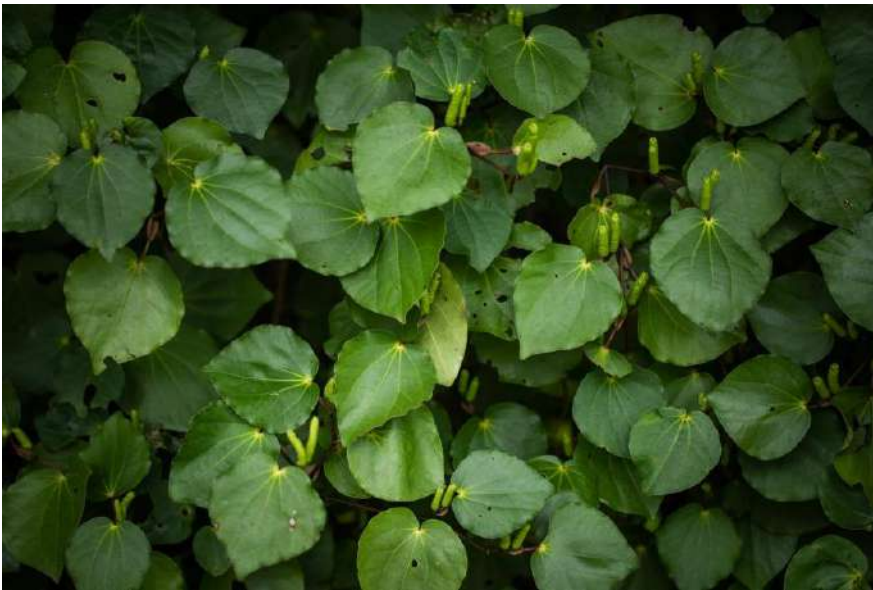




Independent
Agriculture
& Horticulture
Consultant
Network

Medicinal Herbal Research Report prepared for the Rua Taranaki Medicinal Herbal Cluster

Lauren McEldowney
October 2023



RUA TARANAKI HERBAL MEDICINAL CLUSTER

September 2023

ABSTRACT

Indigenous Herbal Research to identify high value herbal medicine plants, suitable to grow in Taranaki; are in demand; and have value-add potential.

Rautāpatu Limited

www.rautapatu.nz

To: Agfirst Taranaki Ltd
From: Rautāpatu Ltd
Rua Taranaki Herbal Medicinal Cluster Research Report
Due: 29 September 2023

Tēnā koe Lauren,

Attached you will find 12 Indigenous Herb Fact Sheets based on the list below:

	List of Aotearoa Native Plants	Scientific name
1.	Kānuka	Kunzea ericoides
2.	Pūhā	Sonchus
3.	Horopito	Pseudowintera colorata
4.	Kawakawa	Piper excelsum
5.	Koromiko	Hebe salicifolia
6.	Paewhenua (Dock leaves)	Rumex obtusifolius
7.	Harakeke	Phormium tenax
8.	Karamuramu or karamu	Coprosma
9.	Pātete	Schefflera digitata
10.	Poro Poro	Solanum aviculare
11.	Matipo	Myrsine australis
12.	Tarata	Pittosporum eugenioides

Research Methodology

We undertook a desktop research process, using existing data (secondary research) to draw together the required information for the Fact Sheets. We used a wide variety of sources and also engaged with Tōhunga to form the list we based the searches on.

To create conformity/consistency, we searched the following subheadings:

1. Māori name
2. Western Scientific name
3. Family (species) name & Common name(s)
4. Features
5. Flowering/Fruiting period
6. Propagation methods
7. Traditional uses by Māori
8. Pharmacological actions
9. Extraction Methods
10. Habitat and Distribution
11. Existing products on the market
12. Value chain and market opportunities

For more information: Contact Glen Skipper, glen@rautapatu.nz

NOTE: We note the IP sits with Rautāpatu Ltd, and ask that members use the Fact Sheets only in the manner they were developed for the purpose of the Rua Taranaki Herbal Medicinal Cluster project .

Māori name: Harakeke

Scientific name: Phormium tenax



Harakeke fact sheet

Family:

Hemerocallidaceae

Common name:

flax, New Zealand flax,
swamp flax

Traditional use by Māori:

Parts used: leaves, sap, roots, seeds.

Medicine and food

Its flowers produced a sweet drink that tasted like nectar. A poultice made from the roots could be used to treat skin infections, and a juice could be produced with disinfectant and laxative properties. Leaves at the base of the leaves contain gum that reduces pain and heals wounds, particularly burns. Bones could be secured with leaves themselves and used as bandages.

Weaving

Similarly, to other parts of Polynesia, women used flax leaves to make baskets, containers, and mats. A sharp shell was used to scrape off the green flesh from the leaves to obtain the strong fibre (muka). Muka is pounded until it becomes soft, then washed and sometimes dyed. It was used to make a variety of items, such as fishing nets, traps, footwear, cords, and ropes.

Features:

Among New Zealand's native plants, harakeke is one of the most distinctive. There are long, upright, often stiff leaves that can reach a length of up to 4 metres on this plant. Its black flower stalks can reach up to 5 metres in height and the dull red, nectar-filled flowers attract many birds, especially korimako and tui.

Propagation:

Harakeke is easy to grow from seed, but it is best to take a fan that has some root material attached so that, when it grows, it will have the same characteristics as the parent bush. Likewise, seedlings mature over a longer period, about 6 to 8 years. The growth time of plants grown from root stock is about half that of plants grown from seed.

Flowering:

(September-) October-
November (-January)

Flower colours:

Red/Pink, Yellow

Fruiting:

(November-)
December (-March)

Distribution:

Native to New Zealand and Norfolk Island. It has been suggested that plants on the Chatham Islands can be distinguished at species rank from those on mainland New Zealand; however, distinct variants are also found on the Three Kings and outer Hauraki Gulf Islands, as well as along the Kaikoura coast. There are subtle differences between Norfolk Island plants and the New Zealand forms of *P. tenax*, despite their uniformity. This variation is being studied further.

Habitat:

This species is found in wetlands, open ground along riversides, and montane forests, primarily in wetlands and coastal regions.

Products currently on the market:

Harakeke and kawakawa soaps

Harakeke massage oils

Harakeke eco cleaning products ie washing powders, dishwashing liquids, liquid hand soaps

Harakeke woven products such as piu piu, pīkau, kete, putiputi, poi, tīpare, whariki (mats) (bouquets, flower arrangements, art pieces, hanging pieces, tukutuku panels.

Harakeke moisturiser, facial creams, anti-aging creams, toner, night creams, body washes, shampoo, and conditioner bars.

Rongoā healing balms and salves.

Rope

Muka ties for pēpi

Flax seeds, flour, flakes, powders for nutritional intake

Possible pharmacological actions:

Harakeke is famous for its clear polysaccharide gel exudate that forms on the surface of leaves at the base of the plant. As a result of its mild astringency, this gel is effective in preventing breakouts due to its ability to control oil overproduction. In addition to soothing, hydrating, and cooling, it also reduces puffiness and redness to inflamed areas similar to the gel of the aloe vera plant.

Extraction methods:

(i) *Maceration*

(ii) *Infusion*

(iii) *Digestion*

(iv) *Decoction*

(v) *Percolation*

Value chain and market opportunities:

Flax seed nutritional powders, seeds, and supplements

Harakeke textiles items

Rongoā balms oils, salves, and supplements

Eco friendly household cleaners

Harakeke beauty products

Harakeke rope and string Piu Piu and cultural garments

Harakeke mats

Harakeke soaps, beauty products and hair products

Harakeke first aid sprays and oils

Harakeke food additives ie herbs, dried tea

Māori Name: Horopito

Scientific Name: *Pseudowintera colorata*



Horopito fact sheet

Family: Winteraceae

Common name:
red horopito, mountain
horopito, alpine
peppertree

Distribution:

Endemic. North, South and Stewart Islands, This plant can be located throughout the Taranaki region.

Habitat:

Coastal, lowland,

Flowering:

November-March

Flower colours:

Yellow

Fruiting:

December-June

Traditional use by Māori:

Parts used: Leaves, fruits.

Horopito leaves were traditionally used by Māori people in New Zealand to treat stomach pain and diarrhoea. This may be due to their astringent and antiseptic properties. In ancient times, bruised leaves were steeped in water or chewed before being applied to skin complaints. Topically and internally, Horopito's peppery constituents stimulate circulation.

Candida albicans and ringworm are among the fungal infections treated with this product, as well as wounds, cuts, burns, and painful bruises. Leaf chewing was also used to treat toothaches. Horopito was used internally to treat diarrhoea, stomach aches, and poor circulation.

