

Using Trees and Gardens to Control Big Leaf Rope

Community Handbook



LIVE&LEARN
Environmental Education

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ABOUT THIS BOOK

This book is about how you can use trees and gardens together to reclaim land that has been overrun by Big Leaf Rope.

This approach has many benefits. Most importantly, it will allow you to make use of otherwise wasted land, and turn it into a fertile and productive garden. Techniques outlined in this book will allow for an increased crop yield and overall profit, helping to better support you and your family. It will help to increase the variety of crops you can grow, and provide further opportunities down the road selling timber from trees.

Equally, trees and wildlife that are often suppressed by Big Leaf Rope will also have a chance to grow back again, helping to restore Vanuatu's rich biodiversity. Using this technique, ongoing efforts to maintain your plot and keep it free from Big Leaf Rope will decrease, making it easier to keep your garden and surrounding environment healthy and productive.

We believe that by following the approach described here, you will see benefits for your community, your environment, and even to your income. This step by step guide aims to help you in setting up your own 'agroforestry garden' either on your own, or as a community.



Whitewood and kumala growing at the Santo test plot

LIVE & LEARN VANUATU AND THE INVASIVE SPECIES PROJECT

Live & Learn Vanuatu (LLV) is a non governmental, not for profit organisation which aims to promote greater understanding of and action towards environmental and human sustainability through education, communication and collaboration.

LLV, with the assistance of the European Union have undertaken the project 'Testing and modelling preventative measures to limit the spread and ecological impact of invasive species in Small Island Developing States,' from 2011-2016. The central aim of this project is to minimise the spread of invasive species in Vanuatu to improve biodiversity, community well-being and food security.

Through this project LLV worked to develop an integrated approach to control *Merremia peltata* or Big Leaf Rope and keep it out of a communal garden area. Field teams set up three test sites on Santo, Tanna and Erromango, which were chosen due to the high prevalence of Big Leaf Rope.

Big Leaf Rope is a threat throughout the Pacific. Other nations and communities within Vanuatu have trialled and tested a range of methods to help minimise the impacts of this invasive vine. But while many of these techniques focus on biological control, pesticides or ongoing physical labour, our model is unique. While it may not provide a complete solution, our method offers an economical and practical way of reclaiming land that has been infested with Big Leaf Rope. We present a method that will help communities and farmers to protect their environment and gardens against the threat of Big Leaf Rope through basic agroforestry techniques.



WHAT ARE INVASIVE SPECIES?

Invasive species are plants and animals (including birds, insects and marine life) that have become destructive to the environment or community livelihoods. They push out native animals and plants and take over in their place.

There are many invasive species throughout Vanuatu. The Indian Mynah Bird, Giant African Snail, Piko and Big Leaf Rope are all types of invasive species found throughout our islands. In different communities people can identify different things that they consider invasive.

These species have different names from place to place. In Tanna, Big Leaf Rope is called Nul Asul. On Santo it is called Nwe'le, and on Erromango people refer to the pest as Nos Ovilau. Scientists call it *Merremia peltata*. In this guide we will call it Big Leaf Rope.

THE PROBLEM WITH BIG LEAF ROPE

Big Leaf Rope is a problem throughout Vanuatu and many countries across the Pacific. It is a fast growing vine that can take over very quickly. Areas of degraded land, such as those that have been deforested can be easily overrun. But Big Leaf Rope can also grow up and over forest, completely destroying what lies beneath.

Big Leaf Rope kills native trees and plants, slowly covering and smothering everything in its path. Where big leaf rope has taken over, it is very challenging to make use of the land. Fruit and nut trees are unable to grow, timber trees die and garden plots are quickly overrun.

Native animals, especially birds, lose their habitat and are forced to move on to new grounds. This has a great impact on Vanuatu's rich biodiversity.

One benefit of Big Leaf Rope is that the leaf cover is able to keep the soil rich and fertile. However to make use of this you need a long-term plan. Our agroforestry method allows you to reap the benefits of the nutrient rich soil, and at the same time eliminate the ongoing challenges of clearing and maintenance that is needed in areas infested with Big Leaf Rope.



