UTILISING & GROWING FLAX ON LIFESTYLE BLOCKS AND MARGINAL LAND IN THE TARARUA DISTRICT
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Introduction

Flax has been a distinctive part of the New Zealand landscape since pre Māori times. When Māori first came to New Zealand, they brought with them the paper mulberry plant from which they made bark cloth for clothing. The paper mulberry did not flourish and a substitute material was found in the native flax (DoC).

Harakeke was the name given to this plant by Māori. The first European traders called it ‘flax’ because its fibres were similar to that of true flax found in other parts of the world. Though we still call it flax today, harakeke is really a lily. It is unique to New Zealand and is one of our oldest plant species.

Throughout this booklet when we refer to ‘flax’ we are meaning New Zealand flax or harakeke.
As Captain Cook wrote: “Of the leaves of these plants, with very little preparation, they (the Māori) make all their common apparel; and of these, they make also their strings, lines and cordage…”

Flax was the most important fibre plant to Māori in New Zealand. Each pa or marae typically had a flax/harakeke plantation. Different varieties were specially grown for their strength, softness, colour and fibre content.

The uses of the flax fibre were numerous and varied. Clothing, mats, plates, baskets, ropes, bird snares, lashings, fishing lines, traps and nets were all made from flax leaves. Floats or rafts were made out of bundles of dried flower stalks. The abundant nectar from flax flowers was used to sweeten food and beverages.

Flax also had many medicinal uses. The sticky sap or gum that flax produces was applied to boils and wounds and used for toothache. Flax leaves were used in binding broken bones and matted leaves were used as dressings. Flax root juice was routinely applied to wounds as a disinfectant.

When harvesting the flax, leaves were cut near the base of the plant using a sharp mussel shell or specially shaped rocks, more often than not greenstone (jade, or pounamu). The green fleshy substance of the leaf was stripped off, again using a mussel shell, right through to the fibre which went through several processes of washing, bleaching, fixing, softening, dyeing and drying.
By the early 19th century, the quality of rope materials made from New Zealand flax was known internationally – the Royal Navy was one of the largest customers. A burgeoning flax industry developed with the fibres being used for rope and twine. Later the flax was used for matting, carpet underfelt, and wool packs. Initially wild strands of flax were harvested but plantations were established with three in existence by 1851. By 1870, there were 161 flax mills nationwide, with 1,766 workers. Most mills were sited near a flax swamp and employed between 20 and 50 ‘flaxies’. Groups of Māori often worked on contract cutting flax. The main flax-milling region was Manawatū, where the largest mills were built after 1890. There were also mills in Northland, Waikato, the Bay of Plenty, Wairarapa, Marlborough, Canterbury, Otago, Southland and on the West Coast.

There was an active industry harvesting and processing flax until the depression of the 1930s. Up to this point, flax fibre was used commercially in the manufacture of rope, twine and upholstery filling. However, from this period on, the industry went into decline. Factors contributing to this included a disease which hit the flax swamps of the Manawatū; demand for flax products diminished in the face of competition from other natural fibres; and government protection being removed in the 1970s. The last flax mill finally closed in 1985.
In the 2000s, the trend towards the use of natural products manufactured from renewable resources has given renewed interest in the use of flax.

In 2003, the Ministry for Primary Industries’ Sustainable Farming Fund began an overview project to bring together research on the environmental and commercial benefits of flax and promote wider use of this natural resource. A plant with a rich history, New Zealand flax clearly has a promising future.
Liz McGruddy, Project Manager of the Ministry for Primary Industries’ Sustainable Farming Fund’s Flax Project wrote in a 2006 issue of Rural Delivery:

“In recent years there has been resurgence in interest in flax, and there is the potential for flax to come back again as an industry. Work is underway in a number of institutions, exploring a range of applications.

“Most of this work is still in the early stages. Further down the track, investments in continued product/market development will in part depend on having confidence in the development of supply lines. Many landowners are attracted by the prospect of growing flax for commercial return but they need to know the markets are there...”

For the full report on Ministry for Primary Industries’ Sustainable Farming Fund’s Flax Project see: www.nzpcn.org.nz/publications/Harakeke-Report06.pdf

Or, contact the project manager, Liz McGruddy, at: nzflax@wise.net.nz

To find out more about Ministry for Primary Industries’ Sustainable Farming Fund see: www.mpi.govt.nz/funding-and-programmes/farming/sustainable-farming-fund/
Main uses of the flax plant

There are three main components of the flax plant that have both traditional and potential commercial uses.