Propagation:

It grows in both sun and semi-shade, but it produces the best foliage colour in the open. The first year of the plant's life is frost tender, so it is advisable to keep it sheltered. The plants can be propagated by semi-hardwood cuttings or seeds. Organic matter and free-draining soil are essential.

Features:

An evergreen shrub with peppery leaves blotched red above and white underneath.



KĀNUKA FACT SHEET

Māori name: Kānuka **Scientific name:** *Kunzea ericoides*



Family

Myrtaceae

Common name

White tea-tree

Features: Bark is flaky. The branches often hang down at the ends, displaying needle-like bright green leaves and clusters of small white flowers. A few very small erect hairs appear on branchlets (20x magnification). The leaves are small, soft and can be grasped with ease. Clusters of white flowers with a red center, borne in 'corymbiform' clusters. The fruit is a small, dry capsule measuring 1.9-3.4 mm by 1.8-3.9 mm.

Traditional uses by Māori:

Part used: Leaves, flowers, twigs, bark.
Tea-trees are named after the early bushmen who brewed a drink like tea using Mānuka and Kānuka leaves.

The Māori and the early settlers chewed young shoots or drank a drink made from seed capsules for dysentery and diarrhoea (Best 1906, 1907). Boiling the bark yielded a liquid that was used to treat constipation, promote sleep, reduce fever, bathe sore eyes, treat colic, inflamed breasts, treat scalds and burns, and treat constipation.

As well as treating scalds and burns, adults and children used the white gum to relieve coughing. Bees prefer Kānuka flowers for their nectar because of their strong taste and antibacterial properties.

It has been shown that Kānuka has antimicrobial activity against Herpes simplex and possibly other viral infections (M. Stevens, Hicks Bay, 1941) There has also been evidence of activity against multiple fungi, including those responsible for athletes' foot and candida (thrush). Several herbal practitioners and patients have successfully treated such infections with topical preparations containing Kānuka.

Flowering

October-February

Flower colours

White

Fruiting

November-March

Life cycle

Seeds are dispersed by wind and possibly water (Thorsen et al., 2009).

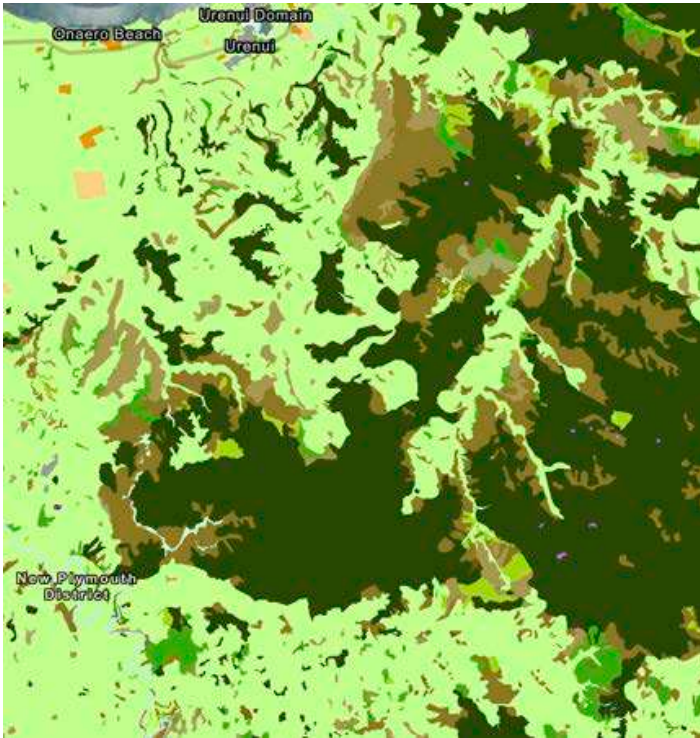
Possible pharmacological actions:

- Antibacterial – volatile oil
- Antifungal – volatile oil
- Antiviral (acyl-phloroglucinol derivatives, in vitro)
- Astringent + haemostatic
- Spasmolytic – volatile oil
- Anti-inflammatory
- Febrifuge
- Diuretic

Propagation:

Fresh seed is very easy to grow. Viability can drop if seed is allowed to dry out after being left for a few weeks before sowing. Cuttings are difficult, but soft wood water shoots produce the best.





Legend- The light brown areas surrounding Indigenous Forest land (dark green) are the clusters of Kānuka and Mānuka.

Distribution:

Endemic throughout the North Island and the northern South Island only. Most common in Northwest Nelson. Currently Kānuka and Mānuka are rare in urban areas which could be a great opportunity for our whānau to start propagating and regenerating this native rākau. Small pockets of Kānuka can be found in and around urban areas but the largest distribution of Kānuka is located around the outskirts of Mounga Taranaki and in and around Indigenous forests of Ngāti Maru, Ngāti Mutunga and Ngāti Tama (see example of arc gis map above.)

Habitat:

Coastal to lowland shrubland, regenerating forest and forest margins, also present in montane forest, ultramafic shrubland and very occasionally present in subalpine shrubland.

Products that already exist on the market:

- Kānuka Honey
- Foot and heal balm
- Anti-aging creams
- Kānuka essential oils for inhalation and medicinal remedies
- Kānuka hand cream
- Kānuka culinary smoke additive for meats and cheeses
- Kānuka and bathroom cleaner
- Kānuka hydrosol
- Kānuka paw balm for dogs
- Kānuka hand sanitiser
- Kānuka agricultural insect repellent
- Kānuka smoked cheese

Extraction methods:

- (i) *Maceration*
- (ii) *Infusion*
- (iii) *Digestion*
- (iv) *Decoction*
- (v) *Percolation*

Value chain and market opportunities:

Soap, cold sore treatments (Al-Waili, 2004), pure essential oils, dental pain treatments, hand soaps, bodywashes, eco laundry powders, medicinal ointments/creams for athletes' foot, medicinal remedies for boils, cuts, scolds and infections, household biodegradable eco cleaners. Cough and cold chest rubs/ elixirs, treatment for candida, herbal teas, dried herbs, eco infectant and honey, herbal rubs and dried herbs for food additive. Agricultural insect repellent (Lee et al., 2004). Skin care treatments, the wood can be used for carving/whakairo.

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Possible pharmacological actions:

Anti-fungal – an agent that inhibits or destroys fungi.

Antiseptic – an agent used to prevent, resist and counteract infection. Counterirritant/rubefacient an agent that increases the circulation to that area of skin, stimulating the dilation of capillaries, causing redness.

Astringent – an agent that contracts tissues, making them firmer and reduces discharges.

Insecticidal

Circulatory stimulant (internal use)

Stimulating expectorant (internal use) – supports the body in the removal of excess amounts of mucus.

Value chain and market opportunities:

Horopito meat rubs

Horopito herbs for food additive (in place of chilli)

Horopito salves, creams, lotions for pain relief, wounds, cuts, burns and painful bruises

Horopito worm treatment

Horopito candida treatment

Horopito drops for stomach complaints.

Remedies for respiratory conditions

Toothache drops.

Cheeses and food products

Products that currently exist on the market:

Horopito dried herbs for cooking

Horopito seasonings

Horopito tea

Horopito extract for ringworm treatment.

Horopito tincture

Horopito spiced vodka

Countdown macro chicken lightly herbed with horopito

Horopito and kawakawa chocolate

Horopito and beef ragu

Horopito candida and wellbeing supplements

Horopito pepper

Horopito Havarti cheese

Horopito and feijoa chutney

Extraction methods:

(i) *Maceration.*

(ii) *Infusion.*

(iii) *Digestion*

(iv) *Decoction*

(v) *Percolation*

Māori name: Kāramu

Scientific name: Coprosma robusta



Kāramuramu fact sheet

Family: Rubiaceae

Common names: karamū, glossy karamū

Traditional use by Māori:

Parts used: leaves, berries, bark

Food

There have been several reports of berries being eaten (Taylor 1870; Colenso 1868a , 1868b , 1880).

Karamū leaves are used as a substitute for china tea (Armstrong, in Aston, 1923a).

It is common to place leaves on the stones in a hangi preceding the small kamara in order to preserve and color them. Using this material, "kao" is made and dried in the sun. (P. Smith 1940).

The leaves are used to line the hangi. The combination of kawakawa and korokio gave the karaka kernels an appreciated flavor (Best 1942).

Fibre

Tū-hou, maro-tūhou, maro-taua; a sea of karamuramu leaves, or other shrub leaves. A religious garment worn by priests during various ceremonies (Best 1898).

Dyes

The colour is described as "curious old gold" (Hamilton 1899).

As a dye source in Aston 1918a, 1918d, Coprosma species were used.

Medicinal

In vapour baths, leaves are used (Taylor 1848 and 1870).

Young shoots were boiled, and the liquid consumed for bladder inflammation or stoppage (Poverty Bay Federation of Women's Institutes Cookery Calendar; mid-1930s?).