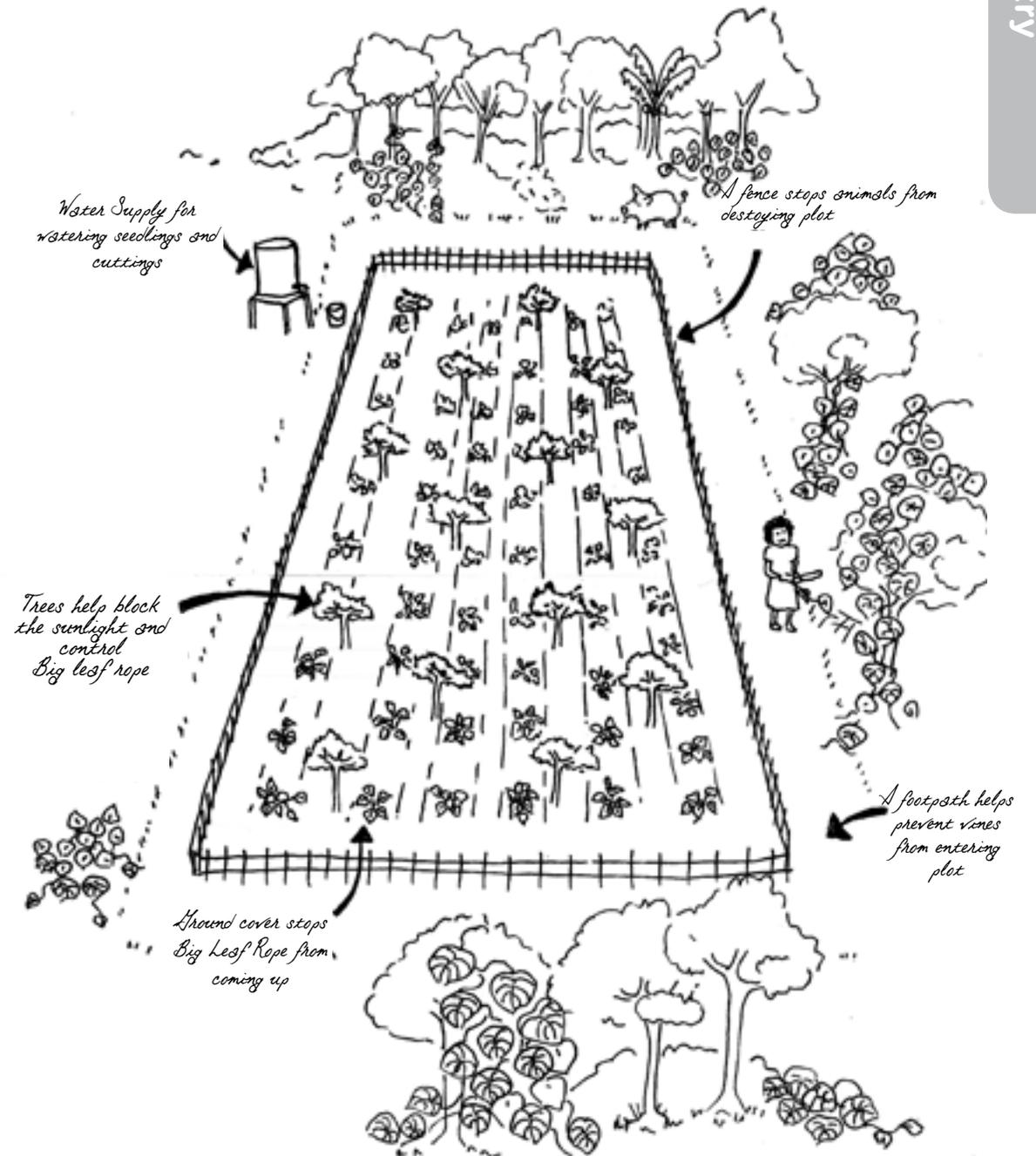
A PRACTICAL SOLUTION: GARDENS WITH TREES

Together with communities, we have combined agriculture and forestry practices, otherwise known as agroforestry, to tackle Big Leaf Rope. Big Leaf Rope needs light to grow. Inside a healthy dark forest, there isn't enough light for seeds to grow, preventing the spread of the vine. Based on this principal, the idea is to rebuild dark forests by planting trees that will grow a thick canopy. This will stop any new seeds from sprouting, and reduce the spread and growth of Big Leaf Rope.

To do this we need to plant new trees. But big trees take a long time to grow. If we do not cover the ground while the trees are still small, Big Leaf Rope will get enough sunlight to grow. So what can we do?

We can plant food crops, such as kumala, that cover the ground like a thick mat, shading out the light. This will make sure the Big Leaf Rope seeds in the ground are not able to grow in the meantime. In a few years, when our trees have matured, they will be able to shade out the Big Leaf Rope by themselves.

We can slowly adapt the crops we use, planting crops such as wild yams that do not need much light, as our trees grow bigger. In this way we will have a healthy, productive garden that needs little maintenance to keep out Big Leaf Rope.



ABOUT AGROFORESTRY

Agroforestry is an old farming practice, used by people in Vanuatu for a long time. Agroforestry means growing food crops and trees together in the same area. The trees give shade, fruit, timber and nuts long after the main crop cycle of the garden is finished.

Agroforestry has many benefits. Most importantly, it is a practical method of re-establishing natural forest. It is the production of forests (that is, the growth of the trees) which is able to 'lock up' carbon and assist in slowing climate change. In this way, all land that is covered with Big Leaf Rope represents an opportunity for Vanuatu to contribute to the global challenge of climate change, simply by replanting



forests. At the same time, agroforestry increases the amount and variety of food and develops a long-term cashflow from the garden. At the beginning people can harvest crops like kumala, then after a few years, fruit, nuts and fenceposts and eventually timber for building houses.

In an established agroforestry garden, native birds feed, wild yams grow and tree crops such as Nangai and Navel are available, each a source of food in hard times. Agroforestry also helps to develop healthy soil, keeping it rich as the trees bring nutrients from deep in the soil and return them to the surface where they can be used again by food crops.

Agroforestry is a return to traditional gardening with trees, nuts, fruit and crops all coming from one place. Plus there is one extra benefit: it can help us to control Big Leaf Rope!

WHY DO IT?

There are at least four reasons to establish an agroforestry garden in areas that are thick with Big Leaf Rope:

1. Ground that has been covered with Big Leaf Rope is usually fertile, so it is a good place for a garden.
2. Parts of Vanuatu have rapidly growing populations looking for land to garden. It is important to avoid cutting down trees for the sake of making a new garden. Instead we can reclaim wasted land that is covered by Big Leaf Rope.
3. The Agroforestry plots trialled by Live and Learn Vanuatu used fences to protect the gardens from wild and domestic animals, improving the food security of communities.
4. Following these techniques has helped the communities make greater profits from their gardens.