**Fibre**

Flax varieties span the spectrum from the fineness of linen to the coarseness of sisal. The industry of last century positioned flax as a coarse fibre, suited to low-end markets. Applications development now underway is looking less to traditional or industrial applications, and more to new uses – development of bio composite prototypes and product concepts, led by the Biopolymer Network (Scion, Plant and Food Research and AgResearch); development of sustainable earth/fibre housing, led by the University of Auckland; and the creation of muka (flax fibre) fabric, led by Rangi Te Kanawa.

**Gel**

Flax gel – pia harakeke – is a sugary exudate found at the base of the leaves. Living Nature incorporates flax gel in their product range; and Callaghan Innovation have undertaken work supporting expanded application in the cosmetic market.

**Seed**

Harakeke seed oil is rich in linoleic acid/omega 6 (as distinct from linen flax seed oil which is rich in linolenic acid/omega 3). The seeds contain around 30% oil.
Current and potential markets for flax

No one is currently growing flax for fibre commercially in New Zealand.

Peter Brorens, a textile scientist with AgResearch, notes that, as far as he is aware, no one is growing harakeke and selling leaf or fibre as a commercial operation and there is currently only a small and disperse niche market for the material. For example, Snowberry grows harakeke for the oil from its seeds for use in some of its skin care products.

Most users of flax source their requirements themselves and extraction methods are by hand – there is no commercial fibre extraction equipment in New Zealand. Although The Templeton Mill in Riverton does some mechanical extraction and offers fibre for sale. Also museums in Foxton and Riverton run demonstration stripper mills.

As noted by Liz McGruddy, the potential markets for the growers of flax are many and varied, but there is still work to be done on creating marketing networks and cooperatives between growers and manufacturers.

There is opportunity here for grower initiative in coordinating such networks.

“The essence of the Ministry for Primary Industries’ Sustainable Farming Fund Flax project is to link the supply/demand sides in the early stages of what could be a new industry. Strengthening the reasons for on-farm plantings, which may be established principally for environmental/farming reasons, but which may equally serve to build a resource that can be harvested for applications being developed.” – Liz McGruddy
There are a growing number of manufacturing and craft operations using flax and flax extracts within New Zealand. As noted, most of these users source their own flax supplies from the local environment. However, growers can contact these users themselves to discuss possible supply of flax.

We have sourced a number of flax operations and listed these below. The list of associated contacts is not exhaustive and is provided as a starting point only for further investigation by individual growers.

**Paper**

Since colonial times the fibre from flax has been used in paper making. Today high-quality flax paper is finding renewed use in the art, craft and florist industries.

One company manufacturing paper and paper products from New Zealand flax is Pakohe Papers Ltd:

www.pakohe.co.nz
Textile and weaving

From its vital role in traditional Māori culture, flax weaving is now an integral part of the cultural identity of New Zealand. Individual weavers and commercial companies often source their flax from the local environment.

We have included two (of the many) weaving sites for further information below:

www.alibrown.co.nz
www.wildsandsweaving.co.nz

Industrial researcher and textile conservator Rangi Te Kanawa has been researching ways of softening flax fibre so when woven it can be made fine enough for fashion clothing.

Her work has been taken up by a new New Zealand company, Muka Ltd, which is reported to be developing a mechanical stripping device to enable it to start production of such a flax fibre for a sustainable muka textile industry.

Skin care

The soothing gel from the base of New Zealand flax leaves and the oil from its seeds is used in skin care and cosmetics products.

Two New Zealand companies working in the skin care field are Living Nature and Snowberry. More information on their use of gel and oil can be found here

www.livingnature.com
www.snowberrybeauty.com
Medicinal and nutritional

For centuries, Māori have used nectar from the flowers of flax for medicinal purposes and as a general sweetener. Boiled and crushed harakeke roots were applied externally as a poultice for boils, tumours and abscesses, as well as to varicose ulcers. Juice from pounded roots was used as a disinfectant, and taken internally to relieve constipation or expel worms. The pulp of pounded leaves was applied as dressings to bullet, bayonet or other wounds. The gum-like sap produced by harakeke contains enzymes that give it blood clotting and antiseptic qualities to help healing processes. It is a mild anaesthetic, and Māori traditionally applied the sap to boils and various wounds, to aching teeth, to rheumatic and associated pains, ringworm and various skin irritations, and scalds and burns. (Wikipedia)

Scope remains to develop the medicinal and nutritional properties of the flax plant in the current environment of natural remedies along with its use in the pharmaceutical industry.