Remove the outer bark of the karamū. In a mug, place the inner bark. Fill the container with water. After boiling for about 15 minutes, remove from the heat. This medication is used to treat stomach aches or to stop vomiting. Adults should take half a teacupful, while babies should take a teaspoonful. (P. Smith 1940)

Several of the leaves were boiled and drunk for kidney problems by North Auckland Māori (Adams 1945).

Infusion of bark is drunk and bathed in as a remedy for kohe or tarai (consumption). It consists of fresh kelp that is sewn together (Mrs Te Au to Beattie, MS E582/E/11, Hocken).

An overview of related pharmacology is provided by Brooker, Cambie, and Cooper in 1987. In the literature, Brooker et al state that decoctions of the leaves were used as febrifuges. Colenso 1844 is given as a reference, but I was unable to find any record of this use.

Features:

Bushy shrub with glossy leaves with a dark-tipped flap between the leaf bases on the stem. The leaves are 7-12 cm long, with a prominent ridge running along the bottom and a furrow running along the top. The fruits are red and clustered tightly along the branches.

Pharmacological actions:

A significant number of natural products have been identified in that have been shown to modulate glucose metabolism, potentially contributing to the anti-diabetic effect of these rongoā

Products currently on the market:

Karamu massage oil
Karamu tea
Karamu de stress oral drops (contains a variety of other rongoā rākau) sold in pharmacies.

Value chain and market opportunities:

Diabetic aid (oral drops, supplements, tonics, kombucha)
Natural dye for textiles and harakeke garments
Dried herbal teas for health and vitality
Food flavouring additives
Tinctures for inhalation for cold and flu relief
Stomach and dysentery aid

Distribution:

An endemic species. The North and South Islands. Several naturalized populations occur in Otago and Southland (usually around planting sites) and also on Rekohu and Chatham Islands between Waitangi and Owenga.

Habitat:

In shrublands and open areas within forests, it can be found in coastal, lowland, and lower montane habitats.

Flowering:

(July-) August-September (-November)

Flower colours:

Green, White

Fruiting:

(March-) April-May (-July)

Propagation:

Easy to grow from fresh seed. It is also easy to grow from semi-hardwood cuttings. Growing quickly and tending to become weedy.

Māori Name: Kawakawa

Scientific Name: Piper excelsum



Kawakawa fact sheet

Family:
Piperaceae

Common names:
pepper plant,
Kawakawa

Traditional uses by Māori:

Parts used: Leaves, fruit.

Māori used the leaves of the kawakawa plant to remedy toothaches ([Bell 1890](#)), skin ailments, boils, cuts, bruises, eczema, dermatitis, sunburn, insect bites ([Kerry-Nicholls 1886](#)). It would be drunk as a tea to aid in digestive issues, as a heart tonic and blood purifier (K. [Pickmere 1940](#)) and to relieve rheumatism and arthritis or aches and pains in the body ([Taylor 1870](#)).

Kawakawa is related to the kava plant known and used in ceremony throughout the Pacific.

Features:

It is a small fleshy shrub with jointed dark twigs bearing large dark green glossy heart-shaped leaves and hard green flower spikes which inhabits the south of Banks Peninsula. A leaf up to 120mm wide with veins radiating from the middle, peppery to taste, often with insect holes. The plant bears fruit which is orange in colour when ripe.

Flowering: August - November

Fruiting: Throughout the year

Life cycle: One year to reach maturity

Habitat and distribution:

An endemic species. Grows throughout the North and South Islands. It is common from Te Pahi south to about Okarito, North Canterbury, and the Banks Peninsula. Can be found throughout Taranaki.

From coastal to lowland (up to 500 m a.s.l. in warmer regions). A common understorey species in coastal forests.

Propagation:

Semi-hardwood cuttings and fresh seed can be grown easily. This tree does best in dappled light with soil that drains well but remains permanently moist. Shade-tolerant. The plant is sensitive to cold and cannot tolerate frost.

Extraction methods:

(i) *Maceration*

(ii) *Infusion.*

(iii) *Digestion*

(iv) *Decoction*

(v) *Percolation*

Māori Name: Koromiko

Scientific Name: Hebe salicifolia



Koromiko fact sheet

Family: Plantaginaceae

Common names:

Hebe, Veronica fonkii Phil.,
Veronica salicifolia var.
communis Cockayne, Hebe
salicifolia var.

Other common

Māori names:

Koromiko, Korohiko,
Korokio, Kokomuka

Features:

Bushy shrub bearing pairs of narrow pointed leaves inhabits many parts of both the North and South Islands of New Zealand. The leaves are variable, reaching 132mm in length, tapering gradually to a narrow point, their margin often uneven, and their margins covered in fine hairs (lenses are needed). An extremely small gap exists between the leaves at the base of the leaf bud. A spike of flowers can reach 23 cm in length.

Distribution:

All over the South Island (except Marlborough Sounds and Stewart Island), Auckland Island and Chile. A naturalized citizen of western Europe (Webb 1972). Koromiko can be found throughout Taranaki and grows very well in our climate; however, it is not determined if it is an historic plant that is indigenous to Taranaki or whether it has been transplanted in the region.

Habitat:

It can be found from sea level to close to the treeline, mostly in open areas

Traditional uses by Māori:

Parts used: Leaves and unopened young leaf tips

For stomach-ache, diarrhoea, and vomiting (all ages), Sister Susanne Aubert (1835 - 1926) used Koromiko in Natanata medicine, which contained Koromiko, Pukatea, Rata, Tanekaha.

For sores, lumps, tumours, scrofula, boils, abscesses, septic infections, piles, and babies' chafe, use Hapete ointment Koromiko, Karamu, Pukatea. Poultices made from the leaves can also be applied to ulcers and boils.

Today Koromiko as a cure for diarrhoea and dysentery is still widely used by both Maori and Pakeha. Veronica officinalis or common speedwell used for coughs, bronchitis, catarrh, dysentery, promotes menstruation and as an ointment for skin disease.

FLOWERING:

(October-) December-June (-July)

FLOWER COLOURS:

Violet/Purple, White

FRUITING:

(November-) January- June (-July)

Pharmacological actions

- Astringent
- Bitter
- Styptic
- Tonic

Propagation:

There are many ways to propagate Koromiko, such as division propagation, sowing, and cutting. Division is best done in mid-spring, while later division will delay flowering. For division, choose a plant that is two to three years old. Cuttage propagation often takes place in late spring or summer.

Extraction methods:

- (i) *Maceration.*
- (ii) *Infusion.*
- (iii) *Digestion*
- (iv) *Decoction*
- (v) *Percolation*

Value chain and market opportunities:

Ornamental garden plant propagation
Dysentery/diarrhoea supplements or drops.
Skin lotions, salves, and balms
Burn treatments.
Nappy rash creams
Medicinal salves for sensitive skin types such as children and babies
Venereal disease treatment
Soap
Moisturisers

Products that already exist on the market:

Koromiko salve
Koromiko nappy rash ointment
Koromiko diarrhoea liquid treatment
Koromiko tincture to support women's bladder issues
Koromiko oil for treatment of ulcers and sores, help stimulate appetite and support the bladder and veins.
Koromiko and cucumber moisturiser
Koromiko soap bars
Koromiko toilet drops.
Koromiko sea salt blend for kai
Koromiko dried tea
Koromiko hand cream
Koromiko nutrient dense stock feed

Pharmacological attributes:

A topical balm made from Kawakawa can be used for eczema, boils, bites, stings, and grazes, as well as toothache, digestive and genitourinary symptoms.

Scientists discovered more than 60 compounds, with pellitorine being the most abundant. A numbing effect of this compound could explain its use for pain relief in rongoā Māori.

Pellitorine also has a key role in chemical pathways in the body that reduce inflammation.

In earlier human trials, yangambin, another compound in Kawakawa, has been shown to have potent anti-inflammatory effects.

Dopamine is also present, which does not cross the blood-brain barrier but has health effects on the digestive tract.

Consumption of Kawakawa tea has been shown to soothe upset stomachs and other gastrointestinal complaints in rongoā Māori.

Additionally, dopamine helps people metabolize sugar and regulate insulin response.

In previous clinical trials on human physiological responses to Kawakawa tea consumption, dopamine could have been the mechanism behind insulin levels being reduced.

