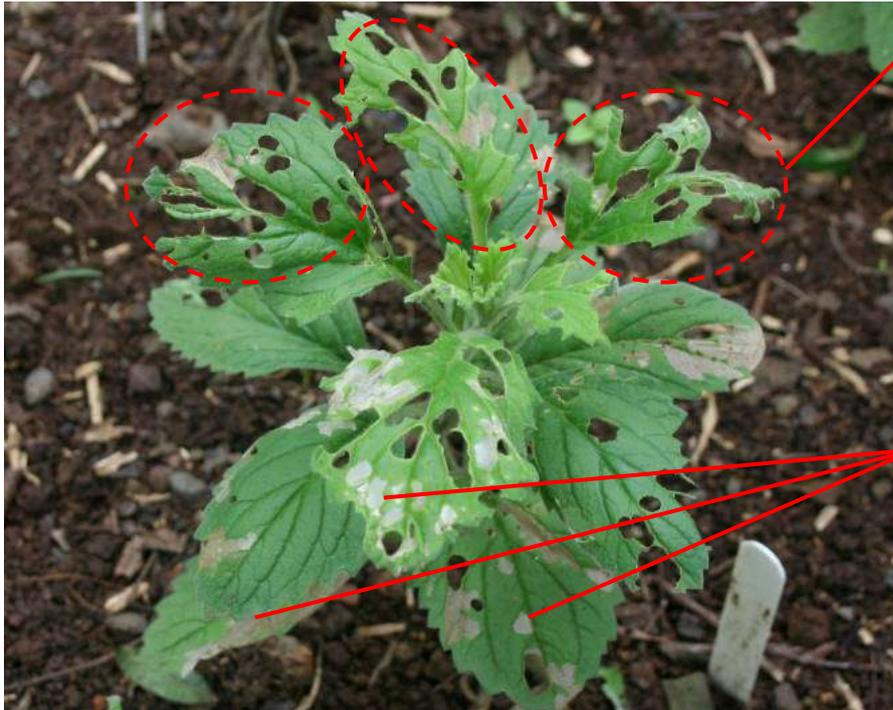
A large Ladybird, common across the island (species unknown) with colour variations from yellow-black to red-black, larva (left)



Ladybirds are well known to us all, but they come in many different colours and shapes, depending on the species. They are very useful and our allies in the struggle against insect pests; they will happily eat sucking insects like root mealy bug and aphids



Stunted Lobelia plants in the nursery with a disfigurement at the growth points. These plants will recover once planted out and possibly indicate a nutrient deficiency in the plant bags



As the caterpillars grow, they start to eat more and more and they can defoliate the plant (remove the leaves)

The first signs of caterpillars are little 'windows' (patches on the leaves where the insects have eaten the green bits away)

Caterpillar damage. Caterpillars are difficult to see but their damage is more obvious. Practice getting your eye in at spotting damaged leaves amongst the rest. All it takes is turning the damaged leaf over, locating the culprit and squashing it. In the nursery there is no reason (apart from irregular or inadequate P&D checks) why a plant should get as damaged as the example in the photo



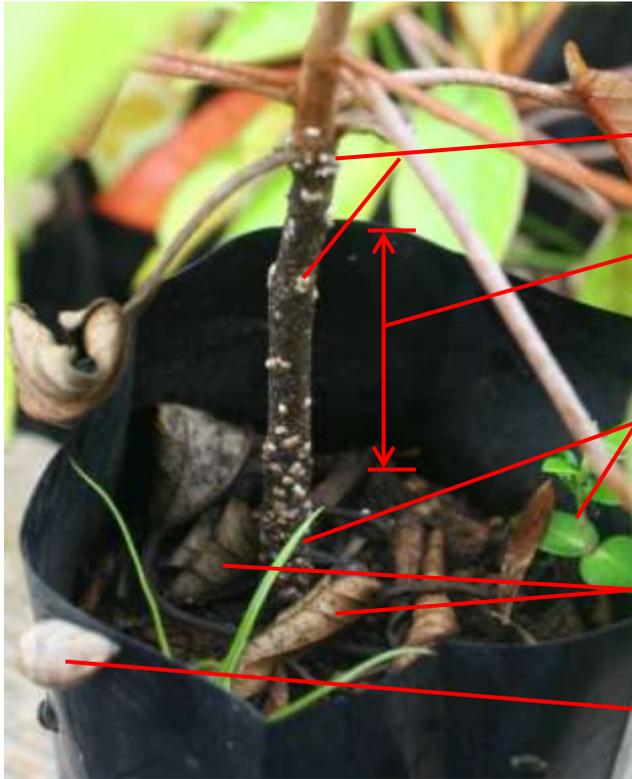
'Looper' caterpillars are masters of disguise and it is easy to overlook them. When young, they herd together in large clutches and will strip the undersides of leaves overnight before dispersing. As they grow larger, like this one in the photo, they will eat the growth tip and whole leaf and become harder to find as they blend in with the stems and leaves



These yellow dotted caterpillars are probably the most common on St Helena. They vary greatly in shades from almost black to this light colour form where all the markings are clearly visible. They have a very clever survival mechanism that makes them particularly difficult to find. They will release their grip on the plant and drop to the floor as soon as they feel threatened. When lying on the potting soil it is near impossible to find one of these, especially the darker forms, as they lie curled up and motionless



She Cabbage cuttings that got too wet for too long. Fungal and bacterial diseases thrive in these conditions. Cuttings should be checked over once a day for signs of excess moisture, and dying leaves should be removed. Any cuttings that show signs of rot should be removed immediately. Rot can be recognised by dull discolouration to the plant tissues



Scale insects all along the stem

A very shallowly filled bag, with not enough soil for the plant to grow in

Weeds stealing the few nutrients that are left in the soil

Dead leaf litter, potential hiding places and breeding ground for P&D

Snail, ready to eat off the remaining leaves

This Ebony is struggling: note all the cultural mistakes that have contributed to the poor health of this plant and see if you can avoid the same errors

Plant Pages

The following plant pages are in alphabetical order based on the common names of the plants as used on St Helena. For clarification on any technical terms used within the Plant Pages, refer to the appropriate chapter in the Technical Section. For those unfamiliar with the accepted local names, the following list gives the botanical names for quick reference, with IUCN Red Data Listings*:

<i>Bulbostylis lichtensteiniana</i>	Tufted Sedge	Endemic	Not Listed
<i>Bulbostylis neglecta</i>	Neglected Sedge	Endemic	Not Listed
<i>Carex diana</i>	Diana's Peak Grass	Endemic	Not Listed
<i>Chenopodium helenense</i>	Goosefoot	Endemic	Not Listed
<i>Commicarpus helenae</i>	Hogweed	Indigenous	?
<i>Commidendrum robustum</i>	Gumwood	Endemic	Endangered
<i>Commidendrum rotundifolium</i>	Bastard Gumwood	Endemic	Extinct in the Wild**
<i>Commidendrum rugosum</i>	Scrubwood	Endemic	Vulnerable
<i>Commidendrum spurium</i>	False Gumwood	Endemic	Critically Endangered
<i>Eragrostis saxatilis</i>	Hair Grass	Endemic	Not Listed
<i>Euphorbia heleniana</i>	French Grass	Endemic	Not Listed
<i>Frankenia portulacifolia</i>	Tea Plant	Endemic	Vulnerable
<i>Hydrodea cryptantha</i>	Babies' Toes	Endemic	Not Listed
<i>Hypertelis acida</i>	Salad Plant	Endemic	Not Listed
<i>Lachanodes arborea</i>	She Cabbage	Endemic	Critically Endangered
<i>Melanodendron integrifolium</i>	Black Cabbage	Endemic	Vulnerable
<i>Mellissia begoniifolia</i>	Boxwood	Endemic	Critically Endangered
<i>Nesohedyotis arborea</i>	Dogwood	Endemic	Endangered
<i>Osteospermum sanctae-helenae</i>	Boneseed	Endemic	Not Listed
<i>Pelargonium cotyledonis</i>	Old Father Live Forever	Endemic	Not Listed
<i>Petrobium arboreum</i>	Whitewood	Endemic	Endangered
<i>Phylica polifolia</i>	Rosemary	Endemic	Critically Endangered
<i>Pladaroxylon leucadendron</i>	He Cabbage	Endemic	Critically Endangered
<i>Plantago robusta</i>	Plantain	Endemic	Not Listed
<i>Sium bracteatum</i>	Jellico	Endemic	Vulnerable
<i>Sium burchellii</i>	Dwarf Jellico	Endemic	Endangered
<i>Trimeris scaevolifolia</i>	Lobelia	Endemic	Endangered
<i>Trochetiopsis ebenus</i>	Ebony	Endemic	Critically Endangered
<i>Trochetiopsis erythroxyton</i>	Redwood	Endemic	Extinct in the Wild
<i>Wahlenbergia angustifolia</i>	Small Bellflower	Endemic	Endangered
<i>Wahlenbergia linifolia</i>	Large Bellflower	Endemic	Critically Endangered

*IUCN 2009. Red List of Threatened Species Version 2009.1 ** Mature Bastard Gumwood tree recently found in the wild

Babies' Toes

Hydrodea cryptantha

Seed Collecting

Timing

Babies' Toes should be collected when the plants have dried out. Test seed availability by pouring water over a few capsules to make them open up. Look for brown grains inside.

When there is a bumper seed year as during 2008 it is important to make as large a collection as possible, from as many populations as possible, but by sampling across the whole of a population. This ensures you get a representative sample of all the populations without stripping the seed from one place

Method

When the plants are dry, they can easily be collected by snapping off parts of plants. This makes best use of time spent.

Spread the collection team out across a site to make sure you collect from as many plants as possible.

The aim is to leave enough seed behind for future generations while at the same time spreading the species into areas where it is less common or absent. Keep this in mind when collecting and only take a sample from across a population (see 'Seed Collection' section)

Seed Sowing

Sowing Method

Babies' Toes is best sown *in situ* but could be grown in a nursery at any time of the year. Although the seed goes dormant, there is always a percentage that will germinate when moist. For best germination the seed should be tickled in and the soil compacted after sowing. When sown *in situ* do not water, but wait for nature to do its own thing

Growth Info

Soils & Watering

Plants grow in extreme heat and flower production is induced by the reduction of soil moisture.

Leaves have a high salt content and can absorb moisture from the air through osmosis. Yellowing drying plants can green up after sea mists or heavy dew

Germination

A percentage germinates after continuous moisture for three to four weeks.

Seed dormancy is not yet understood.

Germinate and grow in full sun to improve seedling survival

Planting out

Timing

Plants cannot tolerate physical handling and should be grown *in situ* by direct sowing of seed. *Ex situ* conservation should be limited to seed collection and seed banking.

Planting out nursery grown plants will only be successful if roots are left undisturbed. However a high failure rate is to be expected

Special Requirements

Plants cannot compete with weeds; weeding out invasives from a good Babies' Toes area will help its long-term survival. The invasive lookalike, Ice Plant, germinates much quicker than Babies' Toes and as a result will out compete it especially during dryer times, therefore weeding in selected areas will be required

Ice plant looks very much like Babies' Toes when it is dry. The background picture is that of ice plant. The easiest way of telling the difference is to look at the dry stems. Ice Plant has round stems, and Babies' Toes (bottom right) has flattened stems. It is very easy to collect Ice Plant by mistake, and this would be a shame, as it is a very bad weed that is outcompeting endemic seedlings



Young Babies' Toes. Note where they have germinated. This gives a clue to the best places to sow *in situ*. The lower lying areas in this picture have collected fine grit and nutrients and probably hold surface moisture longer than the surrounding areas, allowing for the seed to germinate and root into the surrounding soil



These capsules have absorbed moisture and opened up revealing the seeds inside. Note that some of these capsules are filled with brown seeds (red circle) and others are near empty (blue circles)

Bastard Gumwood

Commidendrum rotundifolium

Seed Collecting

Timing

The optimum time is when the seed pappus or hairs have fluffed up on a flower head. However, with 200 or even more flowers on one flower head they do not all fluff up at the same time. The flowers will often undergo a colour change from pale yellow to a pink tinge when pollination has been successful

Method

Collect a whole flower head rather than just the few fluffy seeds that are ready at any one time. A flower head can be collected when there are a number of fluffy seed heads and most of the other flowers have undergone the colour change

Seed Sowing

Sowing Method

When sowing small seeds like Bastard Gumwood, it is important to work out of the wind otherwise the seeds will blow away. Scrape off the top two millimetres of soil out of the seed tray and mix this with the seed, bulking up the seed. This makes sowing easier while improving the spacing of the seed and ensures good contact with the soil. This improves germination

Germination

Keep the seed trays at even moisture for two weeks by spraying a film of mist over the surface once or twice a day (depending on the weather). Expect very low germination (typically less than 1%). Seedlings will show first pair of true leaves two weeks after germination and are ready for pricking out shortly after. Prick out when at the two to four pairs of true-leaf stage

Growth Info

Soils & Watering

Grows in a range of soils. Watering will differ depending on the soil but let the seedlings dry off slightly between watering, this will encourage healthy root formation

Special Requirements

Keep at high light levels and put in full sun one week after pricking out. Provide shade cover on hot sunny days to prevent excessive drying out.

Plants are sensitive to exposed roots. Make sure that the soil is topped up in the bags to prevent burning the roots in the sun

Planting out

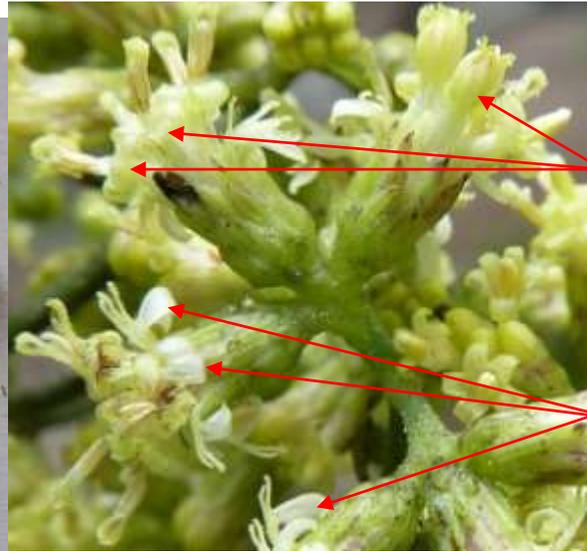
Timing

Planting out while the plants are young and in vigorous growth is imperative for good root formation and speedy establishment. The right timing is between two to three months from sowing to planting out, depending on the growing conditions. Moist, well fed plants grow faster, especially in warmer weather

Method

Dig the holes the same size as the root-ball and plant at exactly the right depth to have the seedling on the exact right level ie. no roots exposed and no soil above the attachment point of the cotyledons (seed leaves)

1000 Bastard Gumwood seeds



Disc florets

Ray florets



Above ground parts

Correct planting level, letting the seed leaves sit on the soil surface

Below ground parts



Round cotyledons (seed leaves)

True leaves



2nd pair of leaves

First true leaves

Cotyledons



Batch of seed that has been collected stalks and all to allow the few under-developed seed heads to mature, drawing energy from the green stalks. Seeds should be cleaned at this stage and dried down and sealed for cold storage as soon as possible. Leaving seeds exposed to the open air can age them very rapidly and their viability will decline. Sowing seeds fresh is always better, but big collections like this one have to be stored for later sowing

Black Cabbage

Melanodendron integrifolium

Seed Collecting

Timing

Black Cabbage flowers and seeds towards the end of winter; it starts to flower once He Cabbage has finished.

Best seed is collected on dry sunny days, so take every opportunity as the seeding season is brief and you might not get another chance. Make sure to return to trees that are flowering later than others in order to secure genetic representation from those in the seed collections as well

Method

Flower heads can be collected when there are a number of fluffy seeds on them, as most of the other seeds will fluff up on the stalk. Another method would be to use a cloth on a windy day or place the cloth underneath a tree on a wind still day and shake the seeds loose with a 'poking' stick (see Whitewood)

Seed Sowing

Sowing Method

Follow the method as for Bastard Gumwood

Germination

Seed germinates very well in the wild (might be because of the vast quantity of seed that is set) and the best germination is in the colder rainier times; not always straight after flowering though, which would suggest a portion of the seed is naturally dormant over the summer months.

Best germination in the nursery has been under misting. Once the seedlings have germinated, they soon become very tough and can withstand drying and being soaked. They seem to do best when given free draining rich compost and kept moist. Keep light levels high otherwise slimes and moulds will develop in darker damp conditions

Growth Info

Soils & Watering

Black Cabbage can be slow if the light levels are low and the soil gets too compacted and wet.

If this happens, replace the soil and allow young plants to dry off slightly by reducing watering.

Black Cabbage will grow very fast given half a chance in deep fertile soil but they seem to develop below ground first, waiting for conditions to become favourable for above ground growth (more work is needed to understand this 'waiting' mechanism in Black Cabbage)

Special Requirements

These plants should be planted back in healthy habitat where associated endemics are in healthy growth. Black Cabbage behaviour is not understood in a nursery situation and experimentation with different light and watering regimes should be undertaken to learn more about what triggers Black Cabbage into extension growth

Planting out

Timing

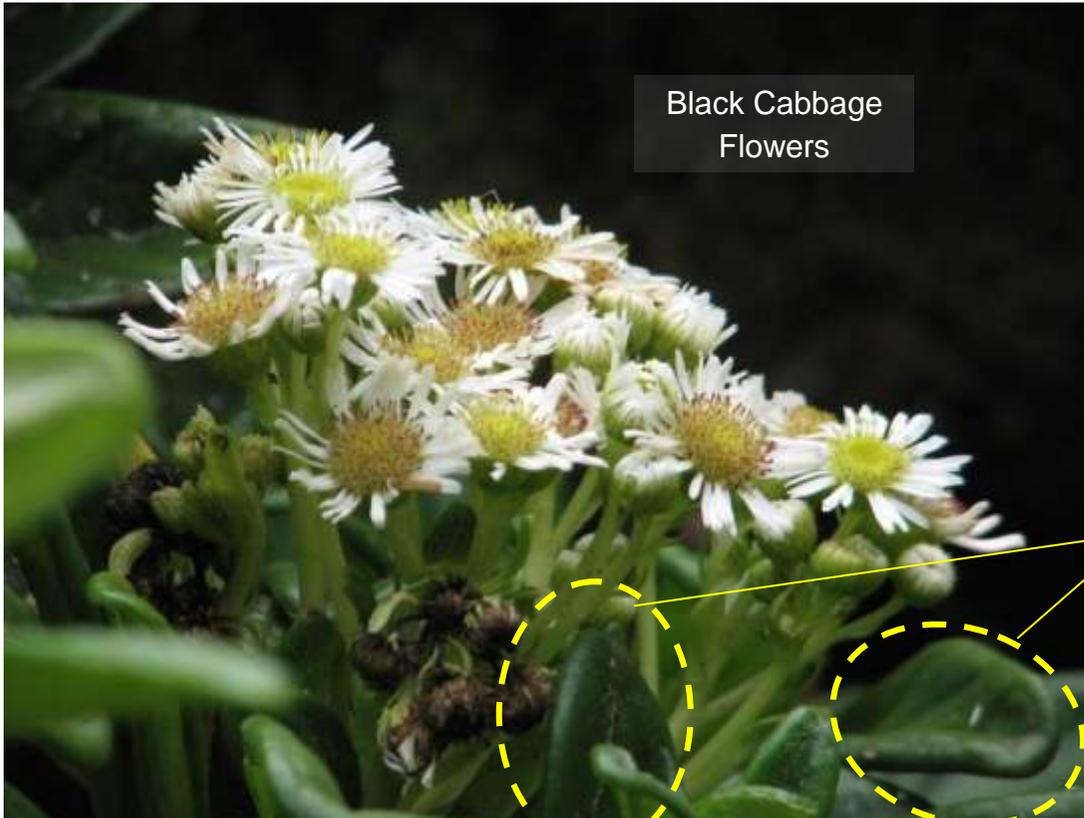
Make sure the plants are strong and in healthy growth when planting back in the wild.

The size of the plant should match the situation of planting ie. if planted in tall Blackscale Fern, the plants need to be about 50cm high; if planted in more open ground they can be much smaller. Either way, the plants should have a healthy balance of 'root to green growth' ratio

Method

Holes should be no bigger than the root-ball.

Pick areas that have soft deep soil. Do not remove native vegetation when planting as this will help to keep weeds out. Make sure you plant many Black Cabbages very closely together, the way nature does



Black Cabbage
Flowers

Black Cabbage leaves are typically dark green on the upper surface. They have smooth edges and are covered in fine downy hair when the leaves are young. This felty covering comes off the leaf with age, exposing its dark green colour



Black Cabbage. The bigger one is ready to be pricked out. The peat & perlite mix that was used did not work very well, as the seedlings didn't develop very well. Neither peat nor perlite has any nutrients and the seedlings just sat there, hungry

Lobelia seedlings

Jeremy Henry, Neil Henry and Gurrance Leo, standing in front of an old Black Cabbage that is growing inside a massive Tree Fern in the background. Black Cabbage has very spongy bark that supports an enormous amount of endemic life. It is well worth protecting these trees and planting young Black Cabbage seedlings, ready to take the place of the big old ones as and when they die



Boneseed

Osteospermum sanctae-helenae

Seed Collecting

Timing

The seed (achene) turns brown when ripe. Visit regularly during the flowering season to assess the development of seed. A population in full flower one week could be finished the next, depending on the local situation. Best collections are made near the end of the flowering season if a visit coincides with dry weather. Timing will differ from year to year

Method

Cup your hand underneath the hanging clusters of seed and touch lightly to make them fall. Visit the outlying plants at the extremities of a population as it is common to find some plants in full seed and others not. Never assume there are no seed

Seed Sowing

Sowing Method

In situ sowing is recommended.

Ex situ: ensure the seed is covered by a fine layer of sowing compost. Place the trays in a warm situation and keep moist, but avoid excess moisture as this will encourage the seeds to rot off. Where modules are used to avoid the pricking out stage, sow 5 – 10 seeds per module and plant *in situ* no later than 4 weeks after germination

Germination

Germinates throughout the year in the nursery, but mainly during late summer to early winter in the field. Make sure that the seed trays are exposed to high levels of light when germinating as this will encourage stronger seedling development

Growth Info

Soils & Watering

Grows on dusty, gritty and clayey soils in the wild. Develops fast in 1:1 dirt:compost mix.