PREPARATION

CHOOSING A PLOT

Once you have decided that an agroforestry garden is right for you, there are a few things you need to consider. Firstly, you need to identify a piece of land that is covered by Big Leaf Rope. We recommend an area of at least 2 hectares.

If you do not own the land you have selected then it is best to sit down and discuss your plans with the landowner. Explain your objectives, as well as your motivations. Remember to emphasise that the land is not productive when it is covered with Big Leaf Rope. Restoring the land through agroforestry will improve the land, its productivity and the surrounding environment. This is a win-win situation for all.

Agroforestry is a long-term investment. While the profits from crops can be seen immediately, it can be between 10 to 15 years before you are able to harvest your trees for timber. It is good to talk about the benefits from new trees, and how future profits can be shared. It is now possible to register the ownership of the trees separately from the land. Talk to your local Agriculture and Forestry officers about this. Some phone numbers are provided at the end of this guide.

Working as a Community

In communities where we have worked, there was a lot of interest in obtaining a garden plot once people realised the extra money that they could make from growing their crops inside a good fence.

Starting an agroforestry garden can be expensive for just one person. While it is possible to set up a plot by yourself, sharing the load can have great benefits. Joining with other community members, you can agree to put your gardens together. You can then share the costs of fencing, tools and seedlings, and work together to clear and maintain the plot.

It is important to talk together about the trees you will be growing. Who will plant the tree seedlings? How will the benefits from the trees be shared in the future? Will each farmer own the trees on his or her plot, or will all the trees be jointly owned by the community? How will you decide when to cut down the trees, how much to sell them for, and how to divide the profits?

If you can come to consensus before you start, you will have less chance of problems further down the road.



Hillside at Erromango completely covered by Big Leaf Rope,

FUNDING YOUR AGROFOREST GARDEN

Once you have selected a suitable plot, you will need to think about how you will fund your agroforestry garden. Things to consider include a fence, tools, seedlings and a water source.

We have provided an estimate of costs, income and profit in a later section.

You can collect tree seeds and raise seedlings fairly cheaply yourself, or buy them from a nursery. You will also need to consider how you will water your new seedlings. In some cases we have put in a water tank and or a pipe with running water. This is not essential, especially if you plant in season, but it can be helpful when you're planting new seedlings and cuttings.

Contact people and stores who will supply you with what you need. The Department of Forestry can give you information on nurseries that can supply you with tree seedlings at affordable prices.



Working as a Community

Organise payment from a communal account and purchase the materials.

Prepare fence posts.

What tools can you share?

Mobilise a team to clear and build the fence.

THINGS YOU NEED



Clearing: bush knife, hoe, possibly an axe or chainsaw, file, wheelbarrow.



Fencing: Fence wire, U-nails, hammer, crow-bar or pick, spade, pliers, pinch bar, strainers, wheelbarrow, tape-measure.



Planting: Tree seedlings, kumala cuttings, spade, bush pegs to mark out lines, tape measure.

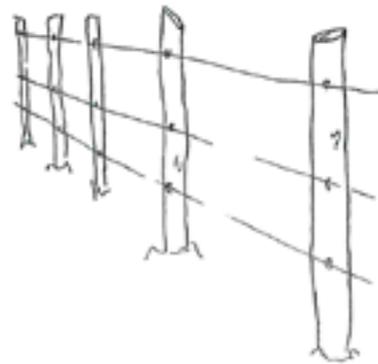
SETTING UP THE PLOT

Once you have everything ready we recommend following this 4 step guide to set up your plot.

Clear the Big Leaf Rope, as well as other weeds and small shrubs. Don't cut down any hardwood trees.



Clear



Build a Fence



Plant trees



Plant ground cover

Build a fence that keeps out pigs and cattle, protecting the food crops and the trees. Keep a 1 metre wide footpath clear on the inside and the outside of the fence. This helps to make sure no new vines are entering the plot.

Plant a range of trees that will grow a thick canopy over time. Fast growing trees should be a part of your mix

Plant a ground cover crop to shade out weed seeds. We recommend kumala to start with.

Remember! If you don't have easy access to water, try to plant your seedlings during the wet season.

CLEAR YOUR PLOT

Once everything is ready, clear the fence line and the plot.

There are two ways you can do this. In our test sites, we cleared all of the garden area inside the plot at once. This is a lot of work but then the whole site is ready for planting. The risk is that the ground might dry out, so you will need to be ready to plant quickly.

Another method is to start by clearing the fence line, and strips where you will plant your rows of trees. After you have planted the tree seedlings, you can continue to clear the areas in between the strips, which will become your gardens for kumala. The risk is that the Big Leaf Rope grows over the young trees and damages them. You must commit to cleaning the tree lines regularly.



We encourage you not to burn the bush when clearing, as this wastes nutrients that go up in smoke. Instead, heap the debris into large piles around the plot. After a few months it will have decayed into rich compost food, releasing the nutrients gradually back to your crop.