Value chain and market opportunities:

Kawakawa health supplements

Kawakawa meat products i.e. sausages and meat rubs

Kawakawa pet products

Kawakawa ecofriendly cleaning products

Kawakawa beauty products

Kawakawa health products

Kawakawa Kombucha and health food drinks

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Products already on the market:

- Kawakawa salves
- Kawakawa beauty products such as soaps, serums, antiaging lotions, shampoo bars, massage oils, lip balms, skin treatments,
- Natural insect repellents
- Dried Kawakawa teas
- Kawakawa baby products for nappy rash and mirimiri
- Kawakawa pain remedies
- Kawakawa hydroethanolic extract
- Kawakawa sausages
- Kawakawa Jelly
- Kawakawa savoury rub for meat and lamb
- Kawakawa and fruit smoothie drops.
- Kawakawa pickles
- Kawakawa and kiwifruit verde
- Kawakawa Kombucha
- Kawakawa, manuka and ginger health tonic fizzy drink

Māori name: Matipo

Scientific name: *Myrsine australis*



Matipo/Mapou Fact Sheet

Family:

Primulaceae

Common names:

red mapou, red matipo, mapau, red maple

Traditional uses by Māori:

Parts used: Leaves, branches.

For the relief of toothache and the cleaning of teeth (Collier 1959).

To relieve toothache, the leaves are boiled and then infused in water (H. Honana, 1941).

It is customary to use branches in ceremonies. As an example, baptism (Best 1929, 1942).

It is believed that the Horouta brought a mapau named Ateateahenga to be used in planting ceremonies for kūmara (Turei 1912, Te Rangi Hiroa 1949).

It is believed that that tree was left at Waiapu (Turei 1912, p. 161)

A green branch of māpou that was used as a mauri in kūmara plantations (Makereti 1938)

Traditionally, the bark and leaves of this plant were drunk to cleanse vein walls of plaque and to preserve their integrity.

As a result, it has cardiovascular properties.

An analysis of red matipo leaves revealed that it contains glucorinic acid, which is used for treating arthritis.

Distribution:

An endemic species. Three Kings, North, South and Stewart Islands.

Habitat:

A common tree in coastal and montane forests that is regenerating and mature. It is commonly found on northern offshore islands.

Flowering:

August - January

Flowering colours:

Cream, White

Fruiting:

September - May

Features:

A tall bushy shrub with bright red twigs and yellow-green leaves that are wavy. Leaves range in length from 3 to 6 cm, with an undulating edge. It produces small, clustered flowers. The fruit is almost black in colour.

Propagation:

The fruit should be collected when it is fully ripe (black) and should be planted directly into a firm bed of seed raising mix, pressing well into the soil. Add a light layer of mix on top. It usually takes two to three months for seedlings to appear, depending on the temperature.

Pharmacological actions:

Astringent
Vascular protective
Antimicrobial
Anti-leukaemic
Analgesic

Value chain and market opportunities:

Toothache drops
Arthritis remedies
Tokotoko and cultural wooden ornaments
Matipo tea
Mapou toothpastes
Great hedging plants for gardens
Pain relief balms

Products currently on the market:

Matipo tea
Matipo pain relief balm
Mapou vein cream
Mapou extract
Matipo tincture (contains other ingredients such as Kawakawa, kohekohe, kumarahour etc)
Pain relief balms

Extraction methods:

- (i) *Maceration.*
- (ii) *Infusion.*
- (iii) *Digestion*
- (iv) *Decoction*
- (v) *Percolation*

RAUTĀPATU

Māori name: Paewhenua

Scientific name: Rumex obtusifolius



Paewhenua fact sheet

Family: Polygonaceae

Common names:
bitter dock, broad-leaved dock, bluntleaf dock, dock leaf, dockens or butter dock

Features:

The leaves of this perennial weed are large and broad, and its taproot is thick and strong.

The plant grows up to 1 m tall when it flowers almost year-round. Green to red flowers appear in whorls on erect and leafy stems.

A broad, flat leaf with a heart-shaped base.

They grow to 35 cm in length and 15 cm in width, are hairy underneath, and have long stalks.

The fruit is small, heart-shaped, brown, and has three angled nuts about 2.5 mm long.

Mature plants have stiff and woody stems.

Distribution and Habitat:

They can be found on lawns and fields throughout New Zealand. It is a common weed found around farmyards, in damp arable & pastureland, wasteland and gardens. Since docks are more tolerant of poorly drained soil than many other plant species, they often grow prolifically in low-lying areas of paddocks. When we examined differing dock densities and most soil parameters, we found poor correlation between dock densities and most soil parameters.

Traditional uses by Māori:

Part used: Leaves, inner shoot, roots

Abrasions were treated with sap by children (Best 1906)

On boils, green leaves are used. It is periodically renewed (S. Neil, Opotiki, 1941).

Applied to cracked lips, the inner shoot of dock is moist. As a poultice, the juice from the leaves can be used for abrasions, wounds, cuts, pierced ears, and other ailments (Adams 1945).

A decoction of dock roots that purifies the bloodstream. Varicose veins can be treated with this product (Collier 1959).

Major nutrients:

Vitamin C (70.89%)
Iron (39.88%)
Vitamin A (38.00%)
Magnesium (32.62%)
Manganese (20.17%)

Products that already exist on the market:

Dock seeds for salads and vegetable gardens (Kahikatea farm 2023).

Dock anti-aging creams

Yellow dock root ointment

Dock leaf salve

Possible Pharmaceutical actions:

Among the main chemical components were anthraquinones, flavonoids, tannins, stilbenes, naphthalenes, diterpene alkaloids, terpenes, and lignans, which had a wide range of pharmacological activities, including anti-inflammatory, antioxidant, antibacterial, antitumor, and antidiabetic properties.

Both plants are highly nutritious. As an example, Curled Dock contains a higher amount of vitamin C than oranges and a higher amount of vitamin A than carrots. Additionally, it contains vitamins B1 and B2, as well as iron.

Many nettle plants grow nearby, and their leaves are famed for soothing stings. Additionally, the cooling properties were used to ease insect bites, stings, scalds, blisters, and sprains.

In the past, they were used to staunch bleeding or purify the blood. Bruises can be treated with the juice from the leaves.

Coughs, colds, and bronchitis are treated using the seeds, and skin ailments, boils, rheumatism, constipation, and diarrhoea are treated with the roots.

Value chain and market opportunities:

Skin creams and ointments
Antioxidant rich vitamins and health supplements
Food additive
Treatment for osteoporosis
Burn creams
Treatment for boils and nettle sting
Blister ointment
Antiviral creams
Anaemia antidote
Laxative
Anti-aging cream

Extraction methods:

- (i) *Maceration.*
- (ii) *Infusion.*
- (iii) *Digestion*
- (iv) *Decoction*
- (v) *Percolation*

Propagation:

Dock loves high potassium soil and will out-grow grass; keep potassium levels at optimum or below to stunt its growth.

Dock spreads by seed. Cutting or grazing dock, especially as it begins to flower, can reduce seed viability by up to 90 percent. Cutting a flower stem will encourage the plant to flower again, so it's important to cut or graze it at the right time to control regrowth.

Dock regenerates from a crown in the same way as rhubarb. If you want to dig it out, you need to cut the root below the crown, about 5-10cm deep. If soil is wet, and you leave the cut crown sitting on top of the soil, it may regrow. When it's hot and dry, it will die off.

Māori name: Pātētē

Scientific name: Schefflera digitata



Pātete factsheet

Features:

Small bushy tree with (usually) 7 thin finely toothed leaflets in a fan on a long stalk. Flowers diffuse a cream spray.

Distribution:

An endemic species. It is widespread. North, South and Stewart Islands.

Habitat:

From lowland to montane forest (sea level to 1000 m a.s.l.).

Family:

Araliaceae

Common names:

Pātete, patatē, patē, seven-finger

Traditional use by Māori:

Parts used: leaves, bark, sap, roots.

Pātete sap was used to treat sores caused by or resembling scrofula. Additionally, it was useful for treating cold sores. To treat these skin complaints, the bark and sap of the west side of the tree were mixed with water to form a lotion. The lotion was used in the treatment of athlete's foot. The leaves of rongoā can also be boiled and their extract taken by mouth as a slimming agent. Young children can benefit from the use of pātete root as a teething remedy. The product is applied to the gums of a teething child until blood appears in the mouth. In addition to its use in medicine, Patate has several non-medicinal uses, including the use of the wood for wood-rubbing for fire-starting and the use of the leaf for bird-whistling. Additionally, the berries can be crushed to produce purple dye and writing ink.

Propagation:

Seeds can be directly sown on a firm bed of seed raising mix and lightly covered with the mixture. Over the winter, seedlings may not appear for 3 - 4 months. For the pātete to thrive, it should be prick out into a good potting mix.

Flowering:

February-March

Flower colours:

Cream, Green

Fruiting:

February-March

Possible pharmacological actions:

The leaves contain falcarindiol, which has been shown to have specific antifungal activity against ringworm (Muir, Cole, Walker, 1982). A review of related pharmacology can be found in Brooker, Cambie, and Cooper (1987).