One company currently working in the medicinal/nutritional area is Phytomed, who use flax root extracts in laxatives and in applications for digestive conditions. Find out more here:

www.phytomed.co.nz

Both Lincoln University (medicinal, nutritional, cosmetic and environmental uses) and Victoria University (anti-fungal uses) have undertaken various research projects into flax – including its medicinal and nutritional properties:

www.victoria.ac.nz/scps/about/news/2012-news#a118123
researcharchive.lincoln.ac.nz/handle/10182/5815
New Zealand flax seed oil

Most ‘flax seed’ oil sold in New Zealand supermarkets is made from the European linen flax – linseed – not New Zealand flax – harakeke.

Bio Oils is New Zealand’s largest producer of cold-pressed flax seed oil and flax seed meal. The oil is pressed from linseed, not harakeke.

For more information regarding their products contact them via their website:

www.bio-oils.co.nz

The oil from New Zealand flax – harakeke – seed contains linoleic acid, vital for human nutrition.

Other companies using flax extracts include:

www.waihibush.co.nz
www.maorifood.com

Manufacturing uses

In the 2000s, scientists began to explore different uses for flax. The Biopolymer Network began investigating ways to improve the strength and performance of flax fibre by combining it with other natural fibres such as hemp and wood, and synthetics such as glass fibre.

Results have been encouraging, and the material also looks attractive. Future uses include building materials, furniture and packaging.

More on Scion here:

www.scionresearch.com

For other manufacturing initiatives see:

www.biopolymernetwork.com/content/Harakeke-Fibre/43.aspx
Agricultural uses

It has been established that the green fraction stripped out during flax fibre production is a reasonable feed for ruminants. Commercial production of such a feed is still to be developed and there is no evidence to suggest that flax is effective against worm problems in cattle.

For other information regarding flax research and development in the agricultural field contact:

peter.brorens@agresearch.co.nz
Flax is proving its worth as a land management tool.

Its use as a shelterbelt and as a nurse crop for two tier indigenous forestry is well established. So too is its use as a stream and riverbank enhancement and as erosion protection on coast and hill environments.

Flax planted along waterways can absorb nitrogen and potassium thereby reducing problems caused by liquid waste runoff from agriculture - while not as effective perhaps as pasture or maize in this area, it does perform on a par with coppiced willow or poplar trees. Flax also has the advantage of living much longer than these trees.

For other information regarding flax research and development in the land management field contact:

peter.brorens@agresearch.co.nz
Two species of New Zealand flax are commonly distinguished: *Phormium tenax* (lowland or swamp flax) and *Phormium cookianum* (coastal or mountain flax) with perhaps hundreds of varieties and hybrid forms between.

*P. tenax* (harakeke) is the larger plant, growing on deeper soils alongside streams, around wetland edges, and extending into lowland hills.

*P. cookianum* (wharariki) is the smaller plant, growing on coastal and inland cliffs, and sub-alpine zones.
Growing flax

There are many small flax holdings in New Zealand.

As a commercial crop, New Zealand flax-harakeke has none of the risks and costs associated with new introductions. It has broad environmental tolerance, grows from one end of New Zealand to the other, is easy to propagate, is cheap to establish and can be harvested five years from planting.

It is compatible with existing farming systems and is attractive to lifestyle block owners and farmers for the potential dual environmental benefits and economic returns.

While few are currently farming flax commercially, there have been some significant plantings for other purposes.

For example, around the margin of Lake Horowhenua, near Levin, local iwi have planted some 150,000 plants. A dairy farmer at Taupo planted 4,000 flax for establishing shelterbelts on his farm because it can co-exist with a pivot irrigator.

Iwi groups are also re-establishing pa harakeke plantations of traditional weaving cultivars for use in weaving and craft activities.
From seedling stock – many nurseries now have a flourishing supply of such stock and have a great depth of experience – plantings with two to three metre spacing allow for optimum leaf growth and ease of management and harvest. Selective harvesting is done by hand. Selection of varieties for particular sites is important.

Wild Sands Weaving notes that when it comes to planting flax for their own use, they simply take root divisions from an existing local plant – fairly easy to do, and it doesn’t damage the source plant.
Grower guidelines

Variatetal selection

For environmental plantings, particularly in more rigorous (cold, frosty, exposed) environments, local varieties will be best adapted for local conditions.

For commercial plantings, indications are that fine-fibre varieties will be of most interest in the future (including P. tenax/P. cookianum hybrids).

Propagation

Flax is easy to propagate on a small scale – by seed or by fan division. Most environmental/farm plantings are seedling stock sourced from the nursery trade, grown on for 2-3 years.