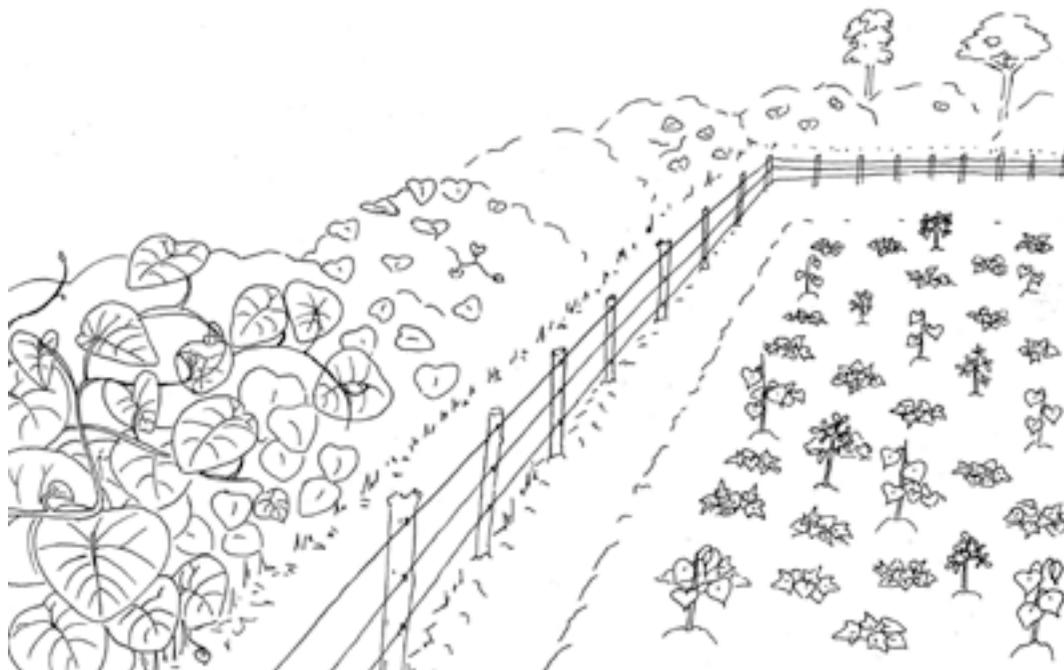
Also remember when clearing that you do not need to clear any existing hard wood trees. It is an advantage to start with developed trees in your agroforest garden. Make the most of them!

BUILD YOUR FENCE

Once your plot is clear it is time to build your fence. While the fence is one of the most expensive aspects of the project, it is also the most useful. It makes it easier to keep new Big Leaf Rope vines out, but it also stops animals and other pests from entering the garden. This can greatly increase your crop productivity and final profit. For our project sites we used local timbers for fence posts and paid for the work of building the fence. It took 10 men 10 days to fence a 2 hectare plot. We used 5 strands of barbed wire, with a total of 3000m of good quality wire required. In 2016, this cost 94,500 Vatu.

We have estimated the total cost of the fence at 180,000. This includes the cost of wire, as well as the price of cutting posts and transport. Your community may be able to do it more cheaply, especially if you work together to cut fence posts for free.

If you cannot afford to build a fence at the start, make sure to clear a 2 metre wide strip around your garden and keep this clear. You can put some money away from you first lot of crops to build a fence in the future.



Working as a community:

Putting your gardens altogether inside a fence helps to share out the costs, but it can be hard too. It takes time to agree on what is fair.

You need to have a plan for how to put some money aside for fence repairs or replacement in the future.



Marking out tree planting lines ready for clearing. Afterwards, planting Whitewood seedlings.

PLANT TREES

The next step is to plant your trees. Choose the right time of year, when there is reliable rain. This will make a big difference to their survival and save you the work of watering very young seedlings.

What trees should we plant?

Any local hardwood trees will work well. If you are raising seedlings then Mahogany, Whitewood, Natapoa and Namamau are a good mixture. Sandalwood is a good solution for rocky areas. Slow growing trees like Nangai are also suitable, but be sure to mix them with other fast growing trees. This will ensure that you will have enough shade to protect the area from Big Leaf Rope long into the future.