Products currently on the market:

Pātete rongoā balm- for treatment of fungal issues

Extraction methods:

- (i) *Maceration.*
- (ii) *Infusion.*
- (iii) *Digestion*
- (iv) *Decoction*
- (v) *Percolation*

RAUTĀPATU

Value chain and market opportunities:

Antifungal creams

Weight loss supplement

Ring worm aid

Cold sore remedy

Remedy for athletes' foot

Māori name: poroporo

Scientific name: *Solanum aviculare*



Poroporo fact sheet

Family:

Solanaceae

Common names:

poroporo, bullibulli, NZ
nightshade, nightshade

Traditional use by Māori:

Parts used:

In the past, Maori women sought contraception from poroporo shrubs (*Solanum laciniatum* and *S. aviculare*). About a week before menstruation, they boiled leaves and drank the broth. Efficacy of the decoction as a birth control method is unknown. Poroporo shrubs were grown in Taranaki in the late 1970s and early 1980s to produce solasodine, a contraceptive steroid. In New Zealand, poroporo is no longer cultivated because growing such plants overseas is cheaper or synthetic substitutes are available.

Poroporo was also used for medicinal purposes. Anti-inflammatory, antipruritic (stops itching), antibacterial, and antifungal properties make the leaves and bark useful in treating eczema and inflamed skin conditions.

Leaves were historically used as bandages. Among the Raupeti family, there are two varieties, one producing a berry the size of a gooseberry, which is eaten by the natives; the other produces leaves that are either cooked or uncooked. (Taylor 1847)

Leafy greens and berries are cooked and eaten. Often planted (Colenso 1868a, 1868b) Fruit used by early colonists for jam making around Wellington (Colenso 1880).

Eaten berries (Makereti 1938)

If left uncultivated, burned forests are quickly occupied by poroporo. There are many berries that are commonly eaten (Taylor 1855; Servant 1973; Best 1942).

A mixture of juice and soot is rubbed into wounds caused by tattooing instruments (White 1874).

Features:

It is a large, fleshy shrub reaching a height of 4 metres with slender narrow leaves that are divided into 1-3 large sharp lobes, and large, purplish ruffled flowers with a yellow centre that project outwards. An average leaf measures 10 to 80 centimetres in length and 4-6 centimetres in width. Flowers with a dish-shaped shape, up to 50 mm in width. Yellow or orange fruit, 23-30 mm in length. BERRIES ARE POISONOUS.

Propagation:

The plant can be grown from fresh seed or semi-hardwood cuttings. Adaptable to heavy shade and full sun, as well as dry or wet soils and cold temperatures. Rapidly growing and capable of becoming invasive. Additionally, the green fruits of poroporo, as with all poroporo, are extremely toxic.

Flowering:

Throughout the year

Flower colours:

Violet/Purple, White

Fruiting:

Throughout the year

Distribution:

Indigenous. North, South, Stewart and Chatham Islands. In the Hauraki Gulf Islands and in the south of Auckland, it is widespread. Actively spreading northward in the northern part of its range due to bird dispersal of fruit from garden plantings. It is also found in southeastern Australia and Tasmania. Naturalised in parts of China and Russia.

Habitat:

In coastal to montane habitats (0-400 m above sea level). It is typically found along riversides, on forest margins, in shrublands, gullies, and in pastures reverting to forest. It often appears after a fire. It is a common weed in many urban areas.

Products currently on the market:

Poroporo dermatitis cream
Poroporo hydroethanolic extract
Natural Health Weight Support Oral Spray (combined with other ingredients)
Poroporo extract (anti-inflammatory for skin conditions)
Poroporo salves and balms

Value chain and market opportunities:

Poroporo healing salves and balms.
Poroporo natural eco dye
Poroporo health extract and supplements
Poroporo eczema treatments
Poroporo health and beauty creams and lotions
Anti inflammatory cream and topical balms
Natural contraceptives

Māori name: Pūhā

Scientific Name: Sonchus



Pūhā Factsheet

Family: Asteraceae

Common names:

Sow thistle, puha, shore puha,
New Zealand sow thistle

Flowering:

August - April

Flower colours:

Yellow

Fruiting:

September - June

Traditional use by Māori:

Parts used: The leaves, new shoots, flower buds, and sap of the plant (topically)

It was traditionally one of the staple green vegetables of the Māori people, and it is still eaten today. Pūhā can be found growing in the wild. The most popular variety of this plant is the 'smooth' leafed variety, but the 'prickly' and slightly bitter varieties are also edible. According to Solander, it was cultivated in 1769, "in graminosis et cultis".

The milky sap would be used to treat cuts, boils and open wounds.

According to Taylor (1847), "the sowthistle springs up spontaneously in every cultivated spot.

Kirk, in Taylor 1870, describes eating green tops.

The leaves of this plant are widely eaten as greens. Covering eels or kokopu with pahwa or mauku leaves before cooking (Best 1902).

As a result of being forced to eat cooked sowthistle, the Hauhaus did not lose condition." (Potts 1879)

According to Beattie, there are two ways to prepare pūhā. One method involved pounding stems in an ipu to extract the bitter white juice or waiu. Stalks are then eaten raw like cress by the Pakeha. (Informant is an old man born on Ruapuke Island). Further north the pūhā was combined with eel or wild pig in a whena or tapora in an umu. The combination of thistle and flesh was extra tasty. Usually, the sour or bitter juice is squeezed out and thrown away, but sometimes people can't resist leaving it in. The pūhā is now boiled in the European manner in a manner like that of cabbage, as is the case today.

Features:

It has a close cousin, *Sonchus asper*, commonly known as spiny/prickly sow thistle or sharp-fringed sow thistle. It is native to New Zealand and is known as *S. Kirkii*, a biennial-perennial that is more bitter than *S. oleraceus*. They have similar bright yellow composite flowers and milky sap, which blooms from spring to late summer, followed by parachute-like seeds. Typically, the foliage of *S. oleraceus* is a dusky blue green with a very pale reddish tint, although the new shoots have a brighter green colour and the main stems are hollow. It is propagated by seed; perhaps the wind has carried some seed to your location? Despite its preference for full sun, it can grow in a wide range of soils and conditions.

Propagation:

From fresh seed, it is easy to grow. This is a short-lived plant that is best treated as an annual.

Distribution:

Endemic. North and South Islands of Aotearoa as well as Stewart and Chatham Islands.

Habitat:

It is coastal. This plant grows on cliff faces in or around damp seepages, often with the alga Nostoc and the fern *Blechnum blechnoides*. This species prefers basalt, calcareous mudstones, siltstones, limestone, or apatite-rich greywacke faces. Some offshore islands have coastal scrub and herb fields. Stabilised sand dunes may occasionally support it. As a result, it appears this species once occupied a broader range of habitats but has retreated to those that are less suited to other faster growing introduced weeds.

Pharmacological actions:

It is a nutritional tonic, a blood purifier, and an astringent. Escharotic (eroding) in nature when applied topically.

Value chain and market opportunities:

Highly nutritious health supplement

Can be an added flavouring for foods, i.e. sausages, condiments, jams and jelly, sauces etc

Smoothie additive

Frozen vegetable mix

Dried herb

Pūhā and pork sausages

Dried pūhā teas

Salves, balms and creams for topical first aid use

Health and beauty products such as anti-aging creams

Products currently on the market:

Pork and Pūhā sausages

Dried herbs mixes including pūhā

Milk thistle supplements and powders

Milk thistle seed oil for cuts and wounds

Milk thistle day antiaging cream

Milk thistle extract effervescent

Hemp and Pūhā vegan burger patties

Mussel and Pūhā tiroi

Extraction:

Pūhā can be eaten fresh and frozen as it is considered by Māori as a nutritious vegetable so there is no need to extract the goodness from this amazing rākau.

In terms of superfoods, puha is one of the best! Vitamins A, B1, B2, Niacin, calcium, phosphorus, iron, magnesium, manganese, sodium, potassium, copper, zinc, and calcium are found in high levels.

Aside from protein, it also contains oxalic acid, carotenoids, and some essential fatty acids.

Māori Name: Tarata

Scientific Name: Pittosporum eugenioides



Tarata Fact Sheet

Family: Pittosporaceae

Common name:
Lemonwood

Traditional uses by Māori

Parts used: Leaves, gum, resin,

- A mixture of resin and gum of sow-thistle was rolled into a ball and chewed (Colenso, 1868b).
- Gum that is resinous and balsamic, used for treating bad breath (Brett's Guide 1883; Goldie 1904)
- It is known as a masticatory (Best 1942)
- To heal raw spots on an unrelieved saddle-sore horse, chewed leaves are made into a paste (Cowan 1930)
- A review of related pharmacology can be found in Brooker, Cambie, and Cooper, 1987
- Also see Riley 1994 for information on the medicinal uses of related plants in other parts of the world
- (Cheeseman 1925; Kirk 1889: Maoris formerly mixed the flowers with fat and used them for anointing their bodies) (Best 1942: Most informants mentioned the exudation from the trunk, not the flowers)
- The gum used in the perfume of tītoki and kōhia oil (Colenso 1868a)
- As a scenting agent in recipes. Please refer to Aciphylla. (Brett's Guide 1883)
- Scent is produced by leaves and particularly gums (Best 1898, 1907, 1942)
- A description of the bird-skin sachets used in Best 1907 and the process involved in obtaining gum from them
- According to Buchanan (1869), "When bruised and mixed with fat, the leaves are used by Māori for perfume. Bark produces resin as a by-product." (Buchanan 1869).