Planting

On a small scale, seedlings or fans can be planted into well-prepared holes. On a larger scale after a pre-plant spot spray, a two-person team can efficiently open a planting slit, for insertion and firming of the plant.
Spacing

In riparian plantings, closer spacings (1.5m) help to create interlocking root systems. In block or commercial plantings, more generous spacings (2-3m) facilitate optimum leaf growth, and ease of management and harvest.

Maintenance

Plants should be protected from stock in the first two years; and released from weeds in the spring/autumn/spring following planting. On weedy sites (eg. riparian plantings) flax is tolerant to spray-over by the triclopyr range of chemicals (Grazon™ etc) commonly used for blackberry and gorse control. In blocks or plantations inter-row mowing, or light grazing with sheep, can be used to control grass growth.

Health and Disease

Selection of fertile, free-draining sites supports healthy growth. Floods help reduce insect pest populations. Harakeke benefits from regular grooming, harvesting mature leaves, and clearing dead and decaying material from the base of the bush.

Harvest

For fibre and gel, only mature leaves should be harvested, leaving the central three young leaves in the heart of the fan. Harakeke seed ripens in autumn, and can be harvested when pods are dry.
What can Tararua District Council offer potential flax-harakeke growers?

**Tararua Flax Network Development**

Tararua District Council is interested in supporting and developing landowner networks around the GO! Project flax crop option. A network is a vehicle to link landowners to key information and knowledge and creates a central point of contact for other organisations or businesses interested in forming partnerships with the Tararua flax growers. The network would be landowner driven and supported by Tararua District Council.

If you are interested in the network concept, please contact: info@tararuadc.govt.nz
The GO! Project

The GO! Project is a Tararua District Council initiative that has identified several crop options that are highly suitable for the Tararua District. The aim of the project is to provide meaningful information for people wanting to diversify their cropping and broaden their potential revenue base.

The information is intended for smallholders, lifestyle block owners and farmers looking for alternatives to traditional crop options, offering the Tararua District community increased opportunities for job creation, biodiversity, sustainable farming systems and increased family business incomes.

An in-depth study was carried out in the Tararua District on land use; documenting soil, climate, and topographic information. The aim of the study was to discover how best to use land in our district, particularly areas which are under utilised.
Thirty-seven highly detailed maps have been produced showing district-wide annual rainfall, crop options and optimal planting areas for high-yield, high-return crops, which would work for the Tararua District. These include, among others, truffles, hazelnuts, saffron, feijoa, manuka and flax – harakeke. The initial study has been followed by market research focusing on mixed market, returns per hectare and mixed farming capability.

The GO! Project initiative has travelled outside the district to events such as Mystery Creek and Central District Field Days. The GO! Project is something that gives all landowners, whether they have a couple of hectare or a few hundred hectare, an opportunity to consider diversification on either a small scale or large basis.

A copy of the ‘Alternative Crops Suitable for Tararua District’ report that kicked off the GO! Project is available on the Tararua District Council website:

www.tararuadc.govt.nz

If you are interested in growing and harvesting flax on your property, please contact the Economic Development Team at:

info@tararuadc.govt.nz

They can link you to the required expertise and networks when it comes growing and marketing flax – harakeke.
01 Review links and information

02 Contact Tararua District Council and any relevant commercial outlets

03 Prepare site and plant

04 Reap the benefits – oil, gel, weaving, land management
Tararua District Council would like to acknowledge the input of the ‘Integrating New Zealand Flax into Land Management Systems’, a Ministry for Primary Industries’ Sustainable Farming Fund Project report compiled by Elizabeth (Liz) McGruddy. We obtained much of the information in this booklet from this report, including the Grower Guidelines outlined on pages 19 and 20.

Ministry for Primary Industries’ Sustainable Farming Fund Flax Project Report available here:

To find out more about Ministry for Primary Industries’ Sustainable Farming Fund see:

We have also gleaned from Nancy Swarbrick’s article Flax and Flax Working, in Te Ara, The Encyclopedia of NZ

Other sources we have appreciated proofing, editing and/or information input from, include:

- Living Nature  www.livingnature.com
- Pakohe Papers Ltd  www.pakohe.co.nz
- Wild Sands Weaving  www.wildsandsweaving.co.nz
- Phytomed  www.phytomed.co.nz
- Bio Oils NZ  www.bio-oils.co.nz
- Biopolymer Network  www.biopolymernetwork.com/content/Harakeke-Fibre/43.aspx
- Scion  www.scionresearch.com
- AgResearch  peter.brorens@agresearch.co.nz
- Functional Wholefoods  www.functionalwholefoods.co.nz

These websites, along with others have all been listed throughout the booklet.