Water sparingly to avoid rotting off

Special Requirements

Annual low growing creeper that can set 1000's of seed in its short life. Planting small numbers of these plants across the dryland areas will allow for seed set *in situ*, and the build up of a soil seed bank

Planting out

Timing

If the reason for planting out is to have a few plants to set seed in a wild area, then you need to plant early on in the rainy season. If however you have irrigation available *in situ*, you could plant throughout the year. Boneseed will die down naturally when moisture gets scarce

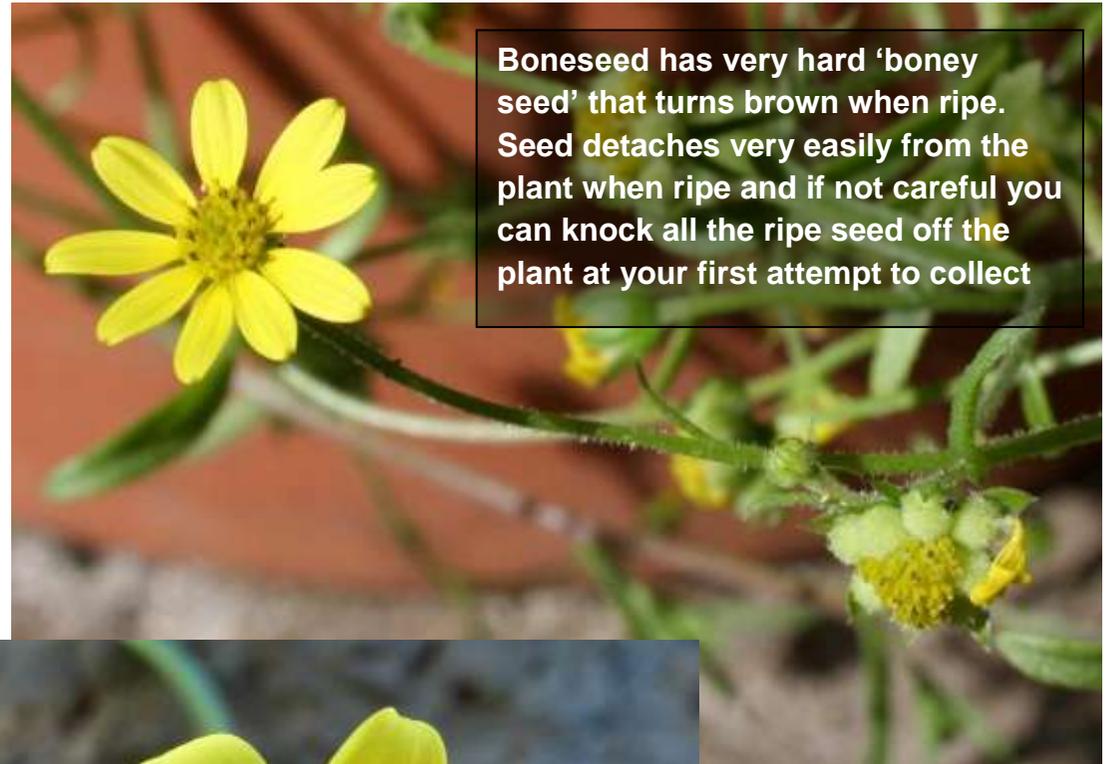
Method

Roots are very sensitive to damage therefore plant out when young and remove bags by cutting off to minimise root disturbance. Alternatively seedlings could be grown in small modules that allow for easy transplantation



Fleabane

Boneseed



Boneseed has very hard 'boney seed' that turns brown when ripe. Seed detaches very easily from the plant when ripe and if not careful you can knock all the ripe seed off the plant at your first attempt to collect



Boneseed seedlings (above) are very distinct but they could possibly be confused with Fleabane *Conyza* sp.



Boneseed flower showing characteristic ray and disc florets of the Daisy Family

Boxwood

Melissia begoniifolia

Seed Collecting

Timing

Boxwood can be found in seed throughout the year, regular visits are thus required to maximise the collection. This project has found that mature plants when in the throes of dying, produce extraordinary amounts of seed. It is crucial to capitalise on these periodic events to bulk up seed stocks

Method

Seed capsules turn brown when ripe but are difficult to spot as the calyx covers the seed capsule and blends in perfectly with the colour of the leaves (see photos below). Looking up into the leaves and in underneath the hanging flowers, you will spot the brown seed capsules. Bending the flower heads up to have a look can cause damage to the plant

Seed Sowing

Sowing Method

Soak seed overnight in warm (not boiling) water. Sow the seeds in a light mix and keep moist. After the first pricking out session, disturb the soil slightly with a 'twizzle stick', level it off and keep it moist. There are always a number of seeds that are still dormant and will germinate later

Germination

Seeds have a dormancy mechanism and tend to germinate best during the months of March to May. It is good practice to keep old Boxwood seed trays and prick out seedlings as they germinate. Some might take many months before they germinate

Growth Info

Soils & Watering

Water lightly and grow out in the full sun from day one. Plants have large roots in relation to the stem and should be planted out early on. Plants could grow in a range of soils but will not tolerate 'wet feet'

Special Requirements

Boxwoods are very fast growing when young. They could put on up to half a metre of growth in the first 8 weeks from germination. This growth is only interrupted by the lack of moisture or oxygen in the soil. Limited space for root development will also slow them down. Timely pricking out and planting out is crucial

Planting out

Timing

Best planting out time is early in the season (March to May). During this time there are still good amounts of heat and sunshine but normally enough rain around to allow optimum growth and successful establishment. Planting out any later than May, growth would have slowed and establishment becomes harder

Method

Boxwood has very soft roots and the stems are very weak at the attachment point with the roots. Planting out should be done carefully, and staking will encourage quicker establishment. The younger Boxwood is when planted out, the more successful on average, the establishment



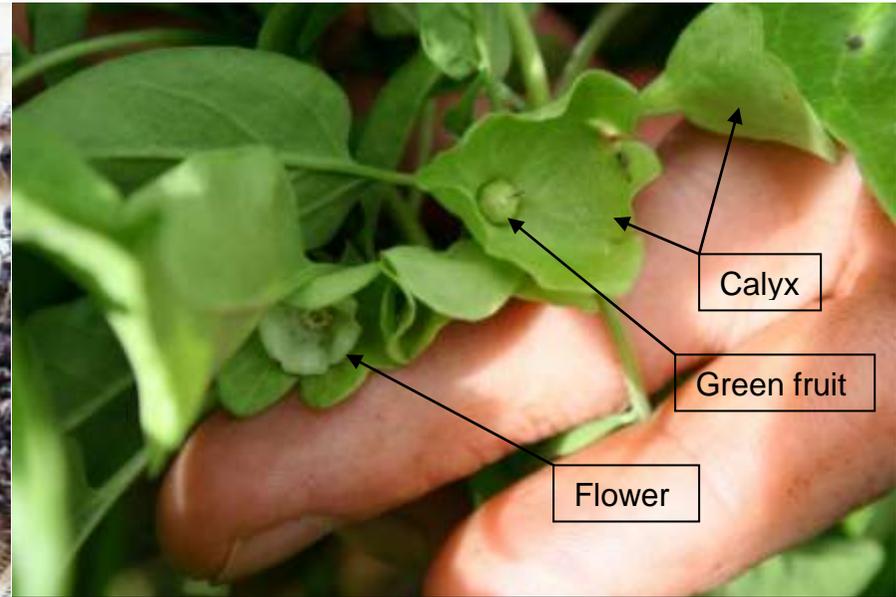
10 week old seedling. The right size for planting out into the wild

Seedlings that are newly pricked out. They will be ready to be moved out into the full sun in about four to five days

Seedling that should have been put out in the sun to harden off. More sun allows for much quicker growth, especially good root development



approx.
8000 seeds



The only way to find the ripe brown seed capsules is to lift the branch (dangerous as they break easily) or to stick your head in underneath and look up from below. Note the green fruit (unripe) sitting in the calyx



A plant growing on its own in the wild is more likely to succumb to pest attack. It won't get the benefit of sharing the workload of pest attack, or collectively attracting insect predators which contribute to the natural pest-predator balance. Close planting en masse is more in line with how plants grow naturally, as noted by J.C. Melliss

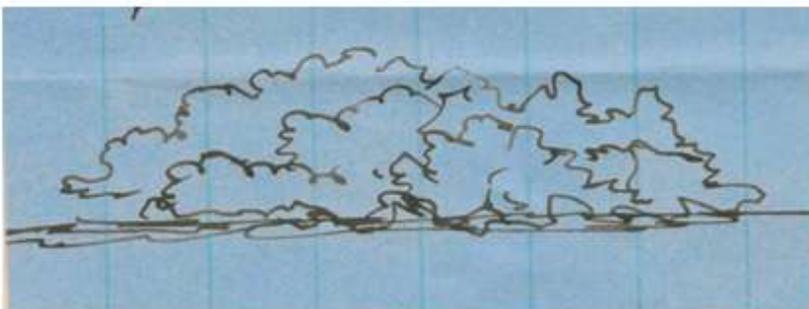
Example of how mass planting benefits plants. 80 seedlings, half of which are strong enough to survive pest attack

No 34. More specimens will be sent on when they are dry enough

Melissia begoniifolia – **Boxwood of the Islanders** St Helena

Found growing upon the hot, barren parts of the island at Long Range & the South Eastern parts of the coast – it grows in soil formed of rocks with coloured marls & where apparently nothing else will grow.

It grows in clumps of 5 or 6 bushes together with leaves down to the ground Thus.



Each clump being about 15 to 20 feet long & 6 to 8 feet high. In some places single bushes are met with - The stems are very crooked & measure about 2 to 4 inches diam: - The natives still collect

& use them for fuel. – the colour of the foliage is pale light-green. The plant when fading secretes a peculiar smell not unlike that of the tobacco plant. The white blossoms are hidden by the larger green calyx which greatly resembles the leaves, and it becomes almost impossible to see the blossoms without lifting the branches & looking underneath the leaves –

a 'Succinea' feeds upon the leaves & I am almost inclined to think it a new one, its climate & food being both so different from those of the 'Succinea' that lives on the Cabbage trees at Diana's Peak

J.C. Melliss

25/11/1867

Dec 12/1867

N^o 34. <sup>better specimens of this tree
we sent when dry enough.</sup>
Melissia begoniifolia – Boxwood of the
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at Diana's Peak.
J.C. Melliss 25/11/67. Dec 12/1867

J.C. Melliss tells the story of how Boxwood used to grow on St Helena. This evidence combined with the findings of trial plantings done at the Millennium Forest suggest that you need to plant very closely (no more than 30cm apart) in groups of about 50 or so. Given the large numbers of seed available and the good germination during the months of March, April and May, we could clothe the island in clumps of Boxwood if planted in this way. [Specimen: (Kew) Melliss 34 (25.11.1867)]

Diana's Peak Grass

Carex diana

Seed Collecting

Timing

Could be collected as soon as the seed heads start to change colour from bright green to a dull green and then brown. Seed will sometimes fall once the seed head has turned brown. Diana's Peak Grass was found in seed on High Peak from December to April and again in July to September. Plants on Longwood Barn had ripe seeds in early November

Method

Pick seed head stems as long as possible. This helps sustain the underdeveloped seeds as they mature on the stem. Stems can be snapped off easily at a joint. Place in a paper bag seed heads first, to allow them to mature and dry. Seeds are difficult to remove from the husks but this is not necessary and will not impede germination

Seed Sowing

Sowing Method

Sow on the soil surface but gently tickle in to make sure that the seed is making good contact with the soil. Place the seed tray underneath misting or alternatively keep the soil moist by checking two to three times a day. Do not place the seed in full sun or allow to dry out

Germination

Germination can be slow. More work needs to be done to determine possible seasonal preferences and/or quicker ways to stimulate germination. Germination can take up to six weeks providing soil never dries out. Even slight drying off could kill the developing embryos

Growth Info

Soils & Watering

Diana's Peak Grass can withstand quite a lot of drought but seems to be most vigorous in damp situations. Germination in the wild is good, but the development of seedlings is slow compared with competing grass weeds. Plants do not seem to cope at all well with water logging

Special Requirements

Take care with the planting depth as plants rot off quite easily if planted too deeply. Leaves also need to be cut back when pricking out to reduce moisture loss. This allows bags to be left on the dry side for a few days to allow healing of damaged roots and the development of new root nodules. At this stage there are no fine roots to soak up moisture and plants can easily rot off if too wet

Planting out

Timing

Plant out when plants are strong and in healthy growth. There is not much space in a plant bag for root development and it is best to plant out when the bag is filled with roots. Plant plants very closely to allow for the strongest to survive and fill the gaps left by those that will die

Method

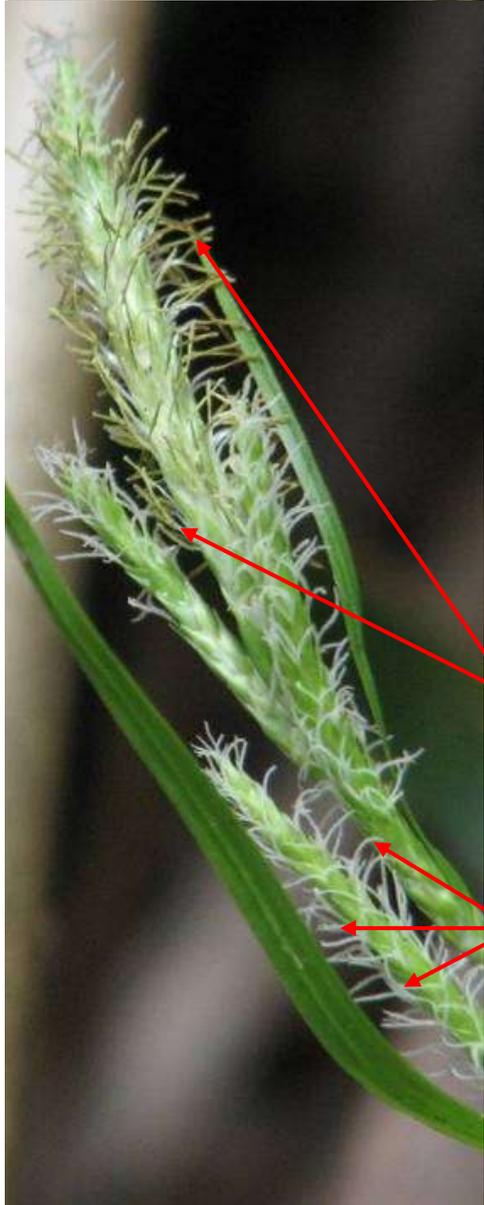
Apart from planting at the correct depth, it does not matter how you plant, as long as the soil is kept as undisturbed as possible. This allows for quicker root establishment into the soil surrounding the planting hole



Most Sedge species have low viability. The fertile seeds in a batch like this can easily be identified by touch. Press your thumb down onto the seed as if you want to squash it. Good fertile seeds feel rock hard like sand grains. Bad seeds will be soft or flat. Seeds do not need to be cleaned more than this for sowing. Be careful not to sow the seeds too thickly



Diana's Peak Grass takes quite a while to germinate and we could only get it to do so if kept consistently moist for the duration which can take up to 6 weeks



Male bits seem to develop later than the female bits to allow cross pollination of plants

Female bits pointing out from under the green bracts



Dogwood

Nesohedyotis integrifolium

Seed Collecting

Timing

Dogwood seems to flower almost throughout the year, on and off. Therefore it is important to keep an eye on the trees and note which ones will be in seed and how far they are developed. Look for flower heads where the capsules in the centre of the head start to turn brown. These are ready to collect

Method

Capsules that are brown and splitting open can be collected and the seed poured out as you would with a pepper pot. To collect larger quantities, whole inflorescences could be collected and ripened up in a cool dry area. To do this it is important to make sure that some of the capsules have turned brown already. Immature capsules alone will not ripen up successfully

Seed Sowing

Sowing Method

Dogwood seed is very small and it is easy to sow the seed too thickly. Mix the seed with a bit of soil to bulk it up; sow the mixture very thinly over the surface of the seed tray. The seed does not need to be covered and will germinate on the surface

Germination

Expect seeds to germinate in about three to four weeks. Keep the seed tray at even moisture until the seedlings are ready to be pricked out. When seedlings come up too crowded, it is worth pricking out clumps of seedlings at an early stage to thin out the seed tray

Growth Info

Soils & Watering

Dogwood does not want to be too waterlogged and an open soil structure can be maintained if the bags are allowed to dry off slightly between watering. Dogwood will not tolerate wilting: this will seriously slow down growth and establishment if this is allowed to happen

Special Requirements

To get the best growth out of your Dogwoods, it is important to encourage strong, healthy root development early on. To this end, prick out when young, pot on at an early stage, and plant out as soon as the roots reach the bottom of the bag. The richer the soil, the healthier the growth seems to be

Planting out

Timing

Dogwoods have big root systems, made up of very fine roots. These roots are very effective at searching out nutrients and can deplete the resources in a small planting bag quite quickly. Either pot the Dogwoods on into bigger bags, or plant out as soon as they are as tall as the bags are high

Method

Dogwoods readily produce shoots from the base of the stem. Planting slightly too deeply will negatively affect this ability. Dogwood also grows in length quite quickly and this could be encouraged by planting in small tight groupings to let the seedlings 'draw' one another up

Predominantly 'female' inflorescence



Petals

Nectary disc (nectar attract insects)

Small stamens on short stalks (male bits)

Large stigma (female bits)

Predominantly 'male' inflorescence



Large stamens (male bits)

Small stigma on a short stalk (female bits)

Nectary disc smooth (not attracting many insects)



Brown ripe capsules, some of which are starting to split and lose their seed

Green swollen capsules, not yet ready to split but well enough developed to be collected

Dogwood Seed Head

When the centre capsules turn brown the whole head could be collected for maximum seed gain. Most of the seed on this head will be well enough developed and germinate well. A green seed head like this should be placed upside down to dry off and allow most seeds to fall out naturally



Seeds ready to fall out as soon as a breeze jiggles the branch

Aperture or split in the capsule through which seeds are dispersed

Capsules are normally made up of two halves (locules) that house the seeds

Some capsules have three locules (reason unknown). Here seen on a 'female' tree, but reportedly only found on 'male' trees (Cronk 2004)

Dwarf Jellico

Sium burchellii

Seed Collecting

Timing

Dwarf Jellico takes a long time to ripen up after flowering, but when the time comes, they seem to just drop their seed. Many of the inflorescences with seemingly perfect developing seeds, seem to suddenly abort for some reason (possibly lack of nutrients or water or sun).

Seeds are best collected when brown ie. at the point of natural dispersal, but that results in a very poor harvest

Method

To secure a bit more seed, you can collect seed heads when they turn a yellow colour. Collect flower heads with the stalks and all and place upside down in a brown paper bag to mature. Seeds collected in this way should be sown fresh as they cannot be banked. The seeds that are brown and ripe will fall off by touch and could be dried and banked safely

Seed Sowing

Sowing Method

Use the same method as for Bastard Gumwood but take about 3 - 5mm of soil off the top of the seed tray.

Make sure to use only a small amount of seed as the seedlings have large leaves and will crowd one another out if not well spaced out

Germination

Will germinate at around three to four weeks if kept moist. Be careful not to overwater as seeds will rot off if waterlogged. Germination in the mist bench is good but trays should be removed as soon as seeds germinate. Reduce watering slightly at this point but do not let them dry out

Growth Info

Soils & Watering

Dwarf Jellico can grow on cliffs with very little soil. The more space they have for root development the bigger the plants tend to get. This has led to some plants being confused for 'hybrids' because they grow in a soil pocket or just below a cliff where there is a bit more nutriment and light, with resultant larger more vigorous plants.

More work is needed on hybridisation between Sium spp.

Special Requirements

Dwarf Jellico requires open space to flourish. It will not do well with non-native herbaceous competition, grasses being the main competitor. Recruitment in the wild where Dwarf Jellico still exists is good, and could be improved by the sensitive removal of weeds in such areas

Planting out

Timing

Dwarf Jellico will suffer badly from being left in a plant bag too long. Plant seedlings out as soon as their roots have filled the bag. Do not plant in an area from which grass has not been eradicated. Planting in or near grass will result in the loss of Dwarf Jellico plants

Method

Plant close, as if you are making a carpet of Dwarf Jellico. Any gaps between plants will take a while to be filled in by the plants themselves and should be planted up with Lobelia, Diana's Peak Grass or some of the smaller moist fern species

No good, small and thin. Won't be viable



Good seed is swollen and plump. Although green, colour is starting to change and seed will ripen up on the stalk

Dwarf Jellico is one of the quick coloniser plants that come up on slopes where recent landslides have scraped off the vegetation cover. Together with ferns, mosses, Black Cabbage, Diana's Peak Grass, Lobelia and Large Bellflower (where there are mature plants around) they all seem to be first to come up on these scraped surfaces. Sections of stem (ie vegetative parts) of Dwarf Jellico are able to root and sprout after they have been snapped off in a landslide. Dwarf Jellico grows easily from seed as long as you maintain a nice moist soil, out of direct sunlight





Dwarf Jellico stems can grow quite long but they cannot support their own weight, so tend to lie flat along the ground and will root from the nodes in places where contact with the soil is good. They differ a lot from Jellico (stiff stems that can support their own weight and stand up straight). Dwarf Jellico bracts are deeply divided and the teeth are irregular



Dwarf Jellico can be found in the wild with two different leaf forms. A normal form and a highly divided form. I have only seen two plants on High Peak with the divided leaf form. However, seedlings germinated from normal forms grew into plants that have exhibited a large range of leaf forms. This seems to indicate (and is supported by evidence of the larger nursery grown plants, changing their leaf form from normal to divided) that plants that are well fed, grow large enough to mature into a divided leaf form. If this is the case, then we can assume that most plants on High Peak are either very young (unlikely) or, most are growing without optimum nutrition (more likely)

Ebony

Trochetiopsis ebenus

Seed Collecting

Timing

Make sure that seed is only collected from plants that are more than 1.5km away from any Rebono or Redwood trees to avoid hybridization. Collect the seed when the pods start to split. Seed germinates best when seed is sown fresh

Method

Pick the pods as soon as they start to split otherwise the seed will fall and be lost.

Clean the seed as soon as possible and separate the good seed from the bad. Leaving uncleaned seed in collecting bags could allow insects to destroy some of the seed

Seed Sowing

Sowing Method

Sow seeds with an inch spacing, then press the seeds into the sowing media using your finger, as deep as half your nail (5mm). Lightly cover the seeds and water in thoroughly. Trays should be kept moist and in a warm place out of direct sunlight

Germination

Expect the first seedlings to pop up after 14 days (if fresh seed), however older (dormant) seed could take a lot longer. For seed trays that do not show any life after 30 days, drying off of the soil surface layer should be allowed. Keep a close eye on the seed trays as tiny little flies might be seen on the surface. They will lay eggs and the larvae will destroy the seed

Cuttings

Selecting and taking material

Thick or thin, they all root very easily without the need for hormone powder. Make sure you take the cuttings as long as possible and strip all the leaves but those on the tip to reduce transpiration loss. Take cuttings in the early morning or on a cool rainy day to further reduce moisture loss. When back at the nursery the cuttings should be cut to size (see pictures)

Striking and care of cuttings

Stick cuttings about half their length into the pots, water in and place under misting or in a Zip-Lock bag. They will root if you keep the soil moist and keep the cuttings in a cool place out of direct sun

Planting out

Timing

Plant out as soon as the bags are filled with roots. The plants are very tough and can withstand a lot of drought but need to be allowed to establish their roots first. Keep a good eye on the cuttings as they may well flower in the nursery, potentially hybridising with the Redwoods that are used as a seed source

Method

Tight planting holes work best for these plants, making the holes just bigger than the bag. However if the roots are curled in the bottom of the bag, they need to be opened up and splayed out in the hole to allow them to grow outwards instead of continuing with their curling root growth



Ebony, like Redwood, will drop its seed as soon as the capsule splits open. There is a crucial moment when a seed head starts to split open and this is the signal for collecting. Note that the split capsule has already lost all its seeds apart from one (indicated by arrow). The capsule on the right is still green and it might be a long while yet before it is ready. Do not collect capsules green as the seed will not mature and nothing will germinate

CAUTION!

Do not collect ebony seed from trees that are near Redwood and especially not near Rebonny



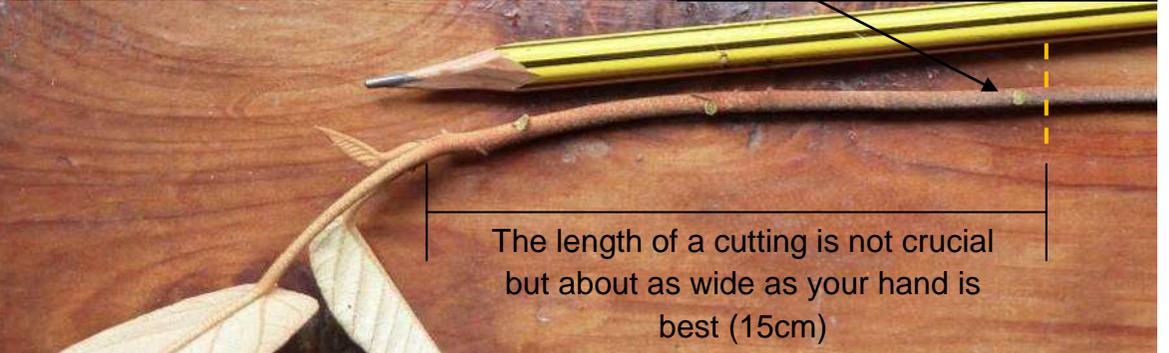
On the right is an example of a well rooted cutting. → This is perfect for potting on.