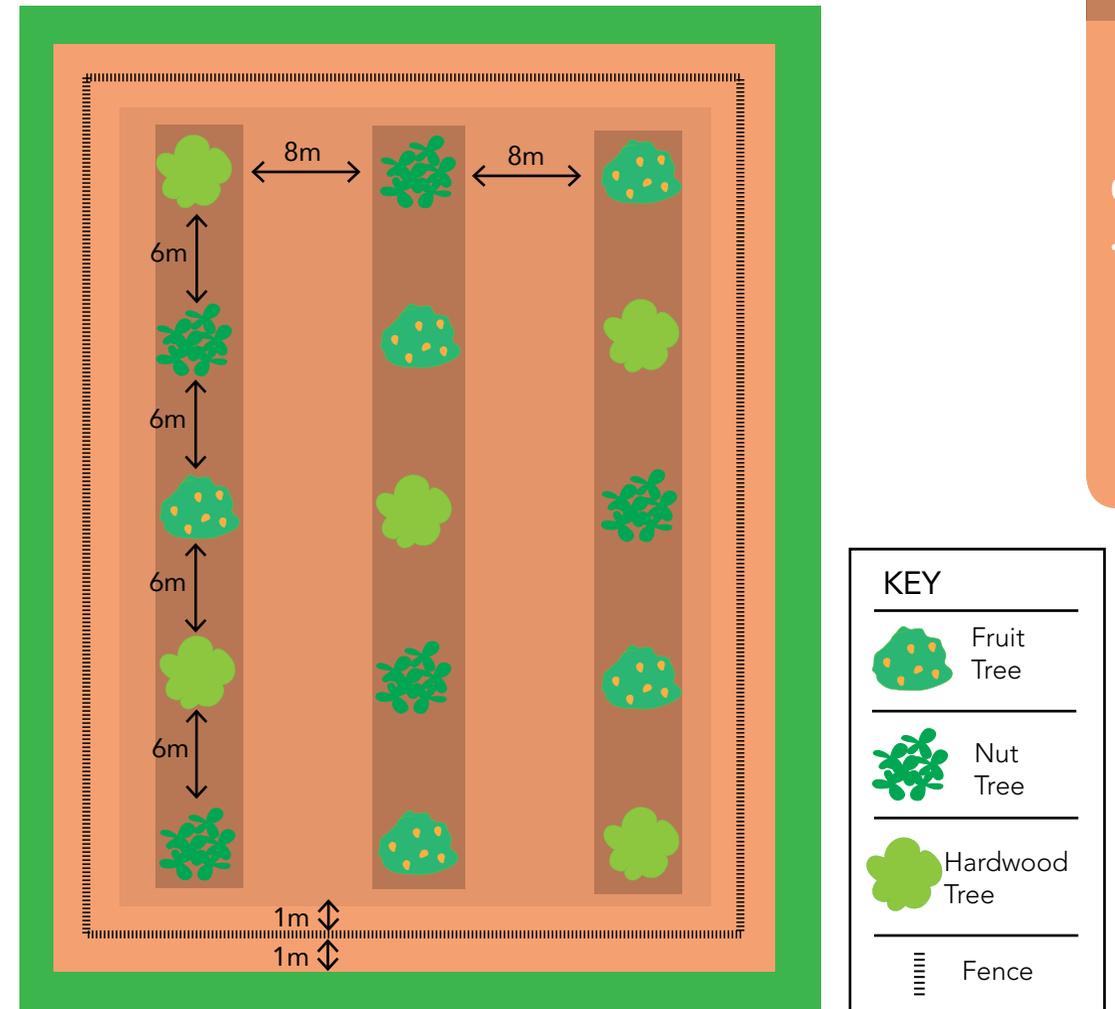
Whitewood Namamau and Natapoa at the Lorum Plot in Santo.

At what spacing should we plant the trees?

The spacing depends on what you plan to do with your agroforestry garden. Do you plan to sell the trees for timber? Or are you hoping to re-establish a natural forest?

In our trial sites, we tested a number of tree spacings to allow good canopy cover and space for planting crops. We recommend planting trees in lines 8 metres apart.

If you plan to sell the trees for timber, then planting them closer together will help them to grow straight and tall. You can then select the best ones



to keep. For this method we recommend planting every 3 metres along the row, so that you can gradually thin out trees as they grow.

Should you plan on leaving the trees to grow back into a thick healthy forest we suggest planting at 6 metres along the rows. In this way they will have enough space to grow, without the need for thinning.

If you use an 8m X 6m spacing then you will need 208 trees per hectare. If you use an 8m X 3m spacing then you will need 416 trees per hectare.

Planting a mix of trees will allow for a range of different benefits. We suggest making every third tree a Whitewood or a Mahogany. In between these you can then put Namamau or native nut and fruit trees, such as Natapoa, and Nangai. This will give you a mix of timber, fruit and nuts in the future. You can also choose to use native forest trees specific to your area, especially if one of your goals is to re-establish natural forest over the long term.



PLANT GROUND COVER

After clearing your plot, plant your ground cover as quickly as possible. You don't have to wait until you've finished clearing the whole plot to start planting your ground cover. The goal is to get a good thick ground cover while the trees are small.

Which crops are best to use first?

The choice of your first ground cover crop depends on the soil and climate in your area. At the LLV trial sites, we used kumala, manioc, peanuts and potato as the initial ground cover crops. This is because they grow quickly and cover the ground well to eliminate any Big Leaf Rope seeds from growing. They also have high productivity and can make good profit when sold at the market.

What spacing should we plant at?

In our test sites we looked at different spacings for planting ground cover. For kumala, we tested spacings of 30cm, 50cm and 100cm. We found that a spacing of 100 cm covered up the ground quickly enough. At closer spacings the kumala was competing too much and the produce was smaller.

Working as a Community

Who will clear the boundary each week? How will this work be shared? Do you need a coordinator?

What are the next cycle of crops we can use?

After planting and harvesting the first round of ground cover, you can start to adjust the types of crops you plant. Over the years, trees will start to grow taller, so you will need to choose crops relative to how much light is available. You can also plan to rotate crops to replenish the soil quality, such as peanuts or mucuna, which put nitrogen back into the ground.

In the first few years, your trees will be small and will not impact your crops. At this stage it is best to choose crops that like plenty of sunlight. At our project sites there were many different successful crops, including kumala, corn, beans, tomatoes, onions manioc, watermelons and manioc. We also had success in rotating crops, starting with kumala, and then to peanuts and then returning to kumala again.

As the trees start to grow, the amount of sunlight available to crops will diminish. With more shade, crops such as taro become more successful. Finally, when your trees are fully grown, and provide a complete canopy over your garden, crops such as wild yams and navia will thrive.



Peanuts, the second crop being grown by some farmers at Port Resolution, Tanna. Peanuts replenish the soil.



ONGOING MAINTENANCE

MAINTENANCE OF BOUNDARY

Big Leaf Rope can enter your plot by growing over your boundary. You need to walk the garden boundary and cut back Big Leaf Rope (and any other weeds) coming in from outside. Try and do this at least once a week.