Features:

An oval tree with light green foliage and a pale green central vein, dense sprays of yellow flowers, and small dry fruits. Five to six mm long fruit splits into two to reveal a papery layer covering sticky black seeds. A dark edged scale covers the leaf buds.

Distribution:

It is endemic to the North and South Islands of New Zealand

Habitat:

In coastal to montane environments, this tree is commonly found in regenerating and mature forests.

Flowering:

October - December

Flower Colours:

Yellow

Fruiting:

October - January

Pharmacological Actions:

- All
- Abrasive
- Anti-acne
- Anti-aging
- Anti-inflammatory
- Anti-microbial
- Antioxidant
- Essential Oils
- Hair conditioning
- Lightening
- Moisturising
- Soothing
- Vitamins

Propagation:

Easy from fresh seed. Can be grown from semi-hardwood cuttings.

Tarata products already on the market:

Tarata wooden toys
Tarata wooden clocks
Tarata and Manuka honey
Tarata hair oil
Tarata essential oil
Tarata pain balm
Kumarahou and Tarata tea bags
Tarata seed pods
Tarata nursery plants
Tarata and kowhai soap (as well as other herbal combinations)
Tarata pain balm

Value chain and market opportunities:

Hair and body products such as balms, shampoos, conditioners, and soaps
Essential oils
Tarata honey
Tarata medicinal body oil
Tarata balms
Tarata perfumes
Tarata wooden cultural pieces or homewares
Tarata tea (combined with other herbs)
Tarata wooden children's puzzles
Tarata ecofriendly household cleaning products
Tarata beverages, alcoholic and non-alcoholic i.e. kombucha, beers, gins, vodkas, health food tonics

Extraction methods:

- (i) *Maceration.*
- (ii) *Infusion.*
- (iii) *Digestion*
- (iv) *Decoction*
- (v) *Percolation*

30 SEPTEMBER 2023

CHINESE HERBAL MEDICINE RESEARCH

JEAN'S NATURAL HERBS OF NEW ZEALAND LTD.

LIST OF CHINESE HERBS

	PLANT NAME (COMMON NAME)	HERB NAME (CHINESE NAME)
1	Astragalus Membranaceus (Milkvetch)	Astragalus Radix (黃芪 Huanqi)
2	Panax Quinquefolius (American Ginseng)	Panacis Quinquefolii Radix (西洋參 Xiyangshen)
3	Codonopsis Pilosula (Codonopsis)	Codonopsis Radix (黨參 Dangshen)
4	Ziziphus Jujuba (Spine Date Seed)	Ziziphi Spinosae Semen (酸棗仁 Suanzaoren)
5	Cornus Officinalis (Common Macrocarpium Fruit)	Corni Fructus (山茱萸 Shanzhuyu)
6	Glycyrrhiza Uralensis (Liquorice Root)	Glycyrrhizae Radix (甘草 Gancao)
7	Forsythia Suspensa (Weeping Forsythia or Golden Bell)	Forsythiae Fructus (連翹 Lianqiao)
8	Carthamus Tinctorius (Safflower)	Carthami Flos (紅花 Honghua)
9	Scutellaria Baicalensis (Baical skullcap)	Scutellariae Radix (黃芩 Huangqin)

NOTE:

- Upon joint research and consultation with specialist Chinese farmers, the following herbs were withdrawn from the list: Citrus Reticulata, Fritillaria Cirrhosa, Gastrodia Elata, Dendrobium Chrysanthum.
This is due to various factors. The main reason being that these herbs are very complicated and difficult to grow, reflected by the fact that it is rarely commercially farmed in China. Instead, they are grown in a semi-wild/semi-harvested state. In the case of Citrus Reticulata, which is the peel of the tangerine; the plant itself is not particularly difficult to grow. However the amount of time required to grow a mature tree that produces tangerines for the peels would take many years, and therefore is not a commercially viable option.
- The following report is a compilation of information gathered from numerous sources; such as oral accounts from farmers in China, consultants of traditional Chinese medicine, as well as Chinese literature. These accounts provide an accurate reflection of the market/farming situation in China.
- There are a myriad of factors that could affect the success rate of these plants. These factors can include but are not limited to: soil conditions, climate, geographical conditions, existing native plants and/or weeds.
- The extent of field management (weeding, fertilisation etc) and use of machinery required is dependant on the above listed conditions, but more importantly the information gathered is applicable to growing herbs in China and hence may not directly correlate or produce the same results in New Zealand.
- Seed and soil preparation are often unique to the plants but are critical to their success. Further information can be provided once analysis has been completed and the next stage has commenced.
- The prices of herbal products are subject to fluctuations in the market; as reflected by the Covid-19 pandemic. Certain herbs have increased in price three-fold due to market demand/supply. Hence the prices indicated in this report is based off the current market values of 2023.



1) Astragalus Membranaceus (Milkvetch)

PROFILE

Astragalus Membranaceus is a perennial herbaceous plant in the Fabaceae family that is native to China. It is predominantly grown in the northern Chinese provinces of Shanxi, Jilin, Hebei as well as inner Mongolia. It usually grows between 80 - 150cm tall with leaves made up of 5 - 14 pairs of leaflets and distinct yellow flowers. It prefers cool and dry conditions.

BENEFITS AND USES

The yellow cylindrical root of Astragalus Membranaceus, called Astragalus Radix, is one of the most commonly used herbs in traditional Chinese medicine, having been used for many centuries. It is believed that Radix Astragalus strengthens ones' immune system and boosts Qi (a vital force of life). It can be used to treat a wide variety of diseases and body disorders which can include: swelling, healing of open wounds, chronic diarrhoea, rectal prolapse, general fatigue and excessive perspiration.



CLIMATIC AND SOIL REQUIREMENTS

Astragalus Membranaceus is a deep-rooted plant and therefore is best grown in dry, sandy and fertile soil that is well drained, with plenty of sunlight. It is resilient to drought so it can often be planted in barren land or on slightly sloped land with a gradient of less than 15 degrees. Slightly low acidic to neutral pH level soil is preferred.

PLANTING AND HARVEST TECHNIQUES

PLANTING

Astragalus Membranaceus can be planted during spring or autumn. It can be grown by either direct seeding or transplanting.

Direct seeding: seeds are planted into trenches with spacing of 25 - 30cm, usually leading to germination in 15 days.

Transplanting: seedlings are planted into trenches with spacing of 10 - 15cm between rows and 20 - 25cm within each row.

WEEDING

Weeds grow rapidly during the seedling stage which require hand weeding or inter-row hoeing to maintain. Weeding required 3 - 4 times annually.

PEST MANAGEMENT

High temperature and water logging can cause powdery mildew, damaging leaves and flowers. Application of calcium polysulfide or Bordeaux mixture may help alleviate these problems. Root rot, Aphids and Gryllotalpidae are of biggest concerns, where use of chemicals is required.

HARVEST

Harvest approximately 2 years after sowing if plants are direct seeded, or 1 year after transplanting. Dig out roots in spring or autumn; preferably in autumn.

PROCESSING

Cut off rootstocks and shake off any residue sand and soil. Dry roots under the sun to remove 80% of moisture. Tie into bundles of 2.5kg and then repeat sun-dry process until all moisture is removed.

FINANCIAL ASSESSMENT

The global market for Astragalus Membranaceus root extract is projected to grow from US\$ 358 million in 2023 to US\$ 525 million by 2033. Astragalus Membranaceus has high export value in China. 4 million kg is exported from China annually, of which 90% is consumed within Asia. Destinations include Hong Kong, Korea, Japan, Taiwan and Malaysia.

In New Zealand, the conservative estimation of demand for Astragalus Membranaceus root extract is 800kg per year. The price is NZ\$ 300/kg.

The income and expenses for growers producing Astragalus Membranaceus (via transplanting) is shown in the table below. The data are collected from consultants/working farmers from China. The yield and expenses are calculated based off a per

hectare rate in China. On the other hand, the income of the product per kg is based off an estimated average retail sale price in New Zealand. These details should be considered as an indication of likely returns. Further research should be conducted to ensure an accurate representation of the expenses for growing the very same herbs in New Zealand.