← On the left shows what cuttings should look like once they are stuck in. Note the depth of the pots: deep enough to allow for space to put the cutting into and allowing space for ample root development.

This rooted cutting is a sign of poor nursery practice. Ants should be kept out, away from your plants at all times as they 'farm' sucking insects like this root mealy bug *Pseudococcus viburnii*



Node – the place a leaf was attached and below which you make a cut – on the dotted line



The length of a cutting is not crucial but about as wide as your hand is best (15cm)

False Gumwood

Commidendrum spurium

Seed Collecting

Timing

Plants seem to have a number of flowering flushes. The first largest flush could be as early as November, and then repeated on and off till May.

There are only nine wild plants so it is very important to collect seed from all of them

Method

Collect a whole flower head rather than just the few fluffy seeds that are ready at any one time. A flower head can be collected when there are a number of fluffy seeds on the head as most of the other seeds will fluff up on the stalk. This makes best use of time and seed as regeneration in the wild is highly unlikely and this potential seed would be lost

Seed Sowing

Sowing Method

Sow seed shallowly. See Seed Sowing section for method, and follow the method described for Bastard Gumwood

Germination

Best results are achieved under mist. Seed germinates within two to four weeks but germinates quite evenly. The weather seems to play a role in how quickly they germinate. Cool rainy days seem to speed things up a bit for this species, as with Black Cabbage

Growth Info

Soils & Watering

False Gumwood likes a bit more moisture than the other *Commidendrum* sp. (Gumwoods) but does not like to be soaked. Open soils with high humus content seem to put the plants into overdrive and growth is quite astonishing

Special Requirements

When young they seem to be very susceptible to Whitefly, and together with Redwood seem to be the first affected by this pest in the nursery.

The plants respond well to good air movement and high light levels, but not to direct sunlight when young

Planting out

Timing

Plant out on a regular basis throughout the year, making sure that the plants are not in a situation where they will dry out ie. tucked in behind flax where mist will not reach them. Plant back in healthy habitat or habitat that has been pre planted with associated species

Method

Use tight holes, making sure to plant at the correct depth. Plants sprout from the base and covering this point with soil could rot off any new emerging shoots.

False Gumwood does well with a cool root run: a light cover of mulch will help if the soil is exposed to the sun



False Gumwood seed leaves are oval. Bastard Gumwood has round seed leaves

Dwarf Jellico seedling

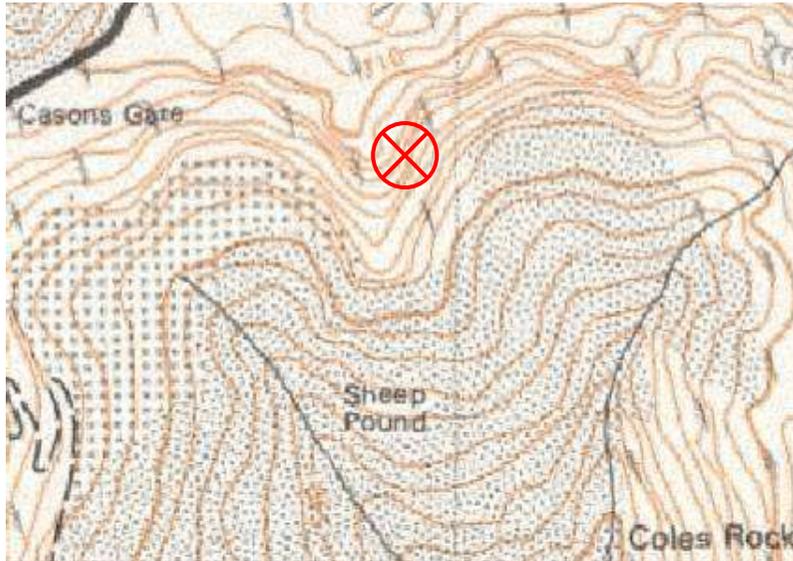
Typical rounded leaf tips of a False Gumwood. The leaf teeth (serrations) are also very distinct and look quite rounded; compare with those of Bastard Gumwood with its pointed leaf tips and pointed serrations



The amount of growth that has been put on after optimum planting out stage. This growth cannot be sustained as the roots have not been allowed to develop in unison with the leaves

This is the amount of growth that could be supported by the size of the bag and amount of roots that could develop inside. When the plant is as high as the bag is deep, it should be planted out or potted on

The size of the roots is restricted by the amount of soil or size of bag. The plant can not develop healthy roots past the size of the bag. If the plant gets too big for the bag, growth will be slowed and the plant might be stunted if left for too long



The 'Coles Rock' False Gumwood

This tree is growing on its own, approximately 1.5km away from the Mount Vesey population. The photo is taken from Sandy Bay Ridge and provides a good view of the tree. It would be a good place from which to monitor this tree with binoculars for flowering and seeding to assess the best time to make an attempt at collecting seed.

Ripe seed heads could be collected with the use of a 5m long bamboo pole with a small hook at the end. The utmost care must be taken not to damage the growing tips as this will weaken the health of the tree.

Ropes could be used to reach the tree but this would be dangerous and very difficult as there is no anchor point or easy access near the top of the tree. Best access is from the bottom approaching from Sheep Pound



French Grass

Euphorbia heleniana

Seed Collecting

Timing

At Gill Point some of the plants get quite large and live much longer than they do in other populations. Often, best seed is to be had towards the end of winter and after the winter rains. The seed pods explode open when they dry and the seed is shot away from the plant

Method

More work needs to be done... a number of tricks could work:

- scoop up any possible seed in a little bit of soil from the base of plant and thus spread seed in this way
- pick off the sandy coloured seed capsules (mostly empty, as the capsules with ripe seeds seem to explode and most of the sandy coloured capsules that are left seem to be empty and will not explode)
- place a wet tissue over a seeding branch of a plant. The tissue will dry in place and the exploding capsules will lodge their seed into the tissue (not tested on French Grass, but an accepted method on *E. obessum*)
- use a custom made seed bag with a pull cord, made from fine net curtain material (that won't let the seeds through but allows light transmission). Place over the plant and pull tight around the base. This should allow the plant to continue development while dropping the seeds in the bag

Seed Sowing

Sowing Method

Sowing *in situ* is recommended.

When seedlings are grown *ex situ*, sow the seed shallowly on the soil surface and germinate out in the sun. Plants do best in compacted soil

Growth Info

Soils & Watering

Watering should not be needed unless the seedlings are in shallow trays.

Keeping the seedlings out of excessive rain might be helpful to prevent them rotting off

Special Requirements

Not much is known about this species or the requirements for growing it

Planting out

Timing

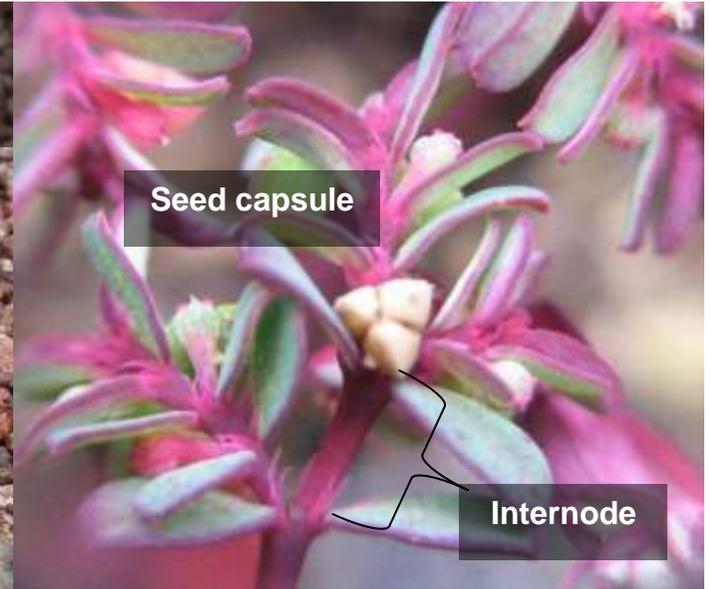
Best grown *in situ*

Method

Being a short lived annual, it makes little sense growing it in a nursery that cannot replicate its wild habitat or environmental conditions.

It is important to increase the range of the species in the wild, and methods should be explored to achieve this

A plant that has slowed its growth. The leaves are turned at 90° angles to the sun to reduce exposure. The internodes are shortened due to the slower growth and the colour is slightly dull, compared to that of a plant in active growth



Below: *Euphorbia serpens* is sometimes mistaken for French Grass, but clearly different. The flowers are white and the leaf margins are smooth. French Grass is supposed to have tiny serrations on its leaves barely visible in the picture above



A plant in active growth. Its leaves are flat giving full exposure to the sun. The internodes are long and the colour is as green as you will ever find on French Grass



Goosefoot

Chenopodium helenense

Seed Collecting

Timing

These plants seed profusely from the moment they start seeding until they die.

There is always seed available even though the flower heads look very green and as if there is no ripe seed. The seeds turn dark brown when ripe and fall as soon as they are ripe. So on one plant you will get flowers, green and ripe seed and even sometimes seedlings underneath it from its own seed

Method

Don't confuse with other introduced species of Goosefoots (*Chenopodium sp.*)

Visit all the plants in a population and bend the heads down into a large paper or material bag (be careful not to snap it off) and give the stem a good few shakes to dislodge all the ripe seed. Large numbers of seed can be collected in this way without destroying the plants.

When using this 'shaking bag' method, be sure to leave the bags open when having a tea-break or rest, to allow the insects to escape and return to their habitat. These seed heads seem to be covered in insects of all kinds, some of which might eat the seed

Seed Sowing

Sowing Method

Best to sow *in situ* and allow self-seeding.

Make sure to tickle the seeds into the soil and compact the soil down to ensure good contact with the seed.

The seeds are light and will be blown away if lying on the surface

Growth Info

Soils & Watering

No watering required apart from natural precipitation.

Plants that receive plenty of water and grow in a slightly richer soil can grow quite large (over a metre) and will seed very well. However, plants that grow in poor soils in dry areas come up year after year and don't seem to be worse off health wise

Germination

Germinates in the wild after rains towards the end of April to May, weather dependent.

Easy to germinate in the nursery and could be grown *ex situ*, but the ease with which they grow in the wild doesn't warrant the effort

Planting out

Method

If nursery grown, plant several plants together in tight groups. They should be planted well before they start to seed, to allow plants to sufficiently establish their roots to support the ensuing demands of flowering and seeding and ensure that the plants survive through the odd dry spell



Goosefoot seed harvesting from an apparent green under-developed seed head. Don't be fooled as they flower and seed all the time and the brown ripe seeds fall off continuously as the plant develops



Four more flower heads over which the bag could be placed. Once in the bag, shake vigorously to dislodge the ripe seeds, but take care not to damage the plant as it will continue to flower and seed for as long as the rain lasts

A lovely young seedling. This is the size plants should be if you were to plant them out in the wild.
Sowing is best done *in situ* and this seedling came up in the Millennium Forest nine months after seed was sown there

Gumwood

Commidendrum robustum

Seed Collecting

Timing

Gumwood flowers on and off throughout the year; the trees show great variability in that flowering is not synchronised. Collect seed when the fluffy pappus, or parachute, attached to the seed has fluffed up and seeds are ready to blow away. The seed fluffs up best on hot dry days

Method

There are lots of grubs that eat the seed and these can consume your seed collection if not killed or removed. Pick the fluffy seed heads with the tips of the fingers (as you would pick up a big pinch of salt) by grabbing onto the parachutes. Rub the seeds between the thumb and finger tips. This removes the parachutes from the seed, and at the same time kills any grubs

Seed Sowing

Sowing Method

Sow Gumwood thinly over the soil surface to avoid crowding of seedlings.

Tickle the seed in so it's lightly covered in the soil

Germination

Germination is quite even and seedlings will be up in about two weeks time.

If there are too many seedlings in a seed tray, they can be thinned out by pulling out the weaker seedlings or pricking out the stronger ones to make space for the smaller

Growth Info

Soils & Watering

Gumwood is drought resistant but does best if given good soil and a regular water supply (like at Peak Dale).

Good root development can be encouraged by soaking the plants and allowing them to dry off before the next soaking. This makes the roots grow down after the water as the soil dries out from the top down

Special Requirements

Gumwood needs a strong taproot to grow into a large specimen. It also needs competition to grow into a good size. This means that a plant on its own, in the open, will have no need to get the sunlight required for flowering and seeding and healthy growth. If large 'forest sized' trees are required, then close planting has to be done to draw the seedlings up in the competition for sunlight

Planting out

Timing

Plant out the seedlings as soon as the roots have filled the bag, before they start to get cramped for space

Method

Holes need to be no bigger than the root ball. In fact the better the contact is between the surrounding soil and the root ball, the easier it is for the roots to find their way out into the soil. Soil also dries out slower when it is left intact, rather than loosened up by digging a large hole



Peak Dale Gumwood Forest,
year of 1993.
Image courtesy of Tim Upson

11.62 metres

9.96 metres

8.30 metres

6.64 metres

4.98 metres

3.32 metres

Katrine Herian, red
shirt = 1.66 metres

Thanks to the brilliant trees that are still alive at Peak Dale, we can safely say that Gumwood can grow well over ten metres tall. The Gumwood forest is in fast decline and a lot more effort will be needed to help the recovery of these forests. Growing healthy seedlings and planting them back at these sites will help. Make sure that only seed from the wild trees is used and no Scrubwood DNA is introduced

Seedlings that got far too large to be pricked out; note how entangled the roots are and how they were also sown too closely. Even though it might seem like a good idea, sowing a lot of seed at once usually never is because there will be too many seedlings that need to be pricked out at any one time. This can result in seedlings being left too long (like those in the picture) and consequently a waste of resources, seed and time, because these trees will already start life heavily disadvantaged



Hair Grass

Eragrostis saxatilis

Seed Collecting

Timing

Seeding stretches over a long period within populations and differs around the island. Main seeding seems to be round late summer to early winter. The inflorescence matures from the tip downwards and as long as you observe and avoid any flowers, everything above them on that stalk, could be collected

Method

Ensure you are collecting seed and not flowers (stamens & stigmas are purple & yellow). Seed matures at the spike tip first, so you might collect just from the tip while it's still flowering lower down. Hold clump of seed heads (spikes) and slide hand up stem with the stalk pinched between thumb and forefinger

Seed Sowing

Sowing Method

Sow a pinch of seed in a group, this will allow for a strong clump of grass to grow. This could be done in modules or directly in bags. Seed sowing *in situ* is also feasible but good contact with soil should be ensured by tickling the seed into the soil and compacting down this patch with the heel of your boot or a flat stone

Germination

Takes about four weeks to germinate. Prick out when about 2cm high. Plant seedlings in tufts or groups, this allows for quicker establishment and stronger grass when planting out. Make sure to weed out other grasses at a young age as they will easily take over and kill the Hair Grass

Growth Info

Soils & Watering

Will grow better in soil with 50:50 humus and soil; do not use heavy clay on its own. Growth can be speeded up by increasing the ratio of compost, but this results in 'soft' plants, prone to disease. Don't overwater at seedling stage, they will easily rot off and rot spreads quickly through a seed tray

Special Requirements

Hair Grass is one of the hardiest of endemics and once established, can tolerate extended periods of droughts. They have enormous root systems and grow very fast if the roots are allowed to develop freely. Mealy bug is often found in the root bases

Planting out

Timing

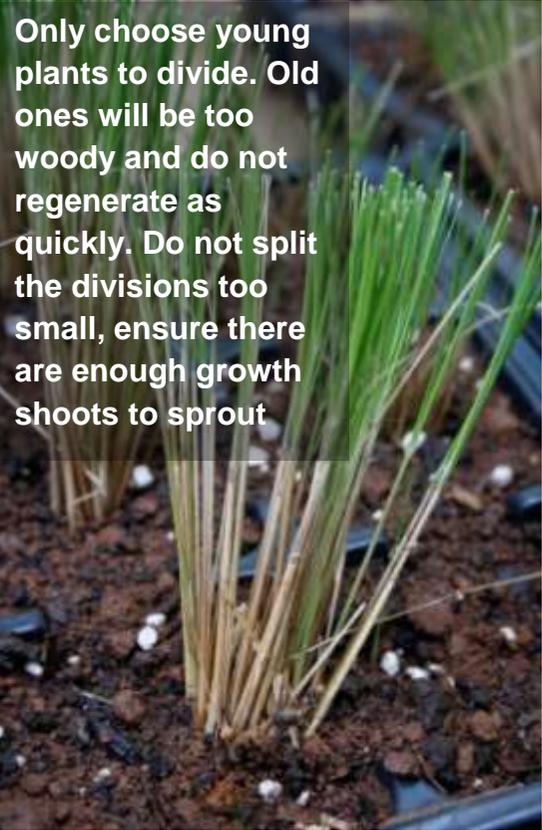
Plants can set seed within one year of being sown from seed. During late autumn to early winter, direct field planting of divisions could be attempted with very high success rates, provided that young clumps of grass are selected and split, and the leaves sufficiently reduced. Plants need a large root run and do best when planted out as soon as the roots start to grow out of the bottom of the bags

Method

Hair Grass will not tolerate shallow planting, and might just sulk and not grow. Rather plant a touch deep than too shallow for this species. Use a sharp spade to make a slit in the ground, ensuring it is deep enough; shove the rootball into the slit behind the spade and step either side to compact the soil back down



Divisions could be prepared in this way in modules or bags or struck *in situ*. Make sure to cut the leaves back as soon as possible to reduce moisture loss, and remove excess roots as they will make it more difficult to push the divisions into the soil. Young roots will be white in colour and will soon replace the older brown ones you cut away

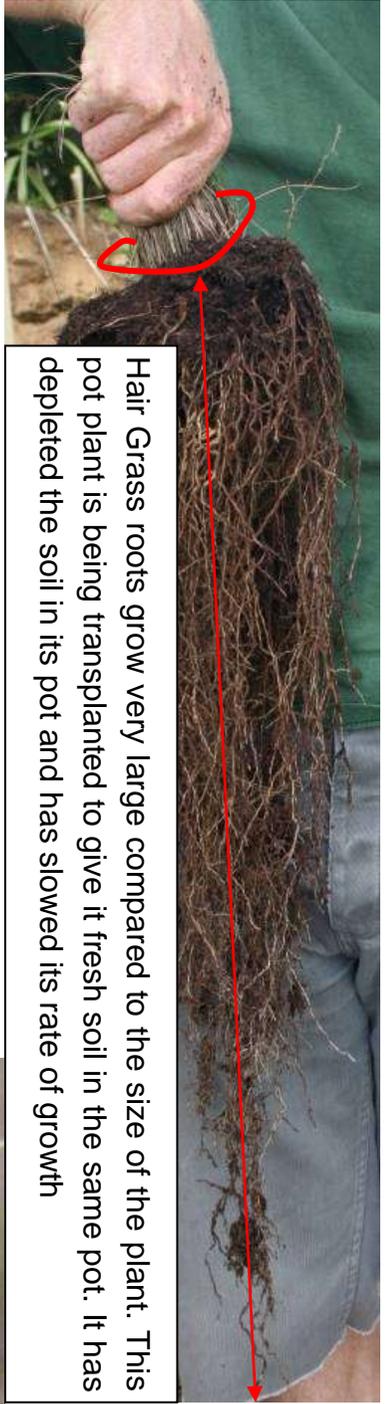


Only choose young plants to divide. Old ones will be too woody and do not regenerate as quickly. Do not split the divisions too small, ensure there are enough growth shoots to sprout

Faintly visible are the signs of Hair Grass flowers: not your normal plant flowers with petals, but still visible if you look closely, look for tiny bits dangling off the flower stalks (spikes), these are the male bits (stamens)



Top bit of flower stalk has finished flowering, seed is ready to collect. Note the brown tip where seeds have dispersed already



Hair Grass roots grow very large compared to the size of the plant. This pot plant is being transplanted to give it fresh soil in the same pot. It has depleted the soil in its pot and has slowed its rate of growth

He Cabbage

Pladaroxylon leucadendron

Seed Collecting

Timing

He Cabbage flowers and seeds in winter. It seems to always flower just as the last Whitewood has finished seeding. He Cabbage finishes seeding as soon as the first Black Cabbages start to flower. Best seed is collected on dry sunny days, so when you are gifted with such a day, take the opportunity as the seeding season is brief and you might not get another chance

Method

A flower head could be collected when there are a number of fluffy seeds on the head as most of the other seeds will fluff up on the stalk. Another method would be to use a cloth on a windy day, or place a cloth underneath a tree on a wind still day and shake the seeds loose with a poking stick (see Whitewood)

Seed Sowing

Sowing Method

Follow the method as for Bastard Gumwood

Germination

Viability has been found to be very low and 3ml of seed per large tray would probably give you a good enough tray cover.

More work needs to be done to determine germination time and requirements to optimise seed use and success rate

Growth Info

Soils & Watering

He Cabbage can be slow if the light levels are low and the soil gets too compacted and wet. If this happens, replace the soil and slightly reduce watering.