Pruning:

Pruning is the removal of branches from the main trunk of a tree. Pruning can increase the value of some trees in your agro-forestry plot. This creates a trunk that only has knots in the very middle of it, making it a more valuable timber log.

If you are pruning larger branches, do not use a bush knife. Use secateurs or a saw. You want to make a clean straight cut that is close to the trunk. Pruning is most useful to do in the first 2-3 years of a trees growth.

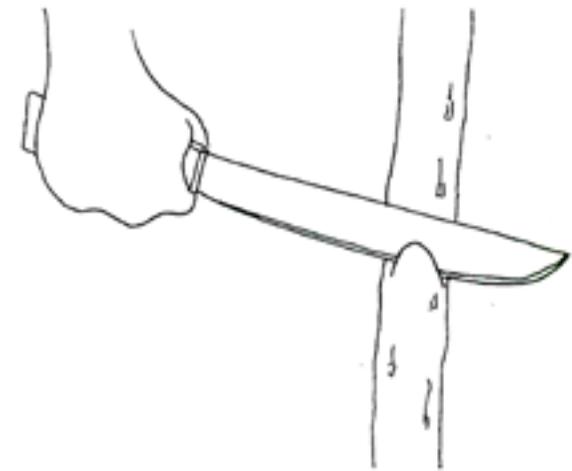
Thinning:

After 3-8 years it may be necessary to cut down some of the trees, to give more space for the best to grow. Remove any crooked trees and the smallest. This is called thinning. This will be most relevant if you have planted your trees at a close spacing.

For example, Namamau can be thinned out and used for building timber or fence posts after 3-8 years. This creates more space for growing your bigger hardwood trees.

Whitewood can be thinned and used for fence posts after 4-6 years, but you must treat it first. It can also be cut for timber after 15 years.

Sandalwood should not be thinned. It takes at least 25 years to mature and develop the heartwood (natora) which produces the valuable sandalwood oil.





HARVESTING AND REPLANTING:

The replanting cycle will change with every farmer and every season. We show an example below. The key things to remember are to:

- » Maintain the ground cover and continue to shade out Big Leaf Rope
- » Rotate your crops to maintain soil fertility
- » Manage spacing and planting density as the trees get bigger and start to shade the garden more.



Plot overrun with Big Lif Rop before clearing

YEAR 1

- Plan your agroforestry garden. Talk with land owners and community.
- Choose your plot, clear and build a fence.
- Plant tree seedlings. Remember to review the varieties and spacings we recommend.
- Plant your first cover crop. We recommend using kumala first.



A mix of small trees and ground cover crops

YEARS 2- 4

- Harvest the kumala. Remember to save some of the profits for fence repairs and new seedlings.
- Your trees are still small, so you have plenty of sun for new crops.
- Once you have harvested your first crop you are ready to plant again. Beans, mucuna or peanuts are a good option, replenishing the soil. Ideally, you can have 2 crops per year.
- As the cycles of harvest continue you can try new types of crops such as watermelons or kava, or return to previous successes, like kumala.

YEARS 5 - 10

- Trees are growing and increasing the shade covering for your ground crops.
- It is now time to plant crops such as taro, wild yams and navia which prefer shade.
- If you have planted your trees close together, it is now time to start thinning. Some trees will be ready to cut down for use as fence posts.



Established trees with shade loving crops such as taro and wild yams.

YEARS 11 - 15

- Your fruit and nut trees are now big enough to harvest produce.

YEAR 25 +

- Your hardwood trees are now ready to harvest for timber. Remember to plant more tree seedlings for those that you cut down.

Once your trees are tall enough to shade out Big Leaf Rope completely, you can look to start a new garden, and begin the process all over again. In this way you can slowly grow your productive land, and reclaim wasted space taken by Big Leaf Rope. You can also have a range of different crops and trees growing and ready for harvest at the same time.



OTHER THINGS TO CONSIDER

Rats steal plenty of food from your garden. You might want to think about implementing methods to control them too. After all, you've gone to the trouble of blocking the cattle and pigs. Planting plenty of onions may help; rats hate the smell of onions. You could also make a bait using local materials. Our field experts recommended grated coconuts mixed with the seed of a grated Poison Fish Tree. If you use this technique, make sure to keep it away from children and animals.

Small Fire Ants were also a challenge on some of our test plots. These are a common invasive species found in many islands throughout Vanuatu. While these pests are hard to control there are methods available. Making a bait is the best option, but it is best to discuss this further with your local biosecurity officer.

Working As A Community

We encourage communities to maintain a pool of funds to support the garden. You could charge a small annual membership fee, or ask people to contribute a percentage of their profits from market. This can be put in a communal account and used to maintain or extend the fence, buy new seedlings, or cover group transport of crops to market.



THE MONEY STORY

All people in Vanuatu are very good at making gardens, but it can be hard to make money from the garden as well as feeding your family.

The benefit of agroforestry is that it can reclaim land covered in Big Leaf Rope and make it productive. It can also help to grow enough crops to feed your family and to sell at market. But it takes investment to get a good return of crops to eat and sell.

The box at the side shows an example of the sort of thinking you need to do to estimate your INCOME, EXPENSES, SAVINGS and PROFIT.

You need to think about how much food is to be kept for the family, or ends up wasted – for example eaten by rats. At Lorum we expect that at least 30-50% of the crop is damaged by rats and it may be much higher than that.

As well as the initial set up and maintenance costs of your plot, you will also need to factor in costs of shipping and transport your produce to market.