Income		
Item	Yield (kg/ha)	Income (\$/kg)
Dried root	4,500 kg/ha over years	NZ\$ 300/kg

Expenses per hectare	
Item	Quantity
Seed	75 kg
Planting	150 hours of labour
Fertilizer (N,P,K)	1,500 kg
Weeding	150 hours of labour
Machinery Operating - Harvesting	150 hours of labour
Machinery Operating - Processing	75 hours of labour

CHALLENGES AND OPPORTUNITIES

- Excessive water can be harmful to the crops.
- As Astragalus Membranaceus is a perennial plant, the cost of upkeep and field management (labour/fertiliser/weeding) from the second year onwards will be half (50%) of the first year which is very beneficial.
- This herb has higher monetary value per kg, it is more likely to be feasibly grown and harvested in NZ, taking into account the higher labour cost.
- Considered a high value herb locally and globally, it may be positioned at a premium price point if product is of equal or better quality than Chinese counterpart.
- Has high demand in both global and domestic market.



2) Panax Quinquefolius (American Ginseng)

PROFILE

Panax Quinquefolius is a perennial herbaceous plant in the Araliaceae family that is native to the United States and Canada. It was introduced and is now successfully planted in many provinces in China. It usually grows between 15 - 45 cm tall with 3 leaves, each with 3 - 5 leaflets and produces small red berries. It prefers relatively warmer climates.

BENEFITS AND USES

The root of Panax Quinquefolius is one of the most high-valued and commonly used herbs in traditional Chinese medicine. It has various proven medical benefits and uses. It can boost the body's immunity, benefit brain function, lower blood sugar, and improve general weakness, palpitations and forgetfulness. It can also be utilised in treating various chronic diseases, such as anorexia, hyperhidrosis and post-hemorrhagic shock.



CLIMATIC AND SOIL REQUIREMENTS

Panax Quinquefolius is best grown in loose topsoil, deep humus soil that is well-drained and fertile. The most suitable temperatures for growing range from 20°C - 25°C. It can also be grown on slightly sloped land with a gradient of 20 degrees or less. The ideal annual rainfall is around 800 - 1100mm. Slightly acidic soil is preferred (pH level between 5.5 - 6.5).

PLANTING AND HARVEST TECHNIQUES

PLANTING

Panax Quinquefolius can be planted during spring or autumn. It can be grown by either direct seeding or transplanting.

Direct seeding: seeds are planted with spacing of 7cm x 7cm or 5cm x 10cm between rows at a depth of 3cm.

Transplanting: transplant seedlings at 1 - 2 years of age. Seedlings are planted with spacing of 5cm x 5cm or 7cm x 5cm between rows at a depth of 3cm.

To keep the soil moist and prevent weeds from growing, (after the seeds are planted), the soil is covered with 4 - 5cm of thick leaves or 3cm thick sawdust. Alternatively, reed curtains can be used to cover the entire field.

SHADING

Panax Quinquefolius is a shade plant that requires some form of shading/plant tent to maximise growth. Entire fields are covered with flat-roofed sheds that provide shading for the plants. The flat roof of the sheds are manufactured by straw, or reed or sunshade nets, whilst the surrounding perimeter of the sheds are covered with straw curtains. This is to ensure natural ventilation throughout.

PEST MANAGEMENT

Black spot disease, Sheath Blight, Phytophthora fruit rot, Sclerotinia sclerotiorum and root rot are commonly found during cultivation. Carbendazim, zineb ,chlorothalonil, mancozeb, Diammonium ethylenebis and bordeaux mixture are often used to treat these diseases. Where Elateridae is found, Trichlorfon can be used to tackle the pest.

IRRIGATION AND DRAINAGE

Good irrigation is crucial for Panax Quinquefolius to grow. Either sprinkler irrigation or watering can be used. Generally, water consumption per hectare is 150,000 - 200,000kg.

HARVEST

Harvest approximately 4 years after sowing; preferably in autumn. Hand harvesting is the preferred technique.

PROCESSING

Wash clean and remove branch roots. It is important to dry the roots, by either mechanically drying or natural air dry.

FINANCIAL ASSESSMENT

Panax Quinquefolius has been experiencing significant growth in the past decades as there has been an increasing awareness of its health benefits across the globe. Dried Panax Quinquefolius can be marketed in various forms or products, such as: powders, capsules, tablets, water or even alcohol liquid extracts. Panax Quinquefolius global market size was valued at US\$ 1.3 billion in 2020 and is projected to reach US\$2.9 billion by 2028. The demand in China reached 2,000 tonnes in 2021.

In New Zealand, the conservative estimation of demand for Panax Quinquefolius root extract is 800kg per year. The price is NZ\$ 350 per kg.

The income and expenses for growers producing Panax Quinquefolius (via direct seeding) is shown in the table below. The data are collected from consultants/working farmers from China. The yield and expenses are calculated based off a per hectare rate in China. On the other hand, the income of the product per kg is based off an estimated average retail sale price in New Zealand. These details should be considered as an indication of likely returns. Further research should be conducted to ensure an accurate representation of the expenses for growing the very same herbs in New Zealand.

Income		
Item	Yield (kg/ha)	Income (\$/kg)
Dried root	1800 kg/ha	NZ\$ 350/kg

Expenses per hectare	
Item	Quantity
Seed	75 kg
Planting	225 hours of labour
Fertilizer (N,P,K)	3,750 kg
Weeding	180 hours of labour
Machinery Operating - Harvesting	300 hours of labour
Machinery Operating - Processing	60 hours of labour

CHALLENGES AND OPPORTUNITIES

- Growing period is 4 years, which is significantly longer than other herbs, but due to its high value, it could still be worthwhile growing.
- Very labour intensive, as the roots require hand harvesting.
- This herb has higher monetary value per kg, it is more likely to be feasibly grown and harvested in NZ, taking into account the higher labour cost.
- Considered a high value herb locally and globally, it may be positioned at a premium price point if product is of equal or better quality than Chinese counterpart.
- Has high demand in both global and domestic market. New Zealand produced Panax Quinquefolius were sold previously via Jean's Natural Herbs and there has been a demand for this product.



3) Codonopsis Pilosula (Codonopsis)

PROFILE

Codonopsis Pilosula is a perennial herbaceous plant in the Campanulaceae family that is native to Asia. In China, it is mainly grown in Gansu, Sichuan, Shaanxi and Shanxi as well as in the north-eastern regions. It produces ovate leaves and bell-shaped yellow-green flowers. It prefers relatively low ground temperature with sufficient sunlight.

BENEFITS AND USES

The long and cylindrical root of Codonopsis Pilosula is often used in traditional Chinese medicine and is of high commercial value. It is effective in boosting the immune system. It is used to enhance the body's weakness and treat a wide range of ailments, such as anorexia, coughing, dyspnoea, feeble voice, dehydration, rectal prolapse and uterine prolapse.



CLIMATIC AND SOIL REQUIREMENTS

Codonopsis Pilosula is best grown in deep humus soil or sandy loam that is well-drained and fertile. It is quite demanding in terms of sunlight requirements. Seedlings prefer shade. However, once grown, the plants require generous amounts of sunlight to thrive. It does not grow well in areas with average amounts of sunlight. Neutral pH level soil is preferred.

PLANTING AND HARVEST TECHNIQUES

PLANTING

Codonopsis Pilosula can be planted during either spring or autumn. It can be grown by either direct seeding or transplanting.

Direct seeding: seeds are planted into rows with spacing of 10 - 12cm at a depth of 1.5 - 2cm and a width of 6 - 9cm. Broadcast sowing is often used. Fields need to be suppressed with wooden rollers after sowing. Prevent direct sunlight and water evaporation to keep the surface moist and to ensure healthy seedling emergence rate. Irrigation before sowing, and covering and shading after sowing are key to the emergence and preservation of seedlings.

Transplanting: seedlings are planted with spacing of 12cm between rows.

WEEDING

Seedling stage occurs about 15 - 20 days after planting. The first weeding will be carried out when the seedling is 6 - 10cm tall. Weeding required 3 - 4 times during the growth period.

Codonopsis pilosula is a twining plant that cannot stand upright. When the seedlings are 6 - 10cm tall, insert branches or trellises between the rows to wrap the stems around them.

PEST MANAGEMENT

Yellow rust disease, root rot and Sclerotinia sclerotiorum are of biggest concerns. Calium polysulfide, bordeaux mixture and copper sulphate are often used to treat these diseases. Grub, mole cricket and wireworm are the pests that can be found usually, which can be treated with gamma-HCH.

HARVEST

Harvest approximately 2 years after sowing; preferably in autumn.

PROCESSING

Cut off rootstocks and shake off soil and sand. Dry roots under the sun. Tie into bundles after 80% of moisture has been removed. Repeat sun-drying process until roots are completely dry.