He Cabbage will grow very fast given half a chance in deep fertile soil. The plants can withstand strong winds and seem to benefit from air movement in the nursery

Special Requirements

These plants should be planted back in healthy habitat where associated endemics are in healthy growth. It is important to strengthen the He Cabbage populations in the wild with continued planting. This will improve seed set, if there are more flowering trees close together in an area

Planting out

Timing

Make sure the plants are strong and in healthy growth when planted back in the wild. The size of the plant should match the planting situation ie. if planted in tall Blackscale Fern, the plants need to be about 50cm high; if planted in more open ground they can be much smaller

Method

Holes should be no bigger than the root ball. When planting, pick areas that have soft deep soil and do not remove native vegetation as this will help to keep the weeds out. Make sure that you do close planting and plant near mature He Cabbage



Pollen grains burst out of the ends of the stamens (male bits)

Stamens (male bits) grow in a tube, surrounding the style (female bit)

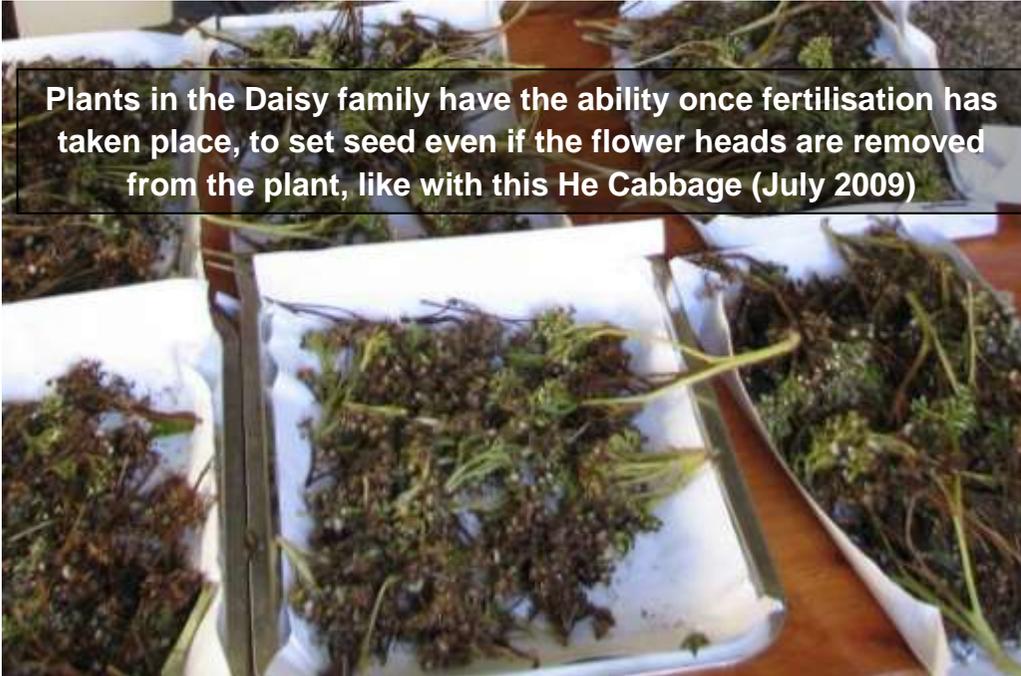
After the stamens have shed their pollen, the style bursts through exposing the curly stigma horns (female bit) with its sticky surface. Note the yellow colouration where the pollen got stuck to it

Corolla lobes (when these turn brown, the flower is ready to collect)

Ligule (petal)



Fluffy seeds ready to blow away. A stalk that holds a bit of fluff could be picked and taken to the seed room where the fluffy seeds could be removed and the rest of the flower stalk can be left to ripen, placed upside down on a piece of paper



Plants in the Daisy family have the ability once fertilisation has taken place, to set seed even if the flower heads are removed from the plant, like with this He Cabbage (July 2009)



The same seed batch two days later. Notice how the seed heads have fluffed up (July 2009)



Note that these stalks have been placed in the correct upside down position (July 2010)



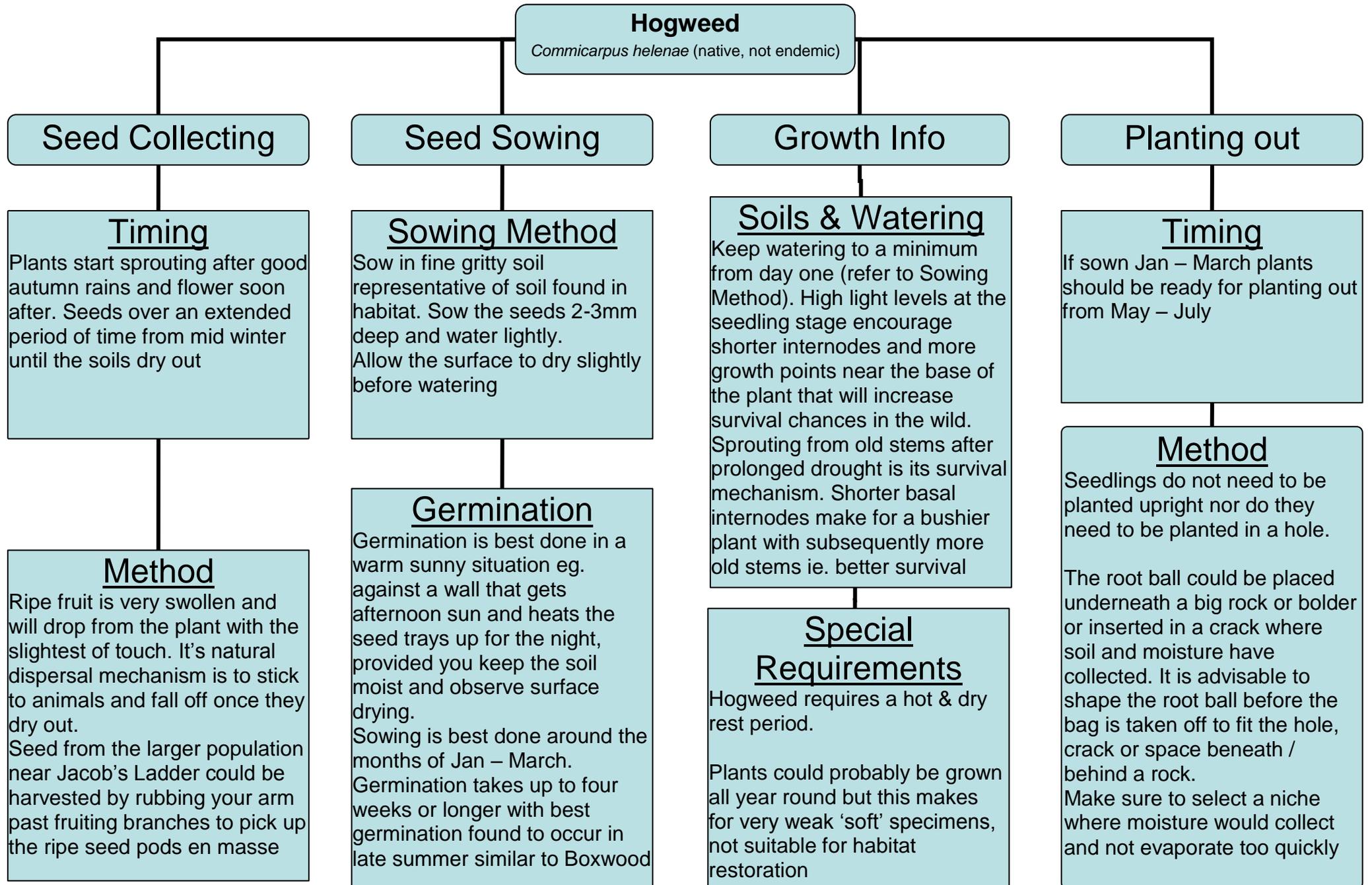
Two days later and more seeds are ready for cleaning off the stalks (July 2010)



Mature trees could be confused with Black Cabbage. The most apparent difference is the frilly leaf edges (irregular serration) that also sets them apart from young She Cabbage (regular serration)

Young He cabbage (pink petioles) could be confused with She cabbage (pink stem, petioles and leaf veins when young) but pink petioles not present at maturity



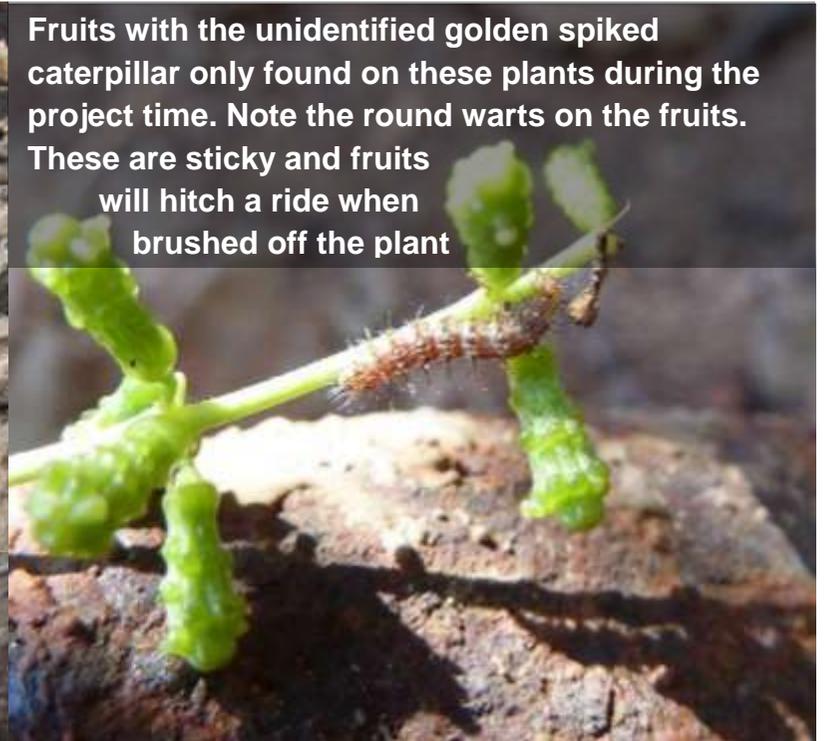




Two year old seedling. Note the brown woody growth, from the previous season, near the base. This is where future growth will come from



This is what the plants look like when in rest. Note the cluster of twigs near the base where the growth will come



Fruits with the unidentified golden spiked caterpillar only found on these plants during the project time. Note the round warts on the fruits. These are sticky and fruits will hitch a ride when brushed off the plant



Seedling showing the very characteristic seed leaves and colour



White flower colour form. The pink colour form produces green fruits with purple warts, unlike those in the picture above

Jellico

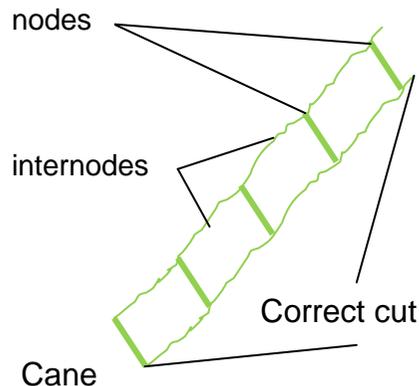
Sium bracteatum

Seed Collecting

Hybrid issues

More work needs to be done to determine the extent of hybridisation between the two *Sium* species.

Jellico is easily grown from divisions or slips (stem cuttings) and until such time as there is more clarity about the hybridisation issues, Jellico should not be grown from seed. Dwarf Jellico is much more vulnerable than Jellico and efforts are currently focussed on the vulnerable Dwarf Jellico



Stem Cuttings

Method

The long green stems of Jellico have the ability to root from the nodes.

To make a stem cutting, a length of stem should be chosen that has reasonably short internodes (the more nodes the more chance for rooting). Cut stems into pieces about 1m long; pull the leaves off and cut the tip off, leaving you with a 'cane'.

Make sure the cuts are made on either side of a node to avoid water filling the cane and causing rot.

These stem cuttings should be laid flat in a suitable area and pressed into the soil, making sure that the nodes make good contact with the soil

Growth Info

Soils & Watering

Jellico seems to do best where there is a regular supply of moisture ie. on slopes where there is regular runoff like the slopes below the Wash House, or in guts.

It is also capable of growing in drier conditions like at George Benjamin's Arboretum. However this has been planted, and it is not known if this species will germinate and establish on its own in a situation like that at the arboretum

Divisions

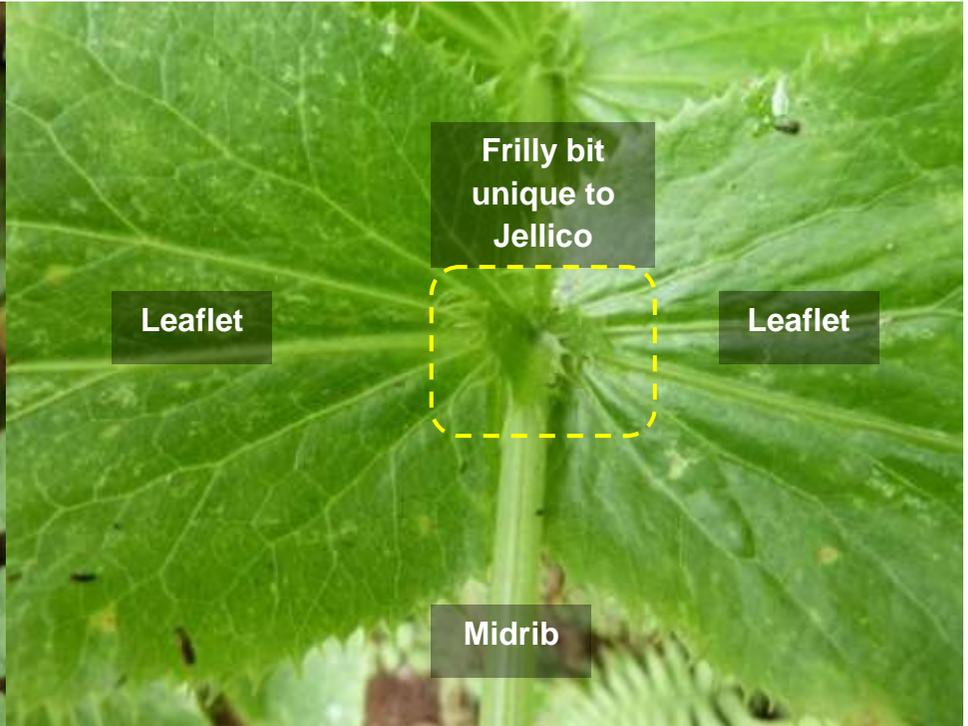
Method

Clumps could be dug up and divided (split up) successfully.

When cutting the stems back, make sure to cut just above a node (see diagram). If you cut below a node, you leave a reservoir where water will collect and the stem will rot off. This could damage the rest of the clump or division.

Make sure not to collect divisions from only one population. Try and collect from many populations, in order to mix plants and ensure the preservation of the genetic material from the different populations rather than growing clones from one population.

Divisions could be planted slanted sideways to limit water entering the cut stems and hopefully further limit rot



The bracts at the base of the leaves are very distinct in Jellico (compare them with the two Dwarf Jellico pictures, below right)



Jellico canes cut at the wrong point will hold water and rot down. Either plant at an angle or lie canes flat. If cut just above a node, water cannot accumulate & canes are less likely to rot



Dwarf Jellico bracts are more deeply divided than that of Jellico

Large Bellflower

Wahlenbergia linifolia

Seed Collecting

Timing

Very difficult, compared with Small Bellflower as the Large B capsules don't change colour. Neither does it have a long extended capsule, it's rather podgy in comparison.

See pictures for clues on what to look out for when seed collecting

Method

Collect a ripe capsule that is starting to split by pinching it off at the joint to leave a bit of stalk on the capsule in case some of the seeds have not yet fully ripened up yet.
Place the seed capsule in a paper packet to split fully and release the seed

Seed Sowing

Sowing Method

Sow very thinly over the surface. Keep seed tray under constant moisture and in a cool spot, without direct sunlight.
In situ: make the tip of your finger moist and press it to pick up a bit of seed. Rub this seed into a suitable moist bank, preferably near the mother plants and away from competition, especially grass

Germination

Germinates after four weeks. Seedlings take a long time to develop and need to be pricked out into a loose medium. The seed will rot off if waterlogged. Moulds are the main threat and seedlings should be pricked out as soon as slime or mould starts to infest the seed tray

Growth Info

Soils & Watering

Ensure the medium is free draining and moist. Plants tend to rot if kept too wet. Increase light levels three weeks after pricking out. Make sure to plant the seedlings out into pots that are big enough for their roots, but not too large, otherwise the excess soil will hold moisture that cannot be taken up by the plant

Special Requirements

Moisture level is most important. Make sure there is a good balance between the pot size and the amount of leaf surface. The leaves transpire and moisture is lost this way. If there are not enough leaves, the fleshy roots will sit in wet soil and rot. Planting three or so smaller plants together in a pot can solve this problem

Planting out

Timing

Plant out when the plants are strong and healthily growing. The size of the plant doesn't matter so much as the plant being healthy

Method

When planting Large Bellflower in the wild, it is very important to disturb the soil as little as possible, so make the hole only as big as is needed to put in the tiny roots.

Make sure that you do not plant too deep. If the basal growing points are under ground, the plant will rot off.

Plant Large Bellflower in a position where, if it is seeding, the seedlings will have a chance to establish



Clear green sepals

Capsule with prominent swollen tip

Toothed bracts at the joints

Clear green, very short flower stems

Small Bellflower capsules



Almost ripe

Perfect ripeness

Above, a typical Large Bellflower inflorescence: just three flowers, large sepals and swollen capsule tip; short stems, with very large toothed bracts at the joints and no colouration apart from its lovely clear green.

The capsules on the right are ripe for collection (the same flower head as above) and one can clearly see the beginnings of the aperture (split) on the tip of the capsule. Capsules normally split open completely the next day when they are at this stage.

It is quite difficult to determine the exact time to collect as there is no colour change; though the capsules do turn brown later, by which time all seed is gone. Collect too early and the seed will not develop well enough on the stalk but if you are sure the capsule is fully swollen and near splitting, or have started splitting, then it is worth collecting. **IMPORTANT:** The seeds are very light and most of them blow away in the wind. When collecting from a wild population, it is important to 'smear' tiny amounts of seed onto exposed mossy patches around the mother plant. They germinate very well *in situ* on moist mossy banks

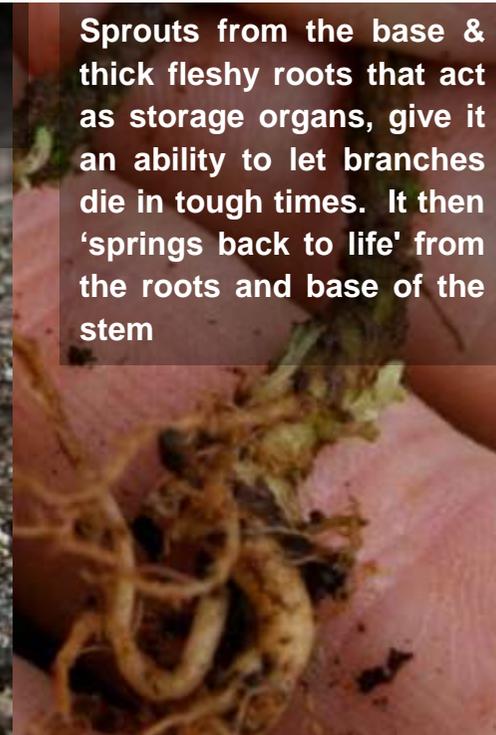




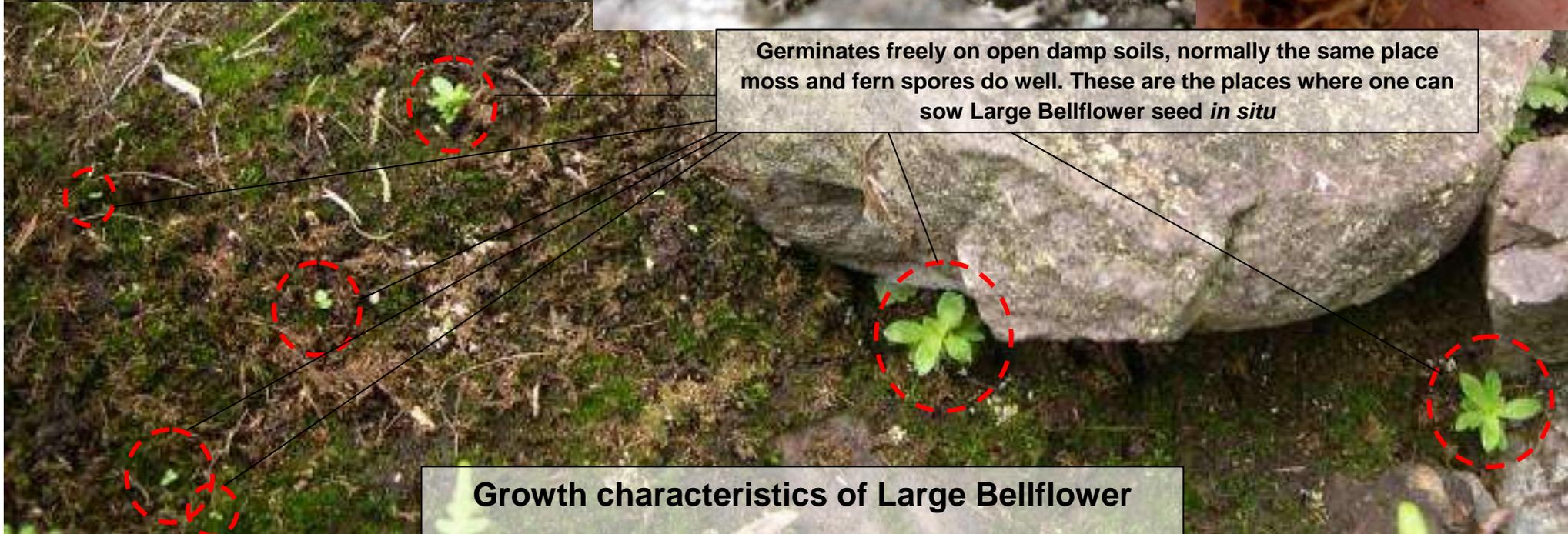
An old Large Bellflower plant, smaller than the Ebony fern on its left. This is due to the harsh windy conditions on the Depot where it grows



Large Bellflower has very clear green leaves and distinct leaf scars



Sprouts from the base & thick fleshy roots that act as storage organs, give it an ability to let branches die in tough times. It then 'springs back to life' from the roots and base of the stem



Germinates freely on open damp soils, normally the same place moss and fern spores do well. These are the places where one can sow Large Bellflower seed *in situ*

Growth characteristics of Large Bellflower

Lobelia

Trimeris scaevolifolia

Seed Collecting

Timing

It is safe to say that there is always a Lobelia somewhere on the island in flower. To collect seed is more difficult as the capsules don't show their maturity. They rather open up without notice and drop their seed giving you little chance to capture it without resorting to collecting closed capsules. Very large swollen capsules sometimes have a faint brown streak down the sides of the capsule and should be well enough developed

Method

Collect capsules with their little stalks attached and place in brown paper bags to open up naturally and shed their seed

Seed Sowing

Sowing Method

Sow seed thinly on the surface of the seed trays and keep moist.

Seed could also be sprinkled *in situ*, loosely sowing it over the soil surface where planting of moist species has just taken place

Germination

Seedlings germinate well in cool damp conditions and did best under the mist bench.

However, they should be moved out from under the mist as soon as they germinate to encourage the roots to develop as the moisture levels drop

Growth Info

Soils & Watering

Lobelia is shallow rooting and can grow on very damp soils providing there is a cover of moss to spread its roots through. Lobelia seems to do well if it is given a free root run, and plants that are constricted in their bags, sometimes get disfigured growing tips (see Pest & Disease section)

Special Requirements

Not enough is known about Lobelia and more observation is needed in nature. Growing trials should continue as more growing of Lobelia is done

Planting out

Timing

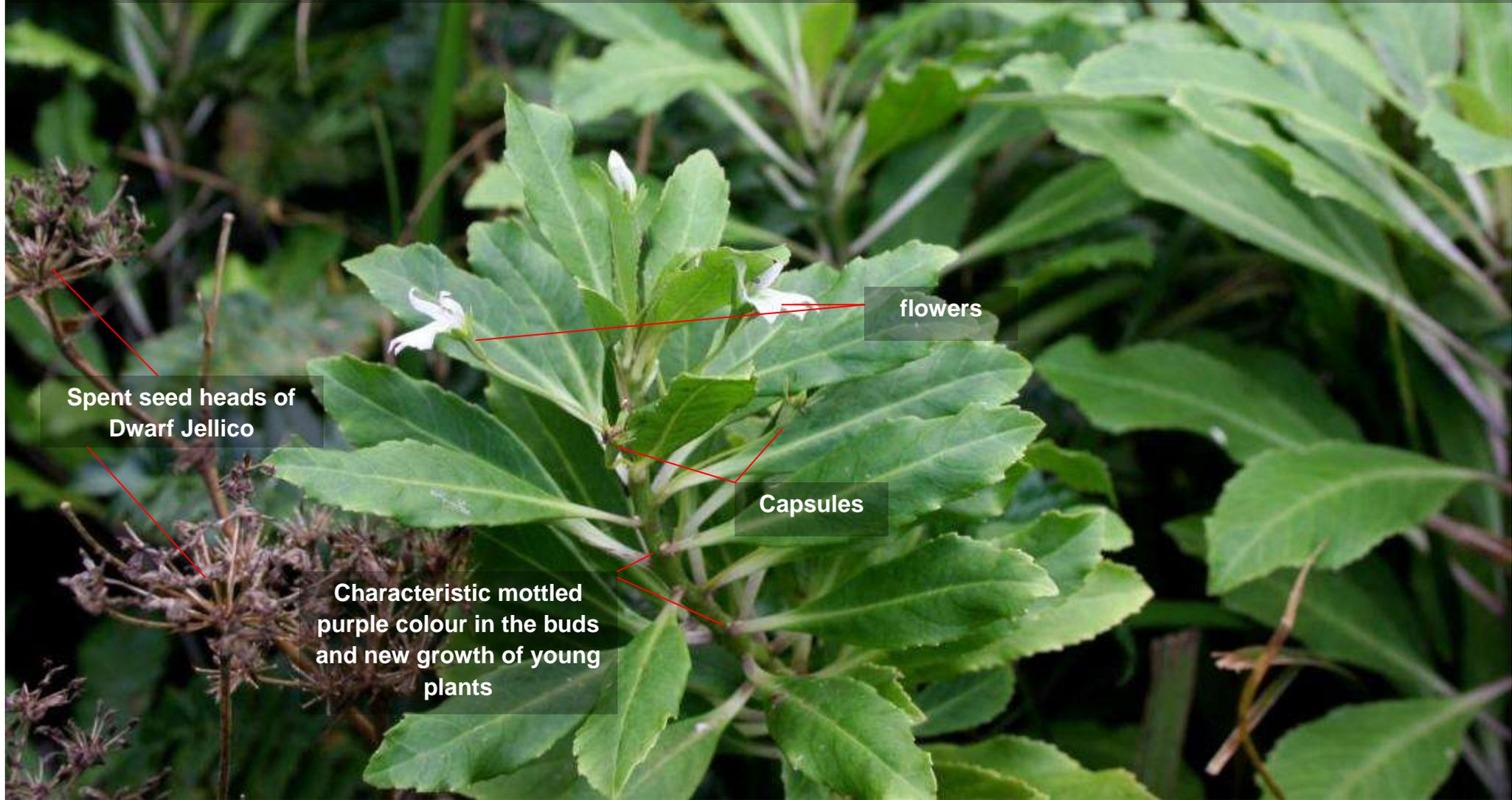
Plant Lobelia out at a young age as there is no benefit to be had, having it in a tiny plant bag. Rather get them out in the wild to set seed and help build up a good endemic soil seed bank

Method

Plants could be cut back to encourage them to sprout and become more bushy. This could be done two weeks before planting out.