Example 1 Kumala at Lorum.

INCOME

- Plant 266 cuttings in say 20*40 m plot (1.5 X 1.5m spacing)
- Each yields conservatively 5 kg harvested over about Month 3-6.
- Total yield of 1333 kg
- Rats take about 50% = 667kg
- Household / sharing 33% = 220kg
- Sell 447 kg for food at 50 Vatu per kg = 22,350 Vt

EXPENSES

- Deduct transport costs (5,000Vt)
- Gives 17,350 Vt.

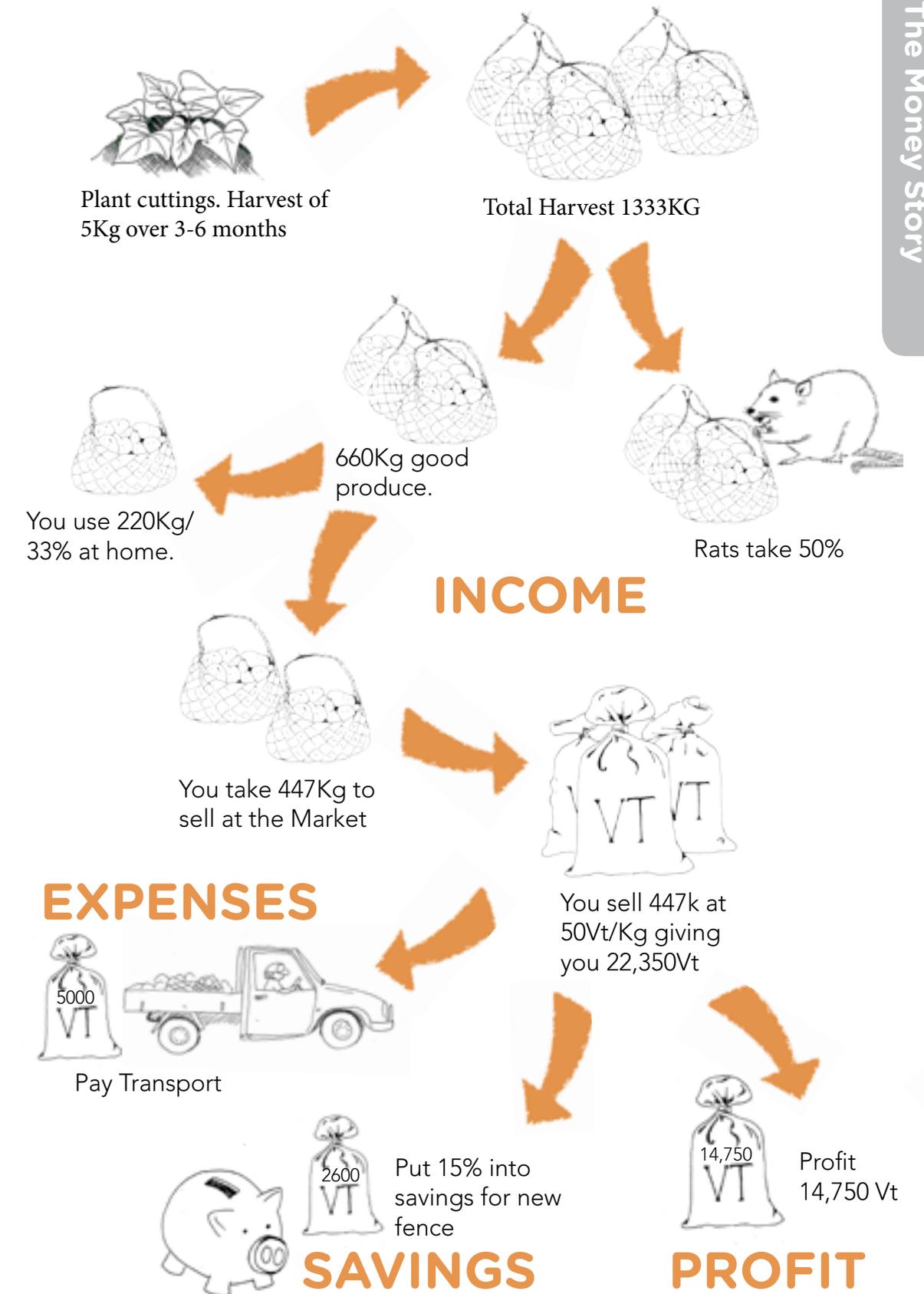
SAVINGS

- Put 15% (2600 Vt) aside for new fence later.

PROFIT

- Subtract EXPENSES and SAVINGS from INCOME to estimate your PROFIT
- Net profit 14,750 Vt.

THE MONEY STORY



COMMUNITY FINANCES

Live and Learn trialled 3 test sites in Tanna, Erromango and Santo. Each site was 2 hectares, which we then divided up into 20 plots. This provided 20 gardens, for 20 community members to make use of.

The tables below have been put together as a guide, based off our own methods and findings. It shows the costs you can expect as a farmer working within a shared plot. These estimates are based on our project that saw farmers share the cost of fencing and tree seedlings.

You can use the tables below to help plan out your own financial costs and profits.

Depending on where you live, and where you plan to sell your produce, you also might need to factor in additional costs for transport. Truck and shipping costs will need to be included if you plan on sending produce to main towns to sell.

Remember, if you plan on making an agroforest garden on your own, you will have increased set up costs. You will not be able to share the costs of fencing or seedlings, so make sure to plan ahead to ensure you can meet these expenses.

Initial communal set up costs (for a 2ha plot)

Costs	Item	VT	Quantity	Total VT	Notes
Fence wire	31.50 per m		3000m	94,500	5 rows of wire
U nails	500 per 500g		30	15,000	Quantity might vary
Fence posts				85,500	Community might be able to provide for free
Tree Seedlings	50		832	41,600	For a plot of 2ha 416 seedlings per ha
Tools (spade, hammer, axe, bush knife)	2000		4	8000	You might already have these!
TOTAL				244,600	If all materials are purchased from the store

A PROFITABLE EXAMPLE

This table shows the costs and income made in the first year for one farmer (inside the 2ha plot) in Tanna sending his produce to Port Vila to sell.

The year is divided up into four quarters – you will need to buy things at different times throughout the year.

COSTS	First quarter	Second quarter	Third quarter	Fourth quarter	Total (Vt)
Peanut Seedlings			1000		1000
Kumala Stems	800				800
Transport		6000		6000	12000
Shipping		6000		6000	12000
Association membership fee			3000		3000
Monthly communications cost	500	500	500	500	2000
Share of fence	9000				9000
Share of trees	2080				2080
Total Cost	12380	12500	4500	12500	41880
INCOME					
Kumala		22350			22350
Peanuts (5 bag)				50000	50000
Total Income	0	22350	0	50000	72350
PROFIT	-12380	9850	-4500	37500	30470

SUMMARY

An agroforestry garden is an economical, practical way to improve land that has been infested by Big Leaf Rope.

Using fast growing food crops and trees together in the one place is an effective way to shade out Big Leaf Rope in a localised context. The method can be carried out by individuals or communities, and requires few resources or equipment.

Clearing Big Leaf Rope land will offer rich soil to support a healthy garden. Growing trees will provide an additional source of income in the future, as well as supporting the natural environment. From your garden you will have a variety of productive crops to help feed your family. On top of this, you will find opportunities to make profit from your crops, and in the future from your trees.

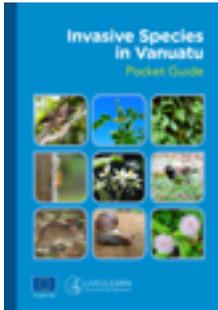
We do not suggest that this model will be able to eradicate Big Leaf Rope in Vanuatu. But we do believe that it is an innovative method of reclaiming land. In using this method, we believe communities will see benefits in their environment, their food sources and their finances.

Together we can work to overcome this invasive vine... one garden at a time!



SUPPORT MATERIAL

Live & Learn Vanuatu (2016) Invasive Species in Vanuatu, Media Guide. Accessed online at <http://www.livelearn.org/sites/default/files/docs/Invasive-species-vanuatu-mediaguide.pdf>



Live & Learn Vanuatu (2016) Invasive Species in Vanuatu, Pocket Guide. Accessed online at <http://www.livelearn.org/sites/default/files/docs/Invasive-species-vanuatu-pocketguide.pdf>

Live & Learn Vanuatu (2016) Invasive Species in Vanuatu, Community Flipchart. Accessed online at <http://www.livelearn.org/sites/default/files/docs/Invasive-species-vanuatu-flipchart.pdf>



Live & Learn Vanuatu (2016). DVD, Invasive Species in Vanuatu. Accessed online at <https://www.youtube.com/watch?v=3va7m8BNhzA>

Live & Learn Vanuatu (2016). DVD, Control Methods for Big Leaf Rope. Accessed online at <http://www.livelearn.org/live-learn-multimedia>



EXTRA RESEARCH

'Breakthrough in controlling an Invasive Vine in the Pacific,' Forrest and Bird New Zealand. Accessed September 2016 at <http://www.forestandbird.org.nz/what-we-do/news/break-through-in-controlling-invasive-vine-in-the-pacific>

'Merremia Peltata Profile', Global Invasive Species Database, Accessed September 2016 at <http://www.iucngisd.org/gisd/species.php?sc=163>

'Kilim Big Lif; a film about control methods used in Vatthe Conservation Area, using injection with herbicides'. Forest & Bird New Zealand

Kirkham, S.(2004) Situating the Merremia Peltata Invasion in Samoa, The Geographical Review 94 (2): 218-228 Accessed September 2016 at <https://www.questia.com/library/journal/1G1-135164204/situating-the-merremia-peltata-invasion-in-samoa>

Neil PE, (1982d) Application techniques when using herbicides for Merremia. Forest Research Note, Forestry Division, Solomon Islands, No. 2/82:8 pp.

Neil PE, (1982e) Herbicides and Merremia species control. Forest Research Note, Forestry Division, Solomon Islands, No. 1/82:8 pp.

GLOSSARY OF SCIENTIFIC TERMS**NOTES**

Big Leaf Rope:	<i>Merremia peltata</i>
Indian Mynah Bird :	<i>Acridotheres tristis</i>
Giant African Snail:	<i>Achatina fulica</i>
Mahogany:	<i>Swietenia macrophylla</i>
Namamau:	<i>Flueggia flexuosa</i>
Nangai:	<i>Canarium indicum</i>
Natapoa:	<i>Terminalia catappa</i>
Navel:	<i>Barringtonia</i> spp.
Pico:	<i>Solanum torvum</i>
Poison Fish Tree:	<i>Barringtonia asiatica</i>
Whitewood:	<i>Endospermum medullosum</i>

Who can help:

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Tel: 33550 / 22525

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