Plant out into small holes, just big enough to receive the root ball

Lobelia is a fast growing coloniser of open ground in endemic moist habitat, like in this picture, taken on High Peak. This species flowers and seeds profusely and should be included in all moist plantings. It is difficult to collect the seed because the capsules (looking superficially like those of Small Bellflower) don't show a definitive colour change to indicate maturity and once open, shed their seed very quickly as they are shaken in the wind. The seed is a light brown colour (almost caramel) and very small. A capsule can hold over a hundred seeds and it is well worth collecting a few capsules every time you walk past a plant



flowers

Spent seed heads of Dwarf Jellico

Capsules

Characteristic mottled purple colour in the buds and new growth of young plants

Neglected Sedge

Bulbostylis neglecta

Seed Collecting

When

When seeds mature they swell, become dark brown and are precariously held by a bract. As the next seed on the same head matures, it dislodges the previous mature seed and that drops to the ground.

To harvest the seed is easy, as the ripe seeds (precariously hanging) come off easily in your hand if you lightly pull the leaves through your fingers.

If you take care not to damage these little seed heads, you can keep harvesting from the same flower heads, for as long as it takes the plant to set all its seed

Other Methods

Plants are easily grown in cultivation from seed. They can also be propagated vegetatively by division, which prolongs their (annual) life. This is done by cutting back the leaves and flowers once you have collected a number of seeds from them, and before they tire the plant out. These nursery grown plants could be placed in trays or on plastic sheets to capture the seeds as they fall.

Plants could also be planted in rows through a cross cut in the plastic (do not cut out a hole) or lay plastic over your plants and pull the leaves through the plastic after cutting a cross with a sharp knife for the plant to stick through. Potentially thousands of seeds can be collected in this way without any effort apart from setting up the system and sweeping up the seeds, and rejuvenating the plants now and again by cutting back for divisions.

It is important to maintain high genetic diversity, and your 'start-up' seed should be representative of a population (collected from at least 50 plants across a population)

Sowing *in situ*

Timing

Germinates in the wild during the winter after good extended periods of rain.

Seed could be sown during the early winter in appropriate places. To learn what the appropriate areas might be, you need to have a good look at the different locations where the populations of Neglected Sedge grow wild. The places where they do best seem to be in areas of low growing and sparse vegetation. But plants are also found in other situations. Notably on High Hill on bare exposed soil and in Plantation's Eucalyptus forest

Method

Do not just throw the seed on the soil *in situ* and expect it to germinate! Sowing should be done by anticipating the movement of air, the movement of water and the water holding nature of the soil.

Imagine a place where the wind might drop a seed if it were blown across the soil (a crack possibly) and then be covered by a tiny amount of dust and small soil particles. Imagine where, if it was raining a lot, a seed might be washed into (together with the other humus and topsoil). Imagine seeds being lodged into position in this way, and then germinating... Now imagine what the soil will do when it dries; where will the moisture hold and where will it dry out too quickly.

Locate a good spot in this way and you will stand a very good chance of success



A very large Neglected Sedge in the wild near High Hill. Note the grey moss and the grey liverwort near the base of the plant. These seem to be providing good enough growing conditions for the plants in this population

Old Father Live Forever

Pelargonium cotyledonis

Seed Collecting

Timing

Potentially in flower at any time of the year depending on rainfall. Thus, monitor regularly. Collect the seed heads when the 'beaks' are stiff and do not bend when pressed between the fingers. If one of the beaks on a flowering head is very stiff, the whole flower head is good for collecting

Method

Flowering stems break easily at the swollen joints. Collect whole seed heads making sure they are ready (look at Timing). Trim the swollen bit off the base with a sharp knife or secateurs and stick it into wet florist oasis straight away. The seeds that are not yet ready on this seed head then have a chance to develop while in the oasis. Keep an eye on the seed heads, harvest the ones that fall off or dehisce naturally and sow

Seed Sowing

Sowing Method

Sow in open soil, making sure that the seeds are covered by a tiny bit of soil. If seeds are spaced about two fingers apart, they have enough space to develop to a good size and more success will be had when pricking out. Placed the seed trays in a sunny position as soon as they have germinated

Germination

Can germinate within 3 days with most all of the seeds up within 14 days. Put out in a sunny position asap.

The fresher the seed is sown, the better the germination will be. For best results, sow the seeds as soon as they are harvested

Growth Info

Soils & Watering

Old Father is tough as old boots but will grow as thick as your wrist in 12 months from the day you sow it, if given good open soil, good drainage, sun over the middle of the day and kept moist. Old Father can drop all its leaves for no apparent reason. If this happens, stop watering and dry the plant off for about a month before watering commences again

Special Requirements

Sufficient light levels from an early stage are needed otherwise it will etiolate (grow long thin stems and be soft). Cuttings could be taken but this is only done when the plants are in rest (no leaves). Allow the cutting wound to dry out completely before it is placed in the soil. No hormones needed

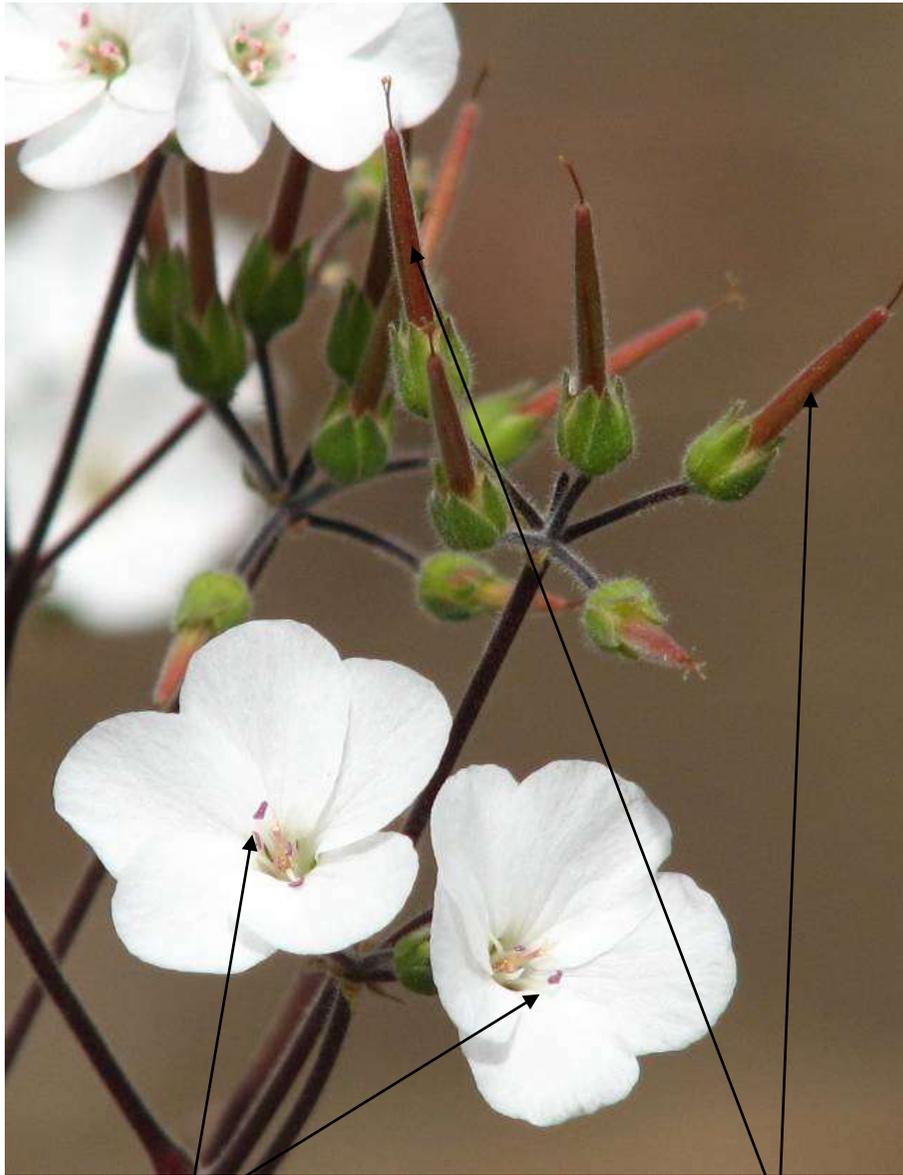
Planting out

Timing

Can produce several thick stems and flower within one year. It is advisable to let the plants grow long enough to build up a nice fat stem before planting out in the wild. This will help the plants to establish in case the conditions are harsh and not what you expected (weather is fickle)

Method

Roots are easily damaged and great care should be taken to keep the root ball intact. Old Father will be slow growing in the wild and closer planting than with most plants will improve establishment - mealy bug tends to attack one plant in an area and the others will get a chance to grow strong while one plant takes the onslaught from the sap sucking pest



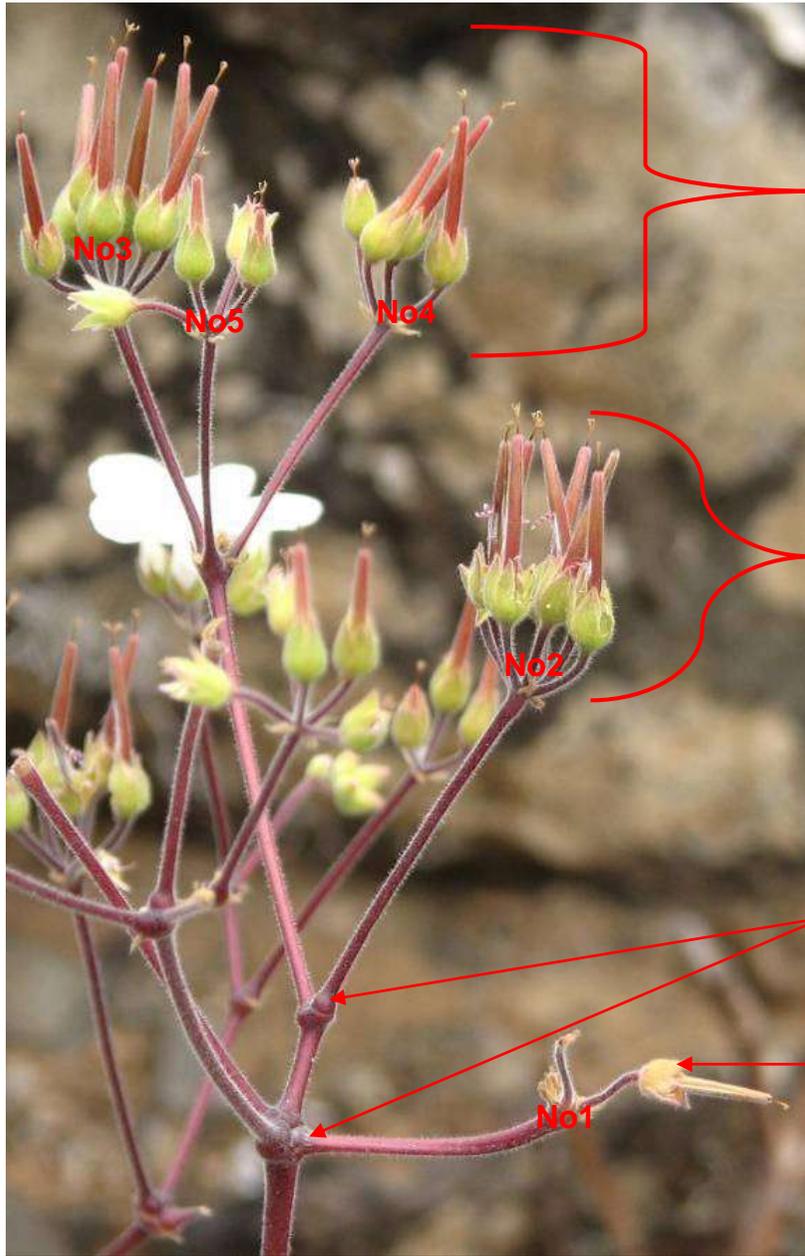
White flower form with pink stamens, producing fruits with red beaks (sometimes with green and red streaks)



White flower form with white stamens, producing fruits with clear green beaks. These fruits will not turn colour as they ripen



Old Father Live Forever cannot be collected based only on the colour of the fruits. The only reliable measure of seed maturity is to test the stiffness of the beaks. A very rigid and hard beak indicates ripened seed



Old Father Live Forever inflorescence, showing the development of the beaks as an indication of when to collect

Age is determined by looking at how far the beaks are developed. The oldest seed heads are attached lowest down on the inflorescence. No1 being the oldest. Note the small differences in beak length in nos 3, 4 and 5. No 5 being the youngest and No1 the oldest

Seed head ready for collection – note that fraying of the beaks has started, as part of the natural process of dehiscence

The exact point where these seed heads should be snapped off. They easily detach at the swollen nodes

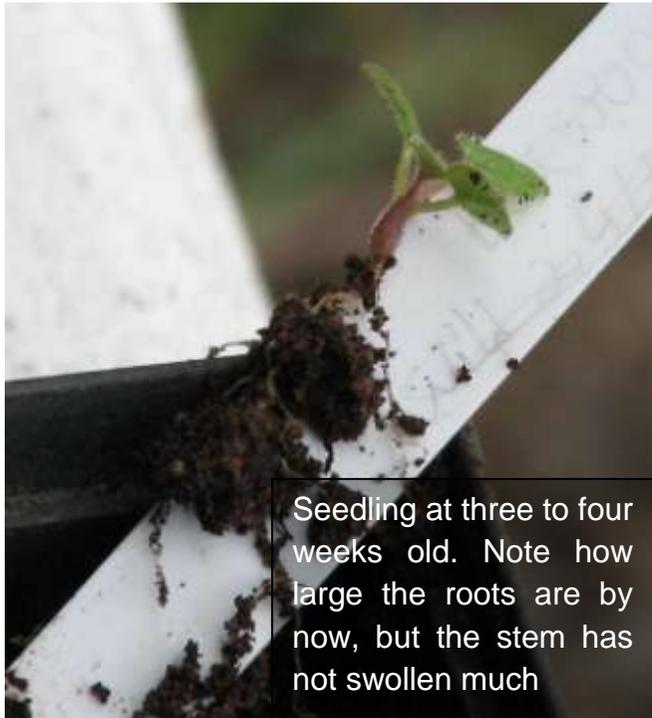
Ripe seed head (seed might have fallen out already; note the beak has turned brown)

Beak, when very stiff it is ready to harvest. The seeds from a stiff beak will germinate within a week

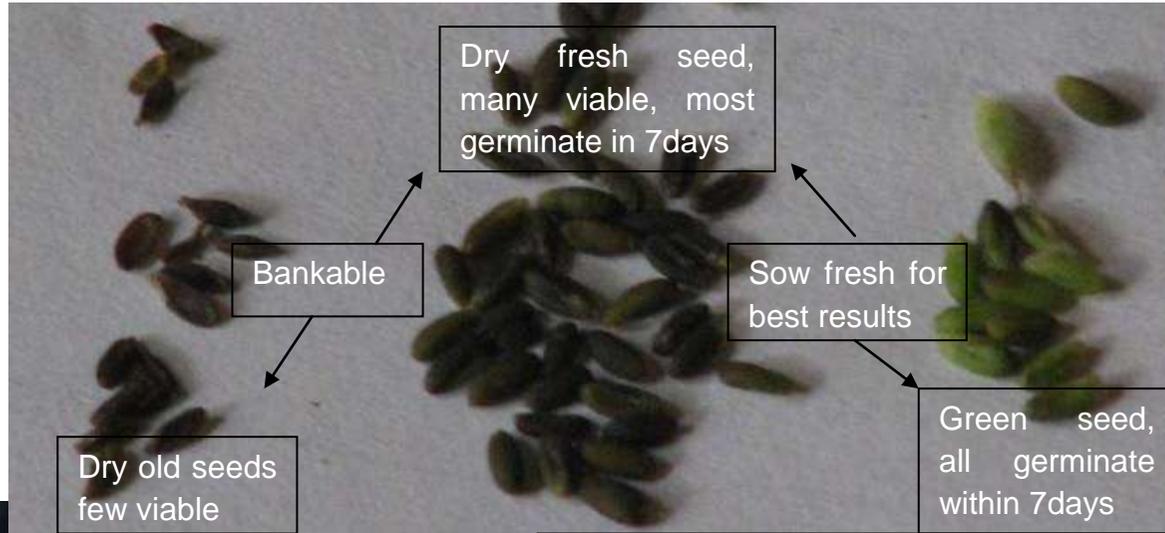


A tub of seed heads with stiff beaks, stuck into wet florist oasis to help the seeds ripen up in the nursery





Seedling at three to four weeks old. Note how large the roots are by now, but the stem has not swollen much



Dry fresh seed, many viable, most germinate in 7days

Bankable

Dry old seeds few viable

Sow fresh for best results

Green seed, all germinate within 7days



Old Father Live Forever is quick to germinate and grows reasonably fast, providing it gets nutrients, moisture and good sunlight for at least half the day (not the full day).

Seed tray on the left is perfect for pricking out. This can only be achieved if the seeds are spaced two fingers apart. This allows for good leaf development. Leaves and sunlight together = healthy swollen stems. And this is the secret to success: pricking out OFLF at any age damages the soft roots, but a healthy swollen stem provides the energy needed to push enough new roots to continue growth.

When pricked out, OFLF seedlings need to be left un-watered in their bags for a day. Leaves may be misted, but wet soil (moist yes, but not wet) will cause rot



17/03/2010 one year on after sowing the seed that produced this magnificent plant. It has grown this fast, because it received the right amount of light, the right amount of water, and despite the mealy bug infestation, enough nutrients



12/08/2010 five months on and still in the same pot. During the wettest time of the year, this plant is having a rest. Note how much the stems have grown in the last five months. This plant needs a change of soil to continue its magnificent growth

Plantain

Plantago robusta

Seed Collecting

Timing

Can be found in flower all year round somewhere on the island. Collect seed heads when they are turning yellowish brown and are fully swollen. Even when they are completely dry and crispy there might be a few seeds left

Method

Break the seed heads off with as long a stalk as possible. Put them upside down into a paper bag to ripen up fully and shed their seed. The seeds are very flimsy and papery and you might think you have nothing, but do keep the chaff and sow everything, as there is always the chance of seed in it

Seed Sowing

Sowing Method

Sow *in situ* in open patches where a bit of moisture will seep through to the surface. *Ex situ*: sow directly in bags or modules, but spread the seed out over the surface to allow each seedling enough space for development. Make sure to sow it very sparingly, as germination is normally very good and they will crowd one another out otherwise

Germination

Germinates readily and grows fast. Move the seedlings into full sun as soon as they have germinated to allow them to grow hard from the word go. Otherwise they get very big and vigorous but don't establish well when planted out in the wild

Growth Info

Soils & Watering

Seedlings can easily rot off if overwatered at the pricking out stage. Plants will demand lots of water when grown soft but do not let their wilted leaves fool you. Excess leaves could be cut off to allow the roots to develop before pushing a new whorl of tougher more drought resistant leaves

Special Requirements

Root nodulation has been observed in older potted plants (unknown origin, function or cause). If plants are required to grow in dry situations, grow them hard from an early age and vice versa for plants that will go out to a moist shady place, like the foot of Heart Shaped Waterfall

Planting out

Timing

Plant out when young, before the roots have had a chance to develop too much in the bag

Method

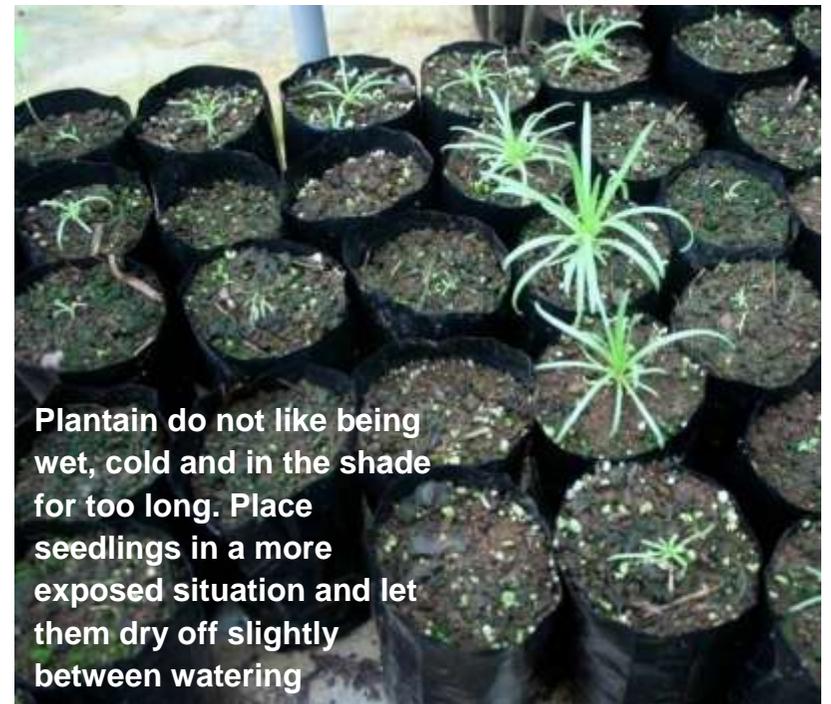
Cut the outer leaves back to reduce the effects of evaporation. This will give the roots a chance to establish before the demands of providing for the leaves are put on them. Plant in tight holes the size of the root ball. Pot bound plant roots should gently be teased out to avoid them continuing their curled up growth.

Plantain should be planted with other endemics, as they will not be able to stand their ground on their own against the weeds



Female bits (stigma)

Male bits (anthers). The anthers are pressurised and when touched the pollen will explode out off them in a smoke-like puff. Very entertaining for school students and adults alike



Plantain do not like being wet, cold and in the shade for too long. Place seedlings in a more exposed situation and let them dry off slightly between watering

Redwood

Trochetiopsis erythroxylon

Seed Collecting

Timing

Keep a close eye on your seed producing trees because each capsule potentially holds thirty seeds (ie 30 more Redwood trees). When a capsule starts to split, it is ready to be collected. If left a day too long, the seed will be lost. There is no record of successful natural regeneration under current conditions, so make each seed count

Method

Hold your hand cupped under the seed capsule to catch any seed that drops out of it and pull it off by snapping the stalk that attaches the capsule to the tree (they snap easily at the joints). Do not pull the capsules as the stalks will tear into the stems and damage the tree

Seed Sowing

Sowing Method

Pick out the good seeds and sow them spaced at least 1.5cm apart. Press the seeds down into the soil with your finger about as deep as half your nail (5mm). Keep seed trays moist

Germination

Germination takes on average 14 days. Fresh seed is often quicker than that. When the seeds have germinated, make sure that they are not too shaded as they will stretch and be very 'soft' and prone to pests and disease. Seedlings push enormous roots and have to be pricked out before their first true leaves are fully opened

Growth Info

Soils & Watering

Make sure the soil does not get too compacted. Allow plants to dry slightly between watering to encourage good root development.

Free draining soil with a high humus content suits them well

Special Requirements

Redwoods respond negatively to root interference and special care should be taken when pricking out and planting out.

Plants should under no circumstances be left in the bags too long, as this puts the young trees at a disadvantage when planted out

Planting out

Timing

Plant out as soon as the roots are filling the bag. Young plants need to be given a good root run to allow them to develop well underground to support later growth.

Make sure to plant seedlings in good deep soils that will get plenty of moisture

Method

Make sure to plant seedlings or young plants with minimal root disturbance. Make small holes and ensure that the gaps in the holes are filled in with no air gaps left.

Staking young trees will help them in the first few weeks to strengthen their roots and thicken up their stems without being blown about. They tend to flop over quite a bit and staking will prevent potential damage



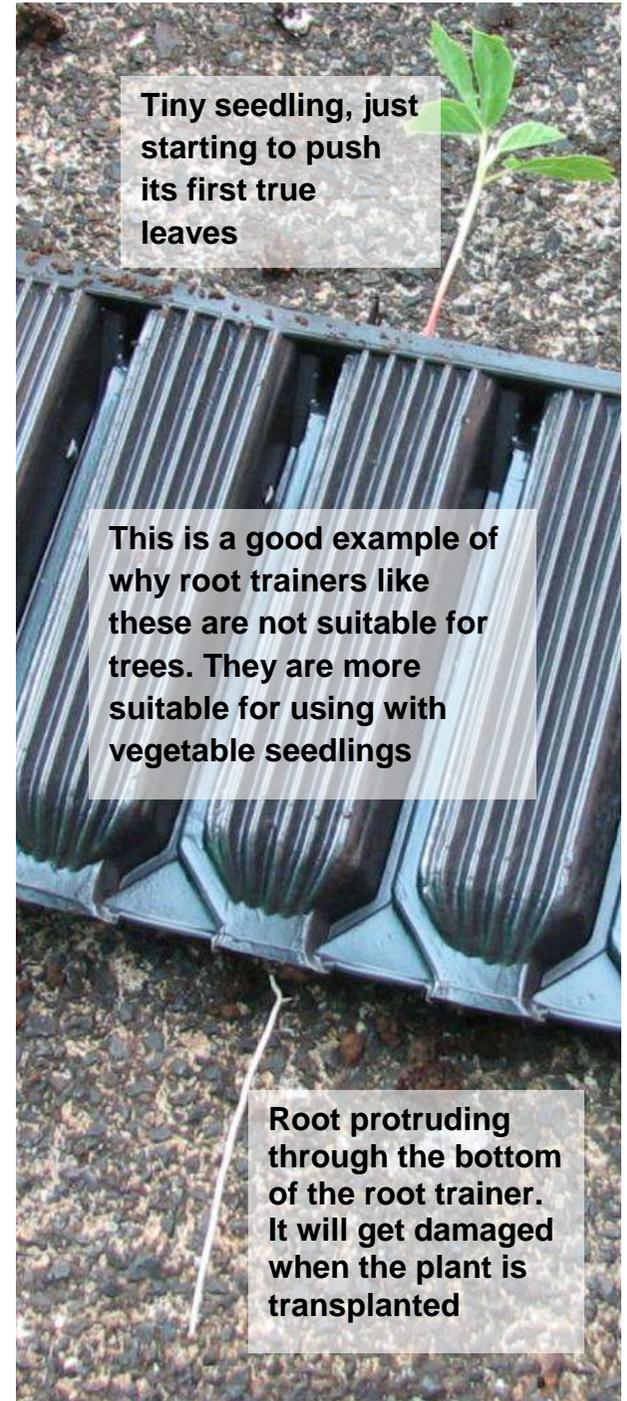
Healthy seedling

It is clear from the size of the roots that seedlings should be pricked out at a very young age



Unhealthy seedling

The taproot got damaged at the pricking out stage and as a result you now have a clump of roots and a horrible looking seedling



Tiny seedling, just starting to push its first true leaves

This is a good example of why root trainers like these are not suitable for trees. They are more suitable for using with vegetable seedlings

Root protruding through the bottom of the root trainer. It will get damaged when the plant is transplanted

High Peak 02/11/2009



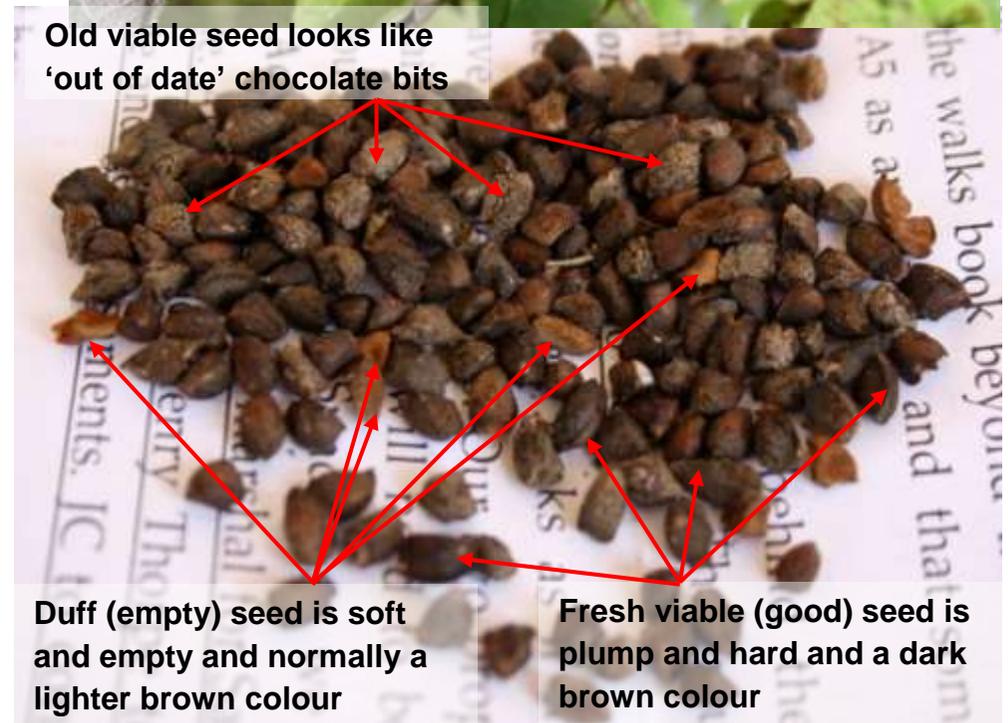
High Peak 13/08/2010

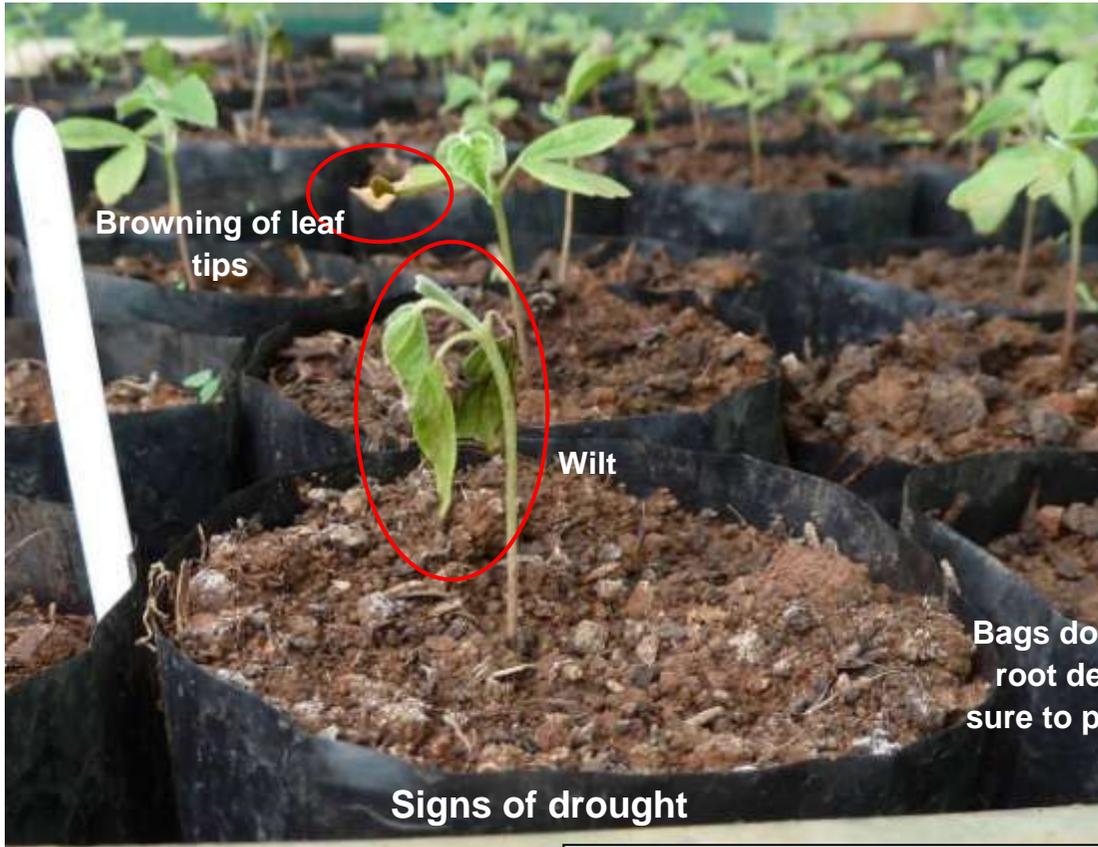
Redwood's natural growth form

We have found that Redwood shows a definite tendency to grow as well as its roots will allow. In other words, if the roots are damaged, malnourished, drying, exposed, constricted or having to grow in compacted or waterlogged soil, the tree will not grow much at all.

The trees in the picture have given a clue to the nature of Redwood, which arguably would have evolved in a 'forest' setting. (No records exist that attempt to deal with its preferred growing conditions, or consider the effect of environmental factors on its growth). Considering this, it makes sense to think that Redwood seeds would have germinated in a forest understorey (possibly similar to the situation in the pictures), and that those seedlings that by chance, managed to grow up into a gap in the canopy, would have been able to get enough light and survive.

For a tree to be able to do this, it has to possess three characteristics: 1) the ability to sit there, waiting patiently for a gap in the canopy to appear before it shoots off; 2) be a fast grower (or faster than most other species in its forest ecosystem); 3) be able to grow straight up into the gap. Redwoods are certainly capable of this. However, specimens that received greater amounts of light, and nutrients have shown even greater growth than these plants in the pictures





Browning of leaf tips

Wilt

Signs of drought



Signs of healthy seedlings

Leaves point up and have a very shiny appearance

Bags do not allow for good root development. Make sure to plant out as soon as possible

When grown in a constantly moist microclimate, Redwood produces roots from the stem. These roots will expand and support the stem. The nature of these roots will allow the tree to support its canopy even if the plant is leaning, like this young sapling. Trees don't have to be planted upright, as they will right themselves in their attempt to grow towards light



Adventitious roots (roots from the stem)

Root nodules (swellings from where roots will grow out)

Rosemary

Phylica polifolia

Seed Collecting

Timing

Collect when fruit are black and hard. Leave the green fruits for later.

Leave about a month or two between visits to allow the green fruit to ripen up

Method

To clean the seed, allow fruits to split open in the heat and dehisce, exposing the shiny black oblong seeds. The fruits split in three when they dry.

Place a freshly collected seed batch in a dry area in a well ventilated container to dry

Seed Sowing

Sowing Method

Soak the seed overnight in tepid water as this will make seeds germinate more quickly and evenly than otherwise. Sow beneath the soil surface about as deep as the seed is thick.

Keep moist for as long as it takes for all the seed to germinate

Germination

Will take anything from 3 to 12 weeks or more ie. germination is not even, and some seeds could stay dormant for a very long time.

The seedlings produce large roots and do well when pricked out young (two leaf stage)

Growth Info

Soils & Watering

Rosemary is tough and can survive drought and excess moisture, but grows best if allowed to dry between watering. This way healthy root development is encouraged.

Use soil mixtures that have high humus content

Special Requirements

Rosemary does best with high light levels. Make sure to water well in the early morning on hot days to allow for healthy growth.

Rosemary is a vigorous grower with a bushy form early on, but now and again, one of the seedlings exhibits the need to grow straight up. These plants will need a deeper root run

Planting out

Timing

Don't allow roots to become pot bound. Plants should be planted out before they get one and a half times taller than the bag is deep.

Weather cannot be planned or foreseen and it is best to plant out throughout the year

Method

Plant in tight holes at the correct depth.

It doesn't matter at all at what angle Rosemary is planted as long as the roots are all below the surface. Preferably the seedlings should be planted with the leader pointing towards where most light will come from



Site where Andrew Darlow and Lourens Malan have felled Spoor and Bermudan Cedar, now filled in with Cowgrass

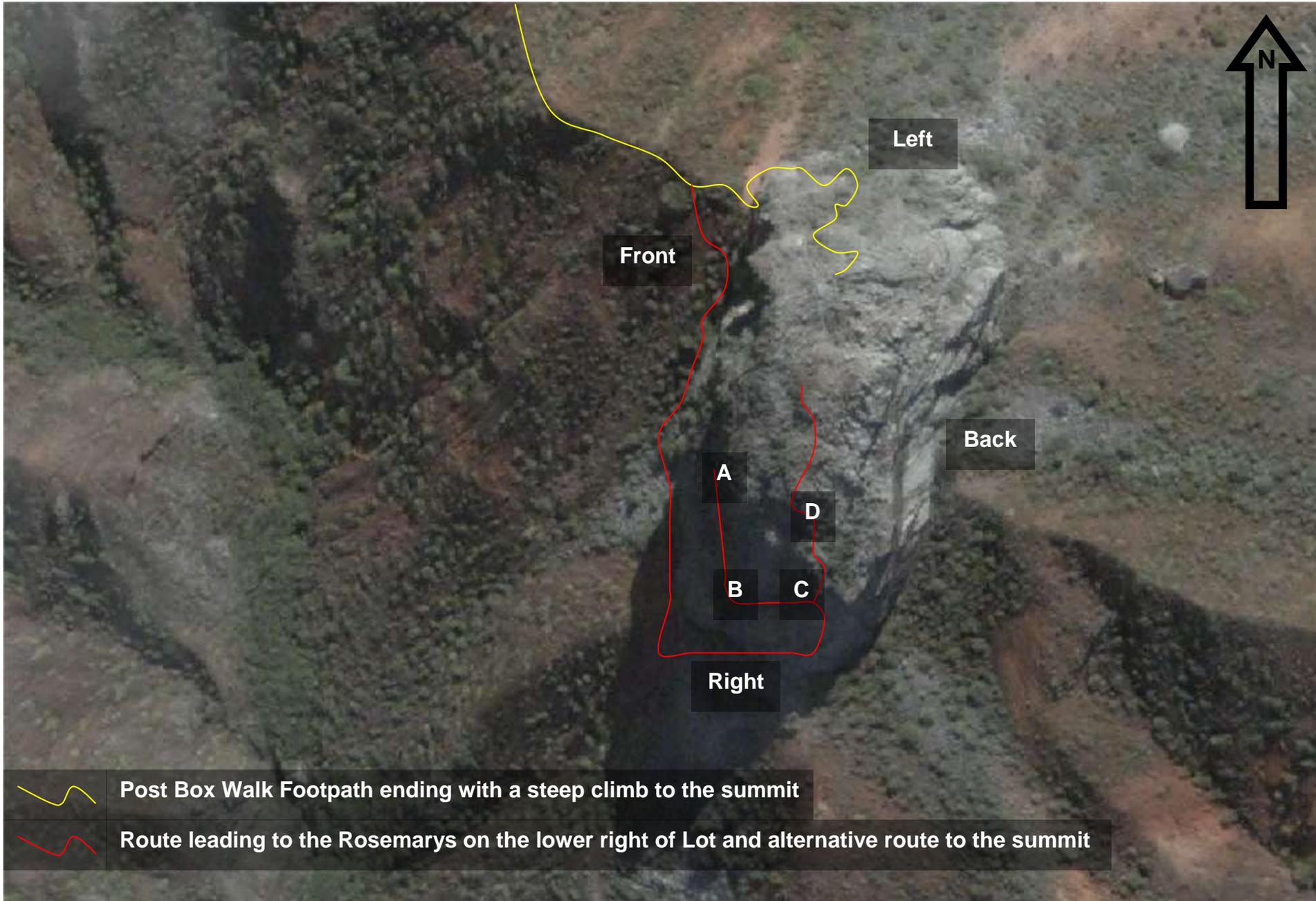
Big clump of old Poison Peach

Rosemary growing, swamped by invasive grasses and Poison Peach

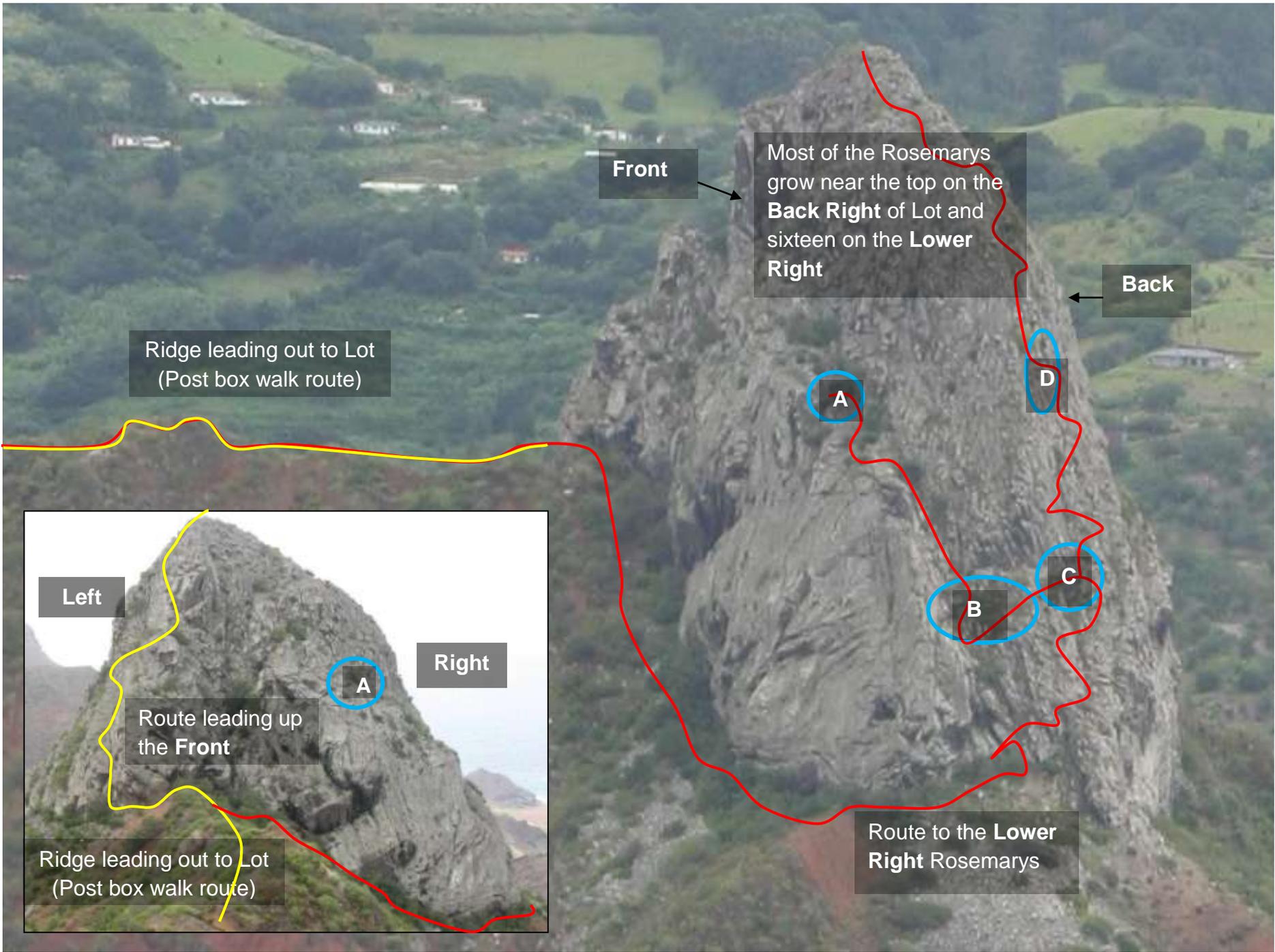
Rosemary growing, swamped by invasive grasses and Poison Peach and Black Olive

Young seedlings were found behind the Pine at the base of the cliff by Katrine Herian

High Hill Rosemary site as seen from the Barren Ground Rosemary seed orchard. These plants are under severe threat of local extinction. Many of them have been completely overgrown by weeds and some plants have already been killed by this invasive threat. Clearing the weeds and planting Hair Grass, Tufted Sedge, Small Bellflower and Rosemary will help save them



Lot as seen from the air: indicating the sides (front, back, left and right), specific locations (A, B, C, D, as used in the following pictures) and main access routes to help with the interpretation of the two plates on the following page



Area A is completely overgrown with weeds and there are only two live Rosemary plants left

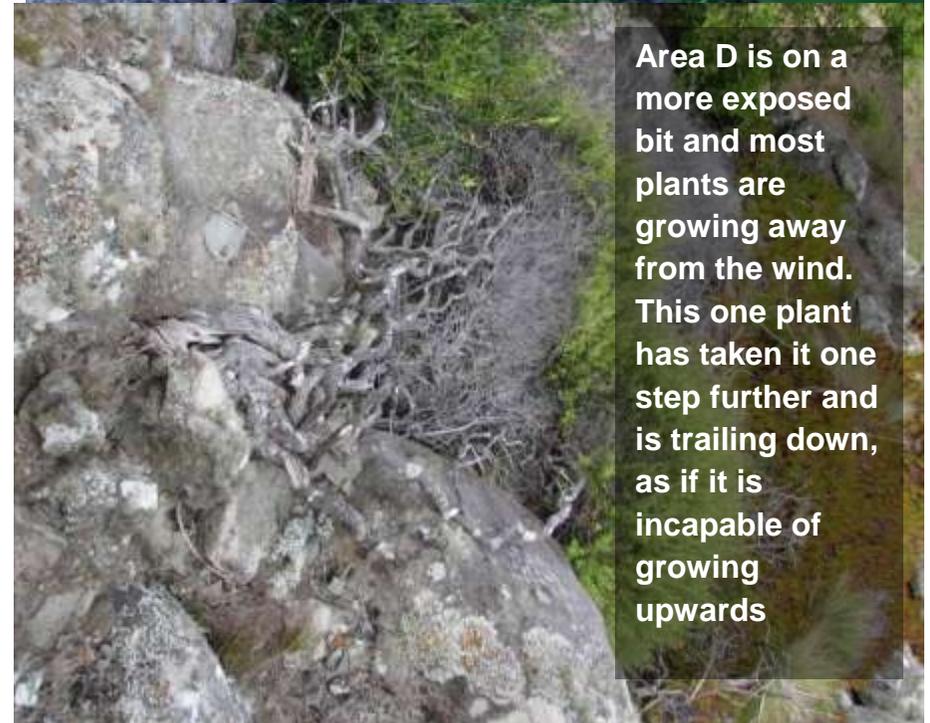
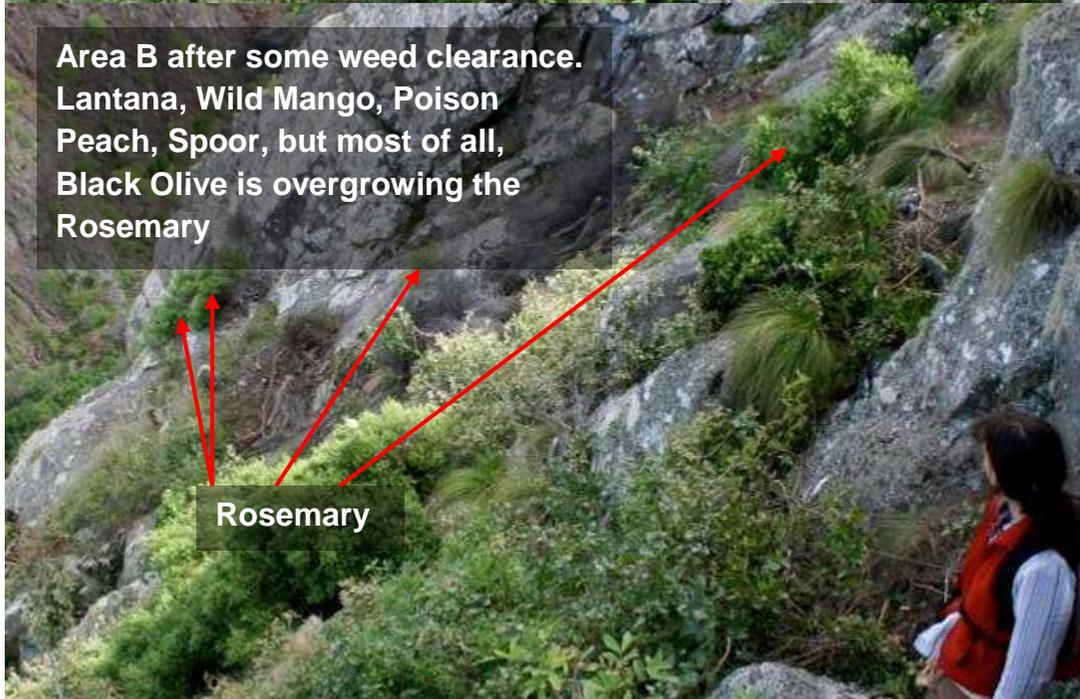
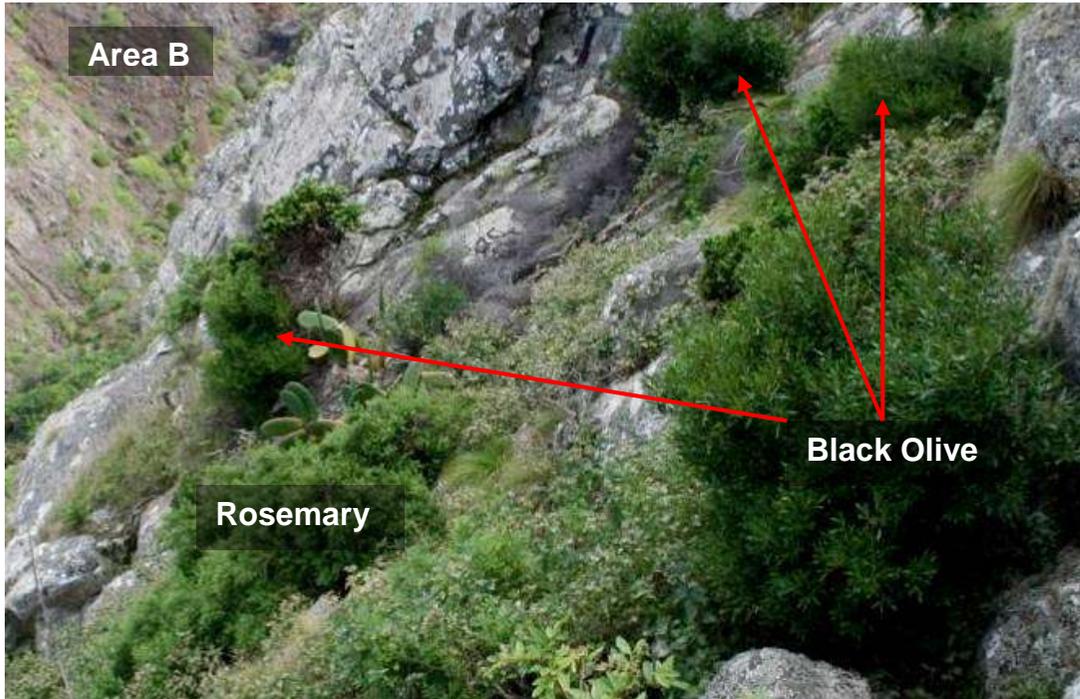
Rosemary

Dead
Rosemary



Massive *DEAD* old Rosemary. Probably the only example left on the island where the stem is nearly the width of a woman's waist (depending on the woman).

This plant was probably killed by the invasion of Black Olive. The whole 'vein' in which this plant used to grow is now filled with a range of different sized Black Olive trees. We have not explored further up this vein past the dead plant. It is well worth carrying a pruning saw and a non leaking spray can with 1:10 solution of Glyphosate to cut and spray some of the invasives





Very root bound. Should have been planted out at least eight weeks ago



Green



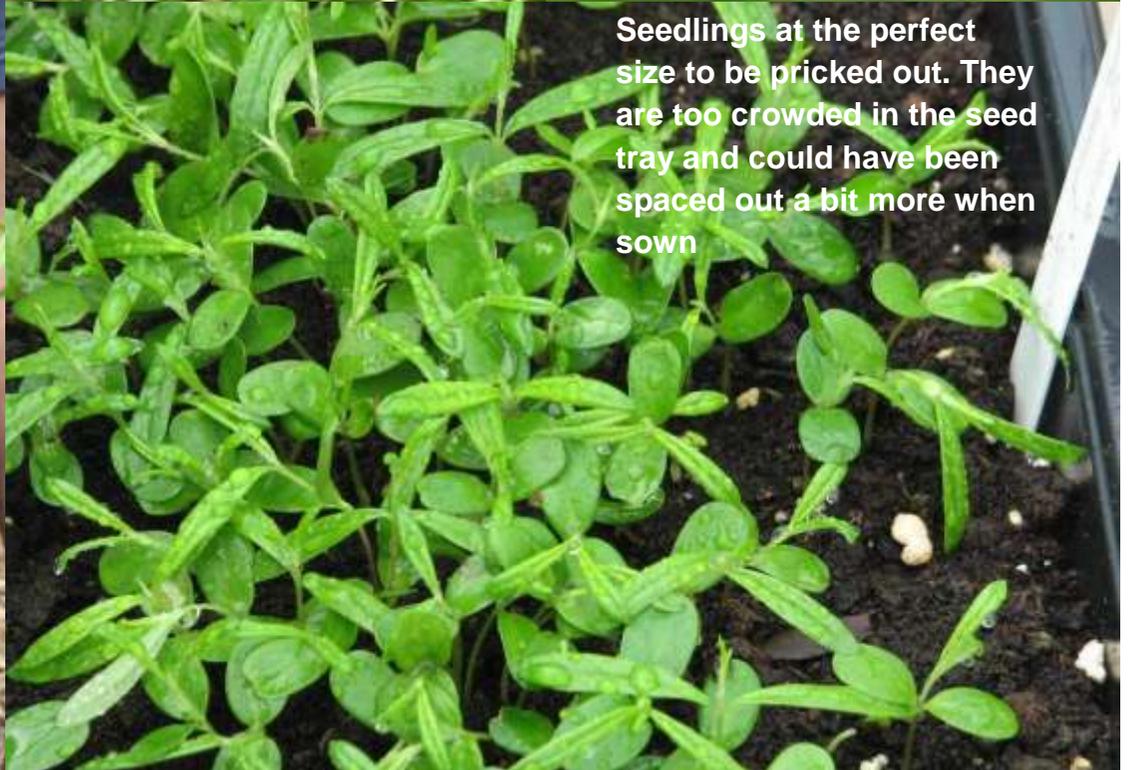
Ripe



Too Late



5x enlarged Rosemary flower cluster, showing the flower structure otherwise hard to see



Seedlings at the perfect size to be pricked out. They are too crowded in the seed tray and could have been spaced out a bit more when sown

Salad Plant

Hypertelis acida

Seed Collecting

Timing

Each flowering head continually puts out flowers. The flower buds hang down and go erect as they develop and open up. As the seeds develop the seed head starts lowering down and goes a very dark colour (compared to the rest of the plant). When they open and shed seed they start to go erect again

Method

Once you have your eye practised at recognising ripe seed pods (see photo) go for the dark, swollen, hard and hanging seed heads and pull them with one hand while holding onto the flower head with the other hand to avoid damage. Open up the collection as soon as possible and spread the green pods out on a tray, lined with newspaper, to allow them to ripen up further without going mouldy

Seed Sowing

Sowing Method

Sow thinly on the surface of a seed tray, making sure not to sow too much seed. Direct sowing into plant bags could be attempted, but make sure not to sow more than ten seeds into one bag and spread them across the surface. Weeding needs to be done in this case to make sure the seedlings are not overgrown by weeds

Germination

Germination takes place after about four weeks. Seed trays should be placed out in a sunny position as soon as germination takes place to allow for strong healthy growth, rather than flimsy soft growth

Growth Info

Soils & Watering

Water sparingly. Make sure that plants are placed in a sunny position from the word go. This will make for strong growth to improve establishment in the wild.

When plants get too large for the bags, they should be trimmed back to encourage bushy growth

Special Requirements

Plants can cope with being watered often, but they will be soft and will be short lived once planted out in the wild

Planting out

Timing

Plant out before they start to flower. It is important to allow the plants to develop good healthy roots before they start to flower and seed.

If the nursery plants are full of flower and seed, this could be trimmed back to encourage new shoots and reduce moisture loss when planting

Method

Be very careful when removing the bags, as the plants are very easy to damage. Both the leaves and the roots will damage with the slightest touch.

It is best planting the seedlings young because bigger plants tend to be top heavy and get damaged at the base when planted



Salad plant sets a lot of seed in one season. You can plant a seedling and allow it to set seed, rather than trying to sow seed *in situ*

Good fat seed pods, ready to collect. Seed pods that are swollen and hard to the touch should contain black seeds. The most swollen ones normally hang down. Feel a few, and break them open. White seeds are not developed enough to collect

It is not very good use of your time to collect open seed pods, as they have shed most of their seeds already

Salad Plant can grow to quite a large size and become very woody and entangled with years of twigs and branches growing over one another. Most plants in drier situations however, behave as annuals



Green algae growing on compacted soil surface. If this happens it is better to prick out what you can, give up on the rest and start over

Etiolated (not enough light) seedlings that were kept in the shadehouse for too long

Fungal patches. This is a killer of emerging seedlings. Good airflow and higher light levels would help avoid this

Dead patch of seedlings that have died due to too much water, and not enough air and sun

Cracks that have appeared due to combination of first overwatering and then drying out

Scrubwood

Commidendrum rugosum

Seed Collecting

Timing

Scrubwood seed heads fluff up through the day and the best seed collecting is to be done in the afternoon of a hot dry day.

Wait for the seeds to fluff out on the plant.

Scrubwoods flower on and off throughout the year

Method

Grab the fluffed up seeds by the pappus (parachutes) and rub the fluffy parachutes off between the fingers and let the seeds fall into the collecting bag.

Make sure to squeeze dead any grubs. It is strongly advised to empty out the seed bags after collecting and allow the remaining grubs to climb out of the seed, and remove them

Seed Sowing

Sowing Method

Same as for Bastard Gumwood.

Make sure that the Scrubwood trays are place in a sunny situation as soon as they have germinated to encourage strong compact growth

Germination

Scrubwood seed germinates well but it is easy to sow them too closely.

Make sure you space the seed out well and prick out as soon as they have their first true leaves

Growth Info

Soils & Watering

Scrubwood doesn't need a lot of water. If over watered the seedlings will just get soft and not be ready for planting out in the wild.

Make sure to let the seedlings dry between watering, and soak the bags through when you are watering

Special Requirements

Scrubwood flowers at quite a young age and can interfere with other gumwood species in the nursery area (hybridisation issues), so it is good practice to plant Scrubwoods back into the wild before they start to push flowers

Planting out

Timing

Plant out when the roots have filled the bags

Method

Plant Scrubwoods in tight groupings and fill the spaces between the groupings with associated dryland species.

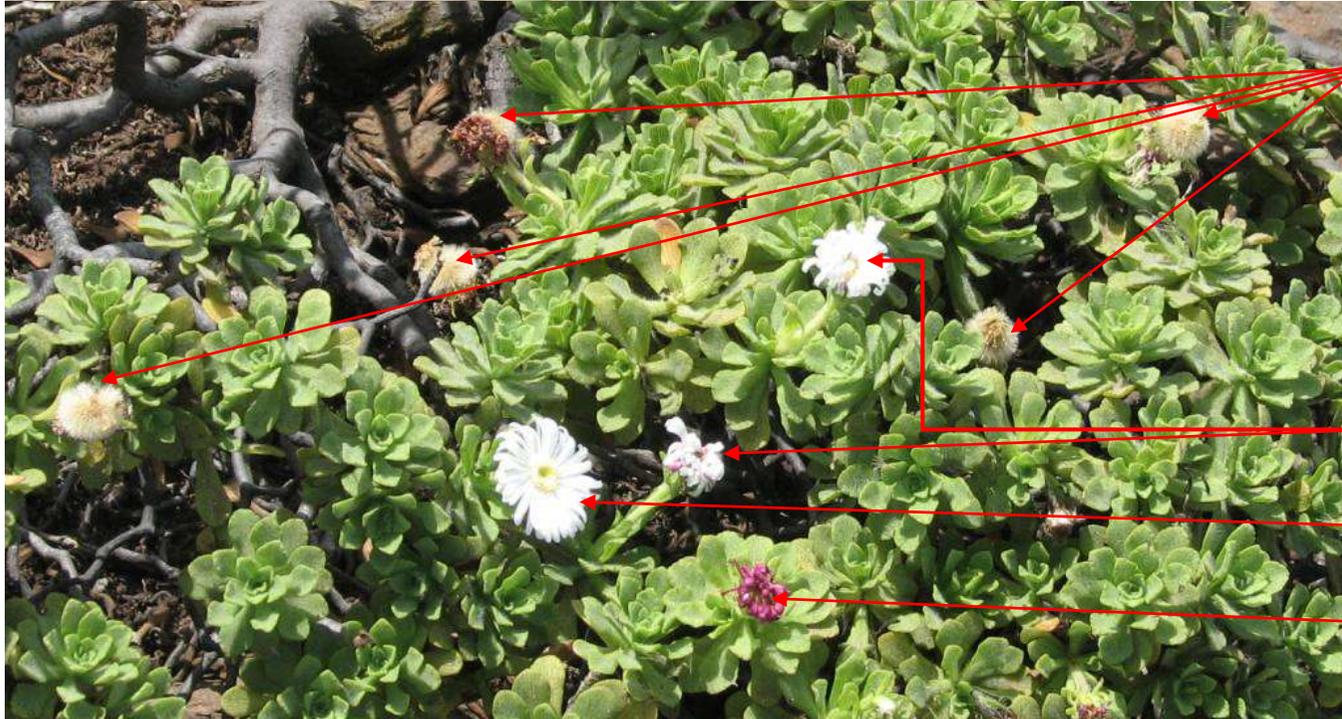
When plants are placed in tight groupings, they might out compete one another, but at least you ensure a good clump in that place.



Scrubwood and Gumwood seed can be cleaned while collecting by picking off the fluffy seed head between the fingers, making sure you hold onto the pappus (parachutes or fluff). Twirl the pappus between the index finger and thumb. This removes the pappus from the seeds and you are left with clean seed in the bag. The pappus can now be thrown away with grubs and all



Unidentified grub. These will eat up your seed if you don't remove them



Fluffed up seed heads perfect for collecting. You very rarely find these in the mornings and mostly in the afternoon. This suggests Scrubwood should be targeted in the afternoons. Rainy weather never helps because the pappus stick to one another and more grubs are found after rain

Flowers that are going over

A fully open flower

Flower that is nearly ready to fluff up. This head will be ready for collection in one or two days

She Cabbage

Lachanodes arborea

Seed Collecting

Timing

After dry warm days plants will need checking on a daily basis so as not to miss any plump viable seeds.

Do not store but sow straight away. The plump seeds will lose viability in storage

Method

There may be a lot of seed but very little will be fertilised and plump. Only the plumpest, fat seeds will germinate.

Flower heads with plump seeds in them will be visibly larger than the others. The whole flower head should be collected and matured in the safety of the nursery. Introduced birds are known to steal the seeds otherwise

Seed Sowing

Sowing Method

Pick out the plump (viable) seeds and sow them in a humus rich soil with at least 1cm spacing between seeds.

Make sure the seeds are covered by no more than 5mm of soil.

Keep moist

Germination

Seeds germinate quickly and easily and are large enough to be handled in the same way as Redwood at the pricking out stage (see Redwood).

Some seeds might have trouble breaking out of the seed coat. Gently pull the seed coat off the seed leaves by cutting it in half with a sharp pointed pair of scissors, taking care not to damage the growth tip

Growth Info

Soils & Watering

She Cabbage does extremely well in free draining humus rich soils, in full sun or part shade.

Make sure you either pot the plants into bigger bags or plant them out as soon as the roots start to grow out of the bottom of the bags. She Cabbage will survive wilting and drying out, but this will slow their growth right down

Special Requirements

Plants need to be planted in very close proximity to aid pollination ie. by reducing the distance pollinating insects have to travel between plants. For seed collecting purposes, trees could be pruned to keep the seeds in reach of the collector

Planting out

Timing

Plant out whenever the plants are ready ie. when the roots have filled the bag.

As this is a short lived tree (supposedly), it is advisable to time growing and planting to allow for successions of generations. This means you will have a range of plants, in size and age, in one area

Method

Always plant close together using tight holes the size of the root ball.

Interplant with other moist tree species.

Do not plant too shallowly as the plants are adapted to grow with their roots in the cool, and not out in the burning sun and drying winds



Incorrect treatment

Seedling too old & root bound
(won't recover)

Poor soil
(no root development)

Shallow planting
(roots burn and dry out)

Planted in grass
(grass stole its nutrients and
moisture and now the plant is
yellow and dying)



Better treatment

Healthy seedling
(good start, gets better)

Good deep soil
(deep root development)

Correct planting depth
(plant continues growth)

Planted amongst endemics
(moist atmosphere
encourages stilt roots to form
to support the fast growing
strong stem)





Characteristic stigmatic 'horns',
similar to those of Whitewood

She Cabbage looks very different from all other endemics thanks to its brilliant pink hairy stems and leaf veins. The flowers are also quite different from the other endemics in the Daisy family (COMPOSITAE or ASTERACEAE).

The plants don't all flower at the same time. If planted very closely there is a greater chance of cross-pollination. Even if only one plant in every six is in flower at any one time, the distance between flowering plants will then be close enough for pollinators to move from one plant to another

Small Bellflower

Wahlenbergia angustifolia

Seed Collecting

Timing

The seed capsules swell and become quite hard when the seeds are ready. The capsules also change colour when in the sun, but stay green when the plants grow in full shade. Once your eye is trained, it becomes easy spotting the seed pods that are ready to be collected. To check, one can break open a few to make sure. The seeds inside should be brown when ripe

Method

Break seed capsules off with as long stalks as possible by snapping the stalk with a quick sharp jerk while pinching between the nail and finger. This way the rest of the inflorescence is left behind to produce more seed. Having a long stalk on the capsule provides energy to further mature the seed

Seed Sowing

Sowing Method

Sow thinly on the soil surface and lightly tickle in.
Seed could be directly sown in bags but make sure to sow no more than about ten seeds across the surface of the bag. If this is done, weeding has to be kept up to avoid the seedlings being overgrown by weeds

Germination

Germination takes place after four weeks if kept consistently moist. The seeds germinate in stages and the larger ones need to be pricked out to make space for the tinier ones coming on. If direct sowing were done in bags, no pricking out is required, but early planting is required to give the clump of seedlings more rooting space

Growth Info

Soils & Watering

Small Bellflower has thick swollen roots that act as storage organs and the plants can withstand an amazing amount of neglect.

With a good root run and moisture the plants will develop into massive entangled cushions of twigs, leaves and white flowers

Special Requirements

Small Bellflower needs a lot of space to root into for quick and healthy development.

Seedlings that get a bit etiolated can be pinched out at the growing tips. This will encourage branching

Planting out

Timing

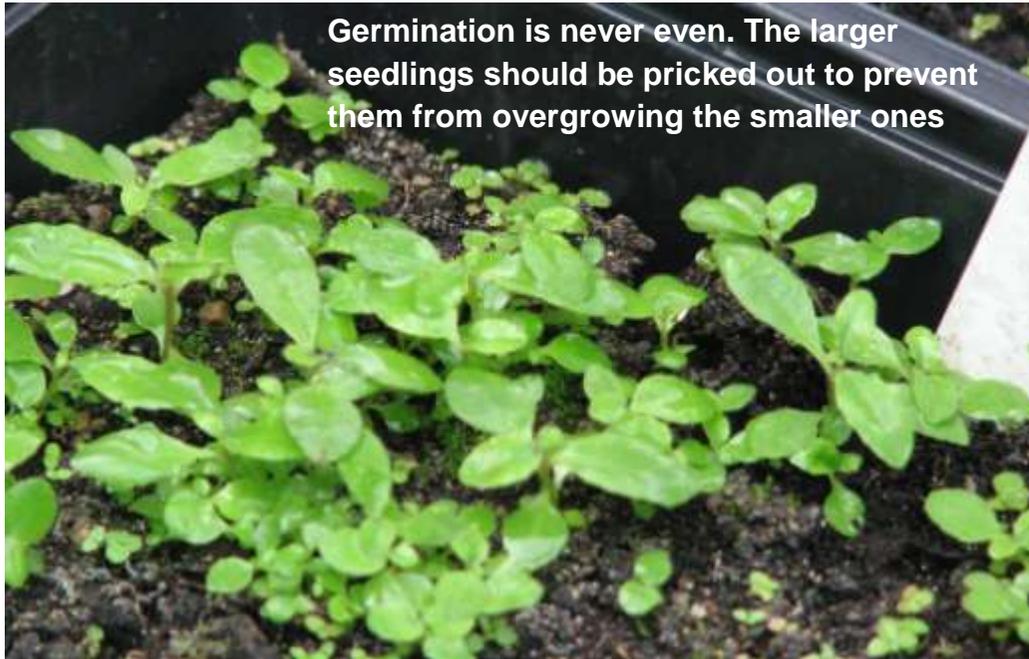
Plant out when plants are still young and as soon as the bags are filled with roots.

Plants could be cut back to make them bush out a bit more, about two to three weeks before planting out

Method

Plant out any way you like, these plants are tough. They will flourish out in the open soil.

However, they do not like having exposed roots and correct planting depth should be observed



Germination is never even. The larger seedlings should be pricked out to prevent them from overgrowing the smaller ones



Typical young plant, growing on a rock face, covered in lichen. The colouration of the growth tip and stems are characteristic of the Small Bellflower



Small Bellflower capsules

Small Bellflower capsules change colour when they start to ripen up. When they are growing in full shade the colour change is less apparent

Nearly ready, but still too green

Place where the seed head can be severed. Snap the seed head off as low down as the stalk will allow

Tea Plant

Frankenia portulacifolia

Seed Collecting

Timing

Tea Plant flowers at different times and at different intensities from population to population across the island.

Seed capsules that no longer have petals attached any more, will have lost their seed. Only collect capsules that have turned brown and where the petals are still present. Ripe capsules will fall off when touched

Method

Select a branch with a good clump of browning flowers where the flowers have gone over slightly. Hold the branch between the index and middle finger with your palm facing up. Holding the fruiting branch in this way, lightly press against it with the thumb with dabbing motions. Hold a seed bag below this branch to catch falling seed heads.

Seed heads that are ripe (plus dead twigs and leaves) will come loose and fall into your bag. Green seed heads (and green twigs and leaves) will not come off the plant unless you press too hard.

Once you get the hang of this, a great number of seed heads can be collected in a short space of time. Alternatively you can sit there for hours, picking off one capsule at a time

Seed Sowing

Sowing Method

When the seeds and chaff have been dried down, it is easy to gently crush it up to release the seeds out of the capsules and break down the bigger pieces of twigs and leaves.

Sow this fine dust like mixture over the surface of a tray and water in, using a hand held mister.

The seeds are too light and will be washed into the corners if watered otherwise.

Alternatively the seed tray could be soaked from the bottom, but this tends to compact the soil too much

Germination

Germination is very good and there is no challenge in germinating Tea Plant. The unanswered question is "what then"?

Best guesses at the moment seem to suggest using sea water mixed into your mist bottle and giving the seedlings a spray of this mixture now and again.

More work is needed to understand the growing requirements of Tea Plant

Growth Info

Soils & Watering

Plants in the wild prefer growing on horrible looking red soils and can even be found growing in the salty spray of the sea.

Surprisingly Tea Plant is found growing in very damp, very shady situations on the cliff sites of Blue Point and Man & Horse

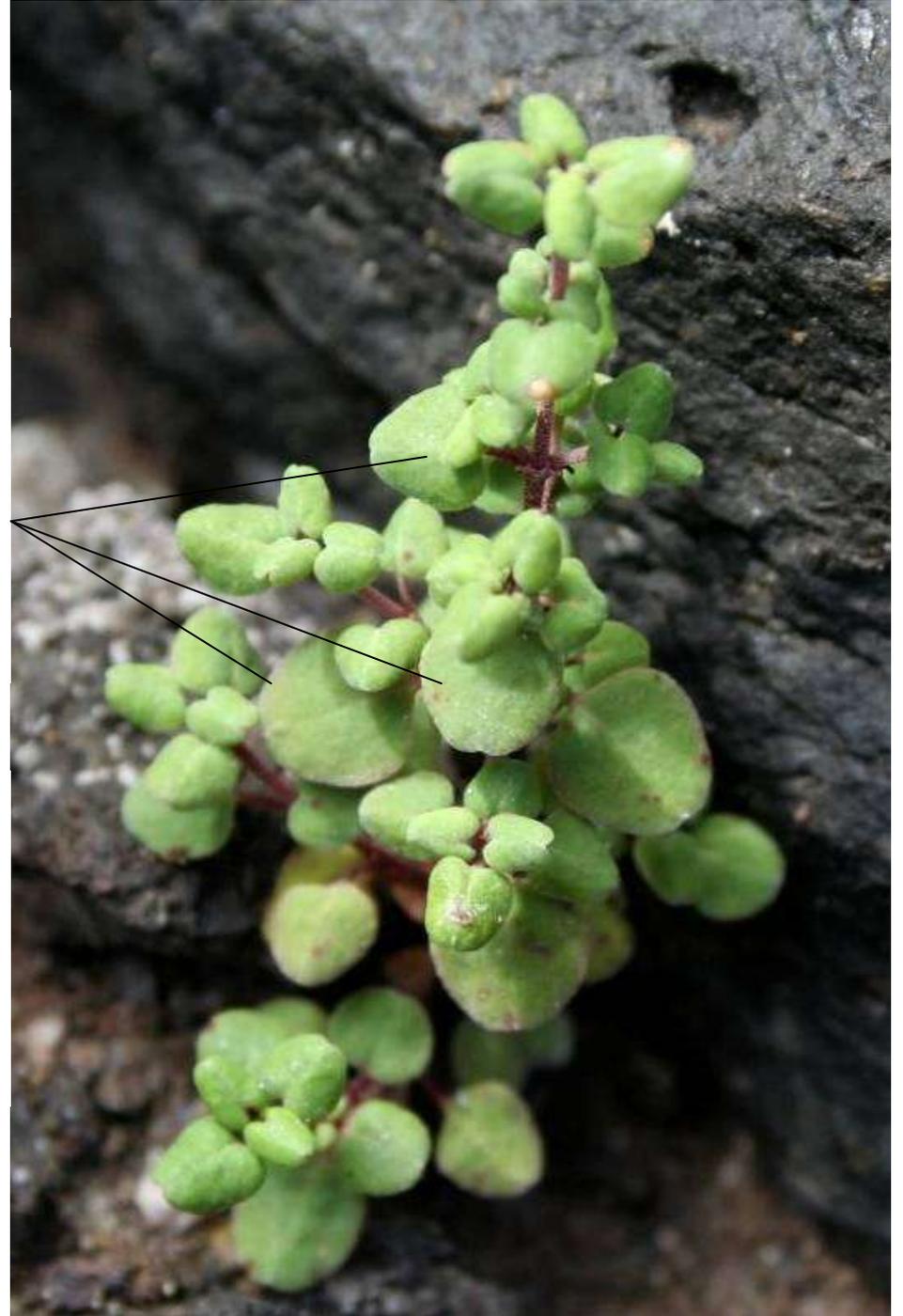
Plants seem to be very different in their growth and physical characters between the East and West of the island. It is possible that there is a genetic difference that plays a role but it might just be environmental influences that give these different phenotypes (what a plant looks like as determined by the combination of its genetics and the environment it grows in)



Hold Tea Plant seedlings by the 'ears' (leaves) rather than on the stem as this could cause serious damage

Tea Plant seedlings have brilliant pink stems, and leaves that are quite flat and round. When mature the leaves are more elongated and the edges are recurved

Seedlings form large roots and need to be pricked out quite small to avoid the roots growing into one another and causing much damage to the roots when pricking out



Old Father Point



Petals

Green capsules. The seeds will be under developed and it is not worth collecting. These should be left on the plant

Ripe capsules. They have turned brown and the petals are still present, stopping the seeds from falling out

Great Stone Top



Plants from different populations look quite different and more work should be done to determine the genetic makeup of these populations. These populations should not be mixed otherwise we might lose their differences

Tea Plant is the only endemic flowering plant that we cannot yet grow successfully *ex situ*. Tea Plant sets thousands of seed every year and germinates profusely in the wild. But the only two sites where Tea Plant is doing really well are either near the sea, where it gets a lot of salt spray, or on the horrible red soils that have these characteristic salt lines where salts leach out. When looking straight down a cliff like Man & Horse, you can't see the Tea Plant until you skirt round the ledges when you find them in great numbers, and of all sizes and ages. More work needs to be done on the soil and water preferences of Tea Plant, but a guess would be that you can supplement the salt requirement by adding the required salts to the water. Due to the lack of knowledge on the exact salts and amounts required, initial experiments could be done by using sea water diluted in a watering can at about 1:10 ratio (sea: fresh water). Test this on a few seedlings first and work out how much sea water to use



One Tea Plant collection. This amount of seed took four people an hour to collect, by using a new method of tickling the dry seed capsules and making them fall off into the bag while unripe capsules remain on the plant





Above: Tea Plant seedlings that are badly etiolated and begging to see the sun. Too many seeds were sown in this tray and the seedlings are a bit crowded. Trays should be placed in an exposed position as soon as the seeds have germinated

Below: Tea Plant seedlings that are a bit healthier. These seedlings have been placed out in the sun a bit late, but are starting to toughen up. Their darker colour has returned and the new growth is not etiolated (stretched because of the lack of light)



Tufted Sedge

Bulbostylis lichtensteiniana

Seed Collecting

Timing

Tufted Sedge flowers continuously, as long as it is in active growth. Each leaf tip holds a head of brown bracts that contains the flowers and seed. The heads that have finished flowering are normally ready for collecting. The heads turn a darker brown when they are ready but colour difference is too slight to be of use

Method

Grab handfuls of seed heads that look right with one hand and hold onto the leaves with the other hand, then pull the seed heads off.
Try and collect a little from as many plants as possible in a population.
Strip only one side of a plant at any one time, and leave the other side to set its seed *in situ*

Seed Sowing

Sowing Method

Break the seed heads up to release the seeds by rubbing them between the hands or use a rubber bung to rub them without damaging the seeds.

Fertile seeds are a dark brown colour. Seeds can be sown with chaff and all. Tickle the seeds into the soil to improve contact with the soil

Germination

Tufted Sedge takes a long time to germinate, over four weeks.

If the seedlings come up too closely, do not try to prick out individual seedlings. Instead you could try and prick out little clumps of seedlings

Growth Info

Soils & Watering

Tufted Sedge is one of the easiest plants to grow and tolerates a range of treatments.

Plants grow better if planted out in the open ground and have a free root run. The leaves will become very long and hang down if placed in a shady situation

Special Requirements

No special requirements needed

Planting out

Timing

Plant out at any time.

If plants got too leggy (long stretched leaves) the leaves could be cut back before planting out. This also makes planting easier, as you do not have the trouble of keeping the leaves out of the hole

Method

Tufted Sedge could be planted quickly by making a slit in the ground with a spade and placing the plant into the hole by holding onto the leaves. Make sure to squeeze the plant in deep enough to ensure the roots will not be exposed. Step on the sides of the root ball to compact the soil around the root ball



Black Olive trying to take over

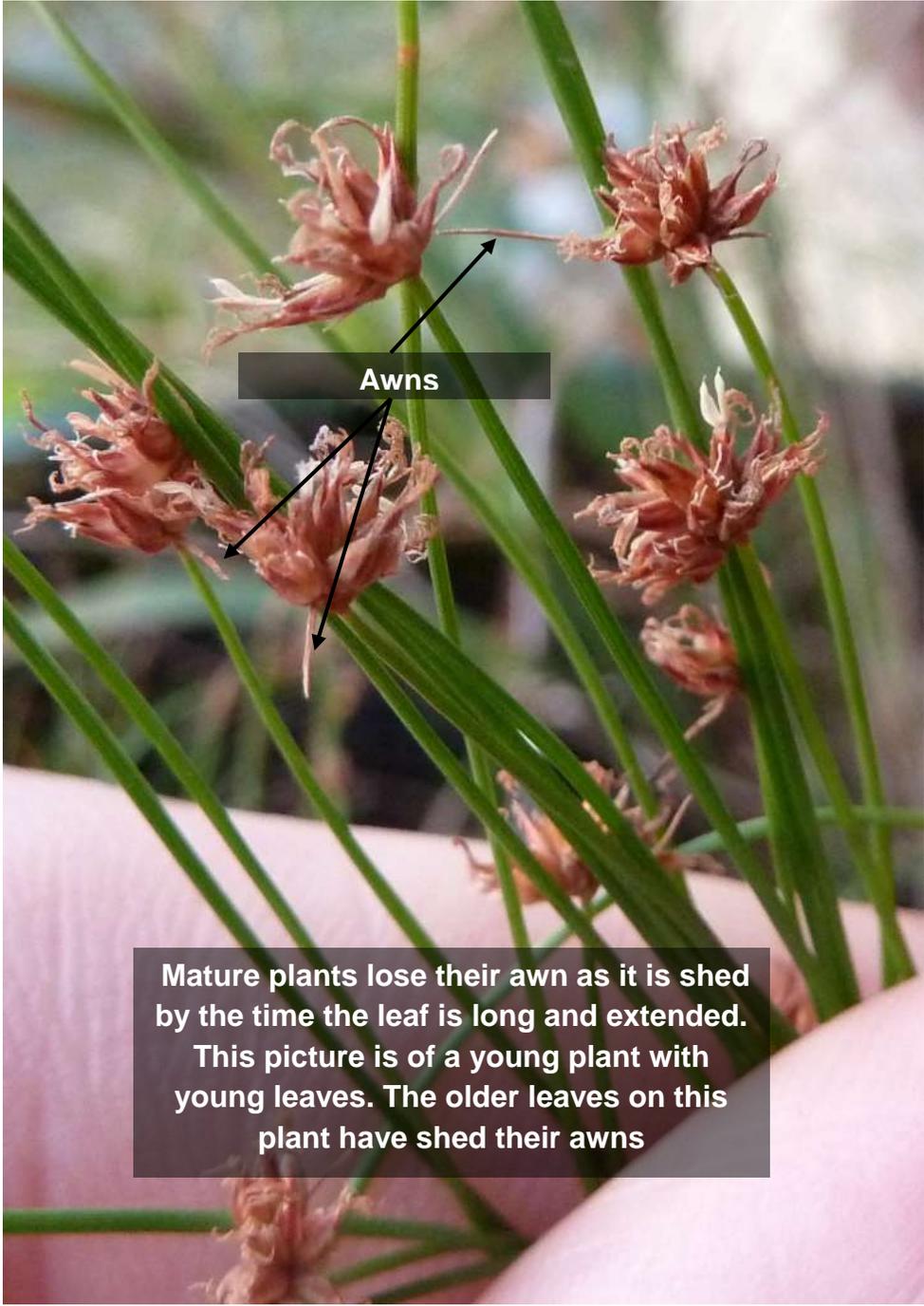
Tufted Sedge makes a good ground cover and should be planted in masses between dryland species to keep weeds at bay



Ten minutes later, Black Olive removed and a mass of Tufted Sedge opened up



Seedling with its large awn. These awns are not seen on mature plants and as a result, seedlings look completely different and could be mistaken for weeds



Awns

Mature plants lose their awn as it is shed by the time the leaf is long and extended. This picture is of a young plant with young leaves. The older leaves on this plant have shed their awns



Drying seed heads. These are ready to collect. Note that the green stems have started to change colour directly below the head

Flower head in full flower. These will not have any seed

Young flower head that have not yet started to flower

Tufted Sedge divisions that have been put into modules. Tufted Sedge could be treated in the same way as Hair Grass divisions



Hair Grass

Tufted Sedge

Whitewood

Petrobium arboreum

Seed Collecting

Timing

Whitewood flowers round April-May time. The seed will not linger on the tree and normally blows off as soon as it is ripe. The seeds are easily dislodged and lost on a dry day and as soon as a sunny day presents itself the opportunity to collect Whitewood should be taken. If you don't use it you lose it!

Method

Ripe seeds will be knocked off the tree as soon as you fiddle with a branch. To capitalise on this (see photos) make use of a sheet of material (like net curtain for instance) to capture the seed in mid-flight. This way you get some of the seed that otherwise would have been lost. The added advantage is that the very light papery seeds are lighter than most off the chaff and the minimum amount of cleaning is required afterwards

Seed Sowing

Sowing Method

Expect about 50-100 seeds out of a 1000 to germinate. Because the seeds are so flimsy and papery-flat, do not sow too many in a tray as you might be surprised how many seeds are in a pinch.

Do not cover the seed with soil

Germination

Low viability, but good even germination. Expect seeds to be up after about two weeks.

Seedlings grow strongly if given enough space to send their roots out, so prick out at a young age

Growth Info

Soils & Watering

Keep moist and growing in free draining humus rich soil. Whitewood will grow quite fast if given deep rich soil in a moist spot.

The female trees have a way of flowering on the ends of branches. The demands of producing seed tires out these branches; exhausted, they die back at the tips, but then sprout new shoots from lower down on the branches

Special Requirements

Whitewood naturally produces air roots but this only happens in a healthy moist environment; but plants that do this, seem to be healthiest and longest living. In other words, air roots are never found on a tree that's dying. Therefore it is advisable to create a healthy moist environment around trees or plant trees into such endemic habitat

Planting out

Timing

Planting out of Whitewood is best done throughout the year. Otherwise it might be too wet, or too dry for planting. Planting all year round, you spread the risk and will hit the perfect weather now and again

Method

Plant in tight holes. There is no need to dig big holes for these plants. Be careful not to damage the roots, especially the tap root.

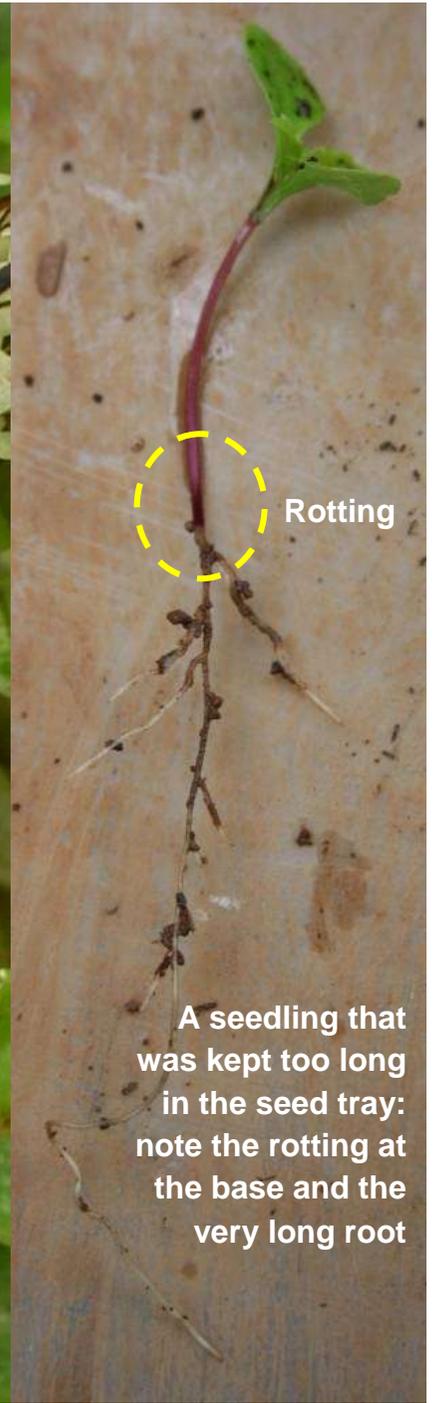
Some of the plants will die when they start to flower, as young female trees sometimes flower too much and never recover from the shock of spent energy. To avoid a gap in generations, interplant with young plants every year



**Very healthy
three week old
seedling**



**Male flowers with
their brown &
yellow drooping
bits. In female
flowers the
female bits
(stigmatic horns)
are splayed open
(see She Cabbage
flower pictures)**



Rotting

**A seedling that
was kept too long
in the seed tray:
note the rotting at
the base and the
very long root**

Catching Endemic Whitewood seed
with a piece of cloth



Papery thin Whitewood
seed

References

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Lambdon, P. & Darlow, A. (2008) *Botanical Survey of Ascension Island and St. Helena 2008: A report on the current state of plant invasions, and their implications for conservation and management* Royal Society for the Protection of Birds, Sandy, Bedfordshire.

Appendix 1

List of endemic and probable indigenous plants of St Helena

The categories in this list are not definitive, but indicate the conditions that are favoured by each species as found during this project.					
NB: Dry-loving, & Dry-loving to Medium species should NOT be planted in the Green Heartland					
Dry-loving species		Moist-loving species		Suggested species for RESTRICTED public distribution due to the threat of possible hybridisation	
Babies' Toes	<i>Hydrodea cryptantha</i>	(No local name)	<i>Asplenium platybasis</i>		
French Grass	<i>Euphorbia heleniana</i>	Black Cabbage	<i>Melanodendron integrifolium</i>		
Hogweed	<i>Commicarpus helenae</i>	Blackscale Fern	<i>Diplazium filamentosum</i>	Bastard Gumwood	<i>Commidendrum rotundifolium</i>
Lily Fern	<i>Ophioglossum polyphyllum</i>	Brownscale Fern	<i>Pseudophegopteris diana</i>	False Gumwood	<i>Commidendrum spurium</i>
Dry-loving to Medium species		Comb Fern	<i>Pteris dentata subsp. flabellata</i>	Gumwood	<i>Commidendrum robustum</i>
Barn Fern	<i>Ceterach haughtonii</i>	Diana's Peak Grass	<i>Carex diana</i>	Scrubwood	<i>Commidendrum rugosum</i>
Boneseed	<i>Osteospermum sanctae-helenae</i>	Dogwood	<i>Nesohedyotis arborea</i>	Dwarf Jellico	<i>Sium burchellii</i>
Boxwood	<i>Melissia begoniifolia</i>	He Cabbage	<i>Pladaroxylon leucadendron</i>	Jellico	<i>Sium bracteatum</i>
Crevice Fern	<i>Cheilanthes multifida</i>	Kidney Fern	<i>Dryopteris cognata</i>	Rosemary	<i>Phyllica polifolia</i>
Ebony	<i>Trochetiopsis ebenus</i>	Lays Back Fern	<i>Pteris paleacea</i>	Large Bellflower	<i>Wahlenbergia linifolia</i>
Goosefoot	<i>Chenopodium helenense</i>	(No local name)	<i>Huperzia axillare</i>	Redwood	<i>Trochetiopsis erythroxyton</i>
Golden Rod	<i>Phlebodium aureum</i>	Plastic Fern	<i>Asplenium compressum</i>	All St Helena endemic plants are under serious threat and priority should be given to efforts to improve their status in the wild	
Hair Grass	<i>Eragrostis saxatilis</i>	She Cabbage	<i>Lachanodes arborea</i>		
Neglected Sedge	<i>Bulbostylis neglecta</i>	Tree Fern	<i>Dicksonia arborescens</i>		
Old Father Live Forever	<i>Pelargonium cotyledonis</i>	Whitewood	<i>Petrobium arboreum</i>		
Parsley Fern	<i>Asplenium aethiopicum</i>	Epiphytes/Lithophytes		None of these plants listed should be removed from the wild	
Plantain	<i>Plantago robusta</i>				
Salad Plant	<i>Hypertelis acida</i>				
Small Bellflower	<i>Wahlenbergia angustifolia</i>	Medium to Moist-loving species		Seed collecting should be done through cooperation with ECS	
Tea Plant	<i>Frankenia portulacifolia</i>	Mossy Fern	<i>Elaphoglossum bifurcatum</i>		
Tufted Sedge	<i>Bulbostylis lichtensteiniana</i>	Strap Fern	<i>Pleopeltis macrocarpa</i>		
Medium to Moist-loving species		Moist-loving species		Never attempt seed collecting on your own	
Buckshorn	<i>Lycopodium cernuum</i>	Common Tongue Fern	<i>Elaphoglossum conforme</i>		
Hen & Chickens	<i>Asplenium erectum</i>	Filmy Fern	<i>Hymenophyllum capillaceum</i>		
Lesser Kidney Fern	<i>Dryopteris napoleonis</i>	Toothed Tongue Fern	<i>Elaphoglossum dimorphum</i>		
Lobelia	<i>Trimeris scaevolifolia</i>	Veined Tongue Fern	<i>Elaphoglossum nervosum</i>		
Sticky Fern	<i>Hypolepis rugosula</i>	Watchstrap/Ebony Fern	<i>Grammitis ebenina</i>		