FINANCIAL ASSESSMENT

China is the primary consumer of Codonopsis Pilosula around the globe. The scope of use for Codonopsis Pilosula is broad. It can be made into capsules, powder and alcoholic drinks. Therefore, it is one of the most highly consumed medical plants in China. The annual consumption in China is around 30,000 tonnes, worth approximately RM\$4 billion (nearly NZ\$1 billion).

In New Zealand, the conservative estimation of demand for Codonopsis Pilosula root extract is 500kg per year. The price is NZ\$ 180 per kg.

The income and expenses for growers producing *Codonopsis Pilosula* (via transplanting) is shown in the table below. The data are collected from consultants/working farmers from China. The yield and expenses are calculated based off a per hectare rate in China. On the other hand, the income of the product per kg is based off an estimated average retail sale price in New Zealand. These details should be considered as an indication of likely returns. Further research should be conducted to ensure an accurate representation of the expenses for growing the very same herbs in New Zealand.

Income		
Item	Yield (kg/ha)	Income (\$/kg)
Dried root	6,000 kg/ha	NZ\$ 180/kg

Expenses per hectare	
Item	Quantity
Seed	75 kg
Planting	180 hours of labour
Fertilizer (N,P,K)	1,500 kg
Weeding	180 hours of labour
Machinery Operating - Harvesting	75 hours of labour
Machinery Operating - Processing	75 hours of labour

CHALLENGES AND OPPORTUNITIES

- As *Codonopsis Pilosula* is a perennial plant, the cost of upkeep and field management (labour/fertiliser/weeding) from the second year onwards will be half (50%) of the first year which is very beneficial.
- This plant reportedly requires soil with neutral pH value to thrive; therefore the proposed site (slightly acidic Taranaki soil) may need treatment to cater for this plant.
- This herb has higher monetary value per kg, it is more likely to be feasibly grown and harvested in NZ, taking into account the higher labour cost.
- Considered a high value herb locally and globally, it may be positioned at a premium price point if product is of equal or better quality than Chinese counterpart.



4) Ziziphus Jujuba (Spine Date Seed)

PROFILE

Ziziphus Jujuba is a perennial plant in the Rhamnaceae family. It is mainly grown in the Chinese provinces of Hebei, Henan, Shaanxi and Liaoning. It usually grows between 1 - 3m tall with spines, oval-shaped leaves, yellow-green flowers and reddish-brown fruits. It prefers warm and dry climates.

BENEFITS AND USES

Ziziphus Jujuba is considered a valuable plant in China, with numerous functions and uses. The fruit can be processed into a variety of products, including noodles, juices, alcoholic drinks, jam and honey to name a few. Its hard branches are manufactured into furniture, whilst the mature seeds are of highest medicinal value. In traditional Chinese medicine, the seeds are used to treat neurasthenia, palpitation and debility sweating. It is also used as a sedative to support sleep and lower stress.



CLIMATIC AND SOIL REQUIREMENTS

Ziziphus Jujuba is best grown under warm and dry climates. There is no strict soil requirement, although low-lying land and waterlogged land are not preferred. Neutral pH level soil is preferred.

PLANTING AND HARVEST TECHNIQUES

PLANTING

Ziziphus Jujuba can be planted in spring or autumn. It can be grown by either transplanting or propagation.

Transplanting: transplant seedlings at 1 - 2 years of age. Seedlings are planted into pits, with spacing of 1 - 1.65m between rows, 0.67 - 1m within rows at a depth of 33cm.

Propagation: cut the roots of fully grown plants and plant them, using the same planting method as transplanting. Regular cultivation and hoeing should be sufficient to keep weeds down to levels that do not interfere with the plants. When the plant grows up to 7 - 10cm tall, ammonium sulfate is required; when it reaches 33cm, calcium phosphate is required.

PEST MANAGEMENT

Rust is the biggest problem, where triadimenol and calcium polysulfide are used to treat the disease. Sufficient pruning and avoiding water logging during wet season are the primary precautions.

HARVEST

Harvest approximately 3 years after sowing. Harvest mature fruits in autumn when the fruits turn red.

PROCESSING

Remove sarcocarp and putamens; this will require various machinery to extract the seeds from the fruit. Collect extracted seeds and sun-dry to remove moisture.

FINANCIAL ASSESSMENT

The demand for Ziziphus Jujuba, in food and pharmaceutical industries in China has been increasing over the past decade. The annual demand is nearly 6,000 tonnes, worth approximately RM\$18 billion (NZ\$4.5 billion).

In New Zealand, the conservative estimation of demand for Ziziphus Jujuba is 500kg per year. The price is NZ\$ 50 per kg.

The income and expenses for growers producing Ziziphus Jujuba (via transplanting) is shown in the table below. The data are collected from consultants/working farmers from China. The yield and expenses are calculated based off a per hectare rate in China. On the other hand, the income of the product per kg is based off an estimated average retail sale price in New Zealand. These details should be considered as an indication of likely returns. Further research should be conducted to ensure an accurate representation of the expenses for growing the very same herbs in New Zealand.

Income		
Item	Yield (kg/ha)	Income (\$/kg)
Dried root	4,500 kg over years	NZ\$ 50/kg

Expenses per hectare	
Item	Quantity
Seed	225 kg
Planting	180 hours of labour
Fertilizer (N,P,K)	1,500 kg
Weeding	150 hours of labour
Machinery Operating - Harvesting	450 hours of labour
Machinery Operating - Processing	TBD

CHALLENGES AND OPPORTUNITIES

- Excessive water can be harmful to the crops.
- This plant reportedly requires soil with neutral pH value to thrive; therefore the proposed site (slightly acidic Taranaki soil) may need treatment to cater for this plant.
- As Ziziphus Jujuba is a perennial plant, the cost of upkeep and field management (labour/fertiliser/weeding) from the second year onwards will be half (50%) of the first year which is very beneficial.
- There has been no effective way of harvesting fruits using machinery hence harvesting is more labour-intensive.
- As the fruit of Ziziphus Jujuba is smaller in size, it also requires more machinery, and procedures in order to process the fruits which may lead to higher costs.



5) **Cornus Officinalis (Common Macrocarpium Fruit)**

PROFILE

Cornus Officinalis is a deciduous shrub or small tree in the Cornaceae family that is native to Japan and China. In China, it is mainly grown in the provinces of Zhejiang, Henan, Anhui and Shanxi. It usually grows to 4 – 10 m tall with dark brown branches, green twigs and yellow flowers. The fruits can be harvested for over 100 years. It prefers warm and humid climates.

BENEFITS AND USES

Cornus Officinalis has numerous uses in China. It is processed into different food products such as juices, jam and honey. The mature sarcocarp of Cornus Officinalis is one of the most commonly used herbs for traditional Chinese medicine. It is used to treat a variety of body disorders and diseases, including general weakness, spontaneous sweating, dizziness, nocturnal emissions and frequent urination.



CLIMATIC AND SOIL REQUIREMENTS

Cornus Officinalis is best grown in thick and fertile soil or sandy soil that is well drained. It can also be grown in sandy foam. Neutral pH level soil is preferred.

PLANTING AND HARVEST TECHNIQUES

PLANTING

Transplanting is used in planting Cornus Officinalis. During spring, sow the prepared seeds into trenches, with spacing of 33cm and at depths of 3 - 5cm. Cover the soil with a layer of grass to maintain surface moisture. Seedlings generally emerge in late spring and may continue to emerge into the spring of the next year.

Once the young tree reaches 67 - 100cm in height, transplant into pits with spacing of 2.7m × 2m or 3.3m × 3.3m between where they will be permanently located.

FERTILITY MANAGEMENT

Fertilise the young tree during spring and autumn, increasing the amount of fertiliser depending on age of the tree. Once the tree reaches 10 years of age, the amount of fertiliser (animal manure) required will not increase any further. At this point the fertiliser amount needed for a tree should be no more than 10kg, applied once every spring and autumn.

HARVEST

Harvest approximately 4 years after transplanting. Harvest fruits when exocarp turns red, usually in autumn.

PROCESSING

Remove flesh of the fruit by heating, boiling or steaming. Once the seeds are extracted, heat or dry under sunlight to obtain final product.

FINANCIAL ASSESSMENT

China is the primary consumer of *Cornus Officinalis* around the globe. The price of and demand has been increasing over the last decade. The annual consumption in China is over 5,000 tonnes.

In New Zealand, the conservative estimation of demand for *Cornus Officinalis* is 500kg per year. The price is NZ\$ 50 per kg.

The income and expenses for growers producing *Cornus Officinalis* (via transplanting) is shown in the table below. The data are collected from consultants/working farmers from China. The yield and expenses are calculated based off a per hectare rate in China. On the other hand, the income of the product per kg is based off an estimated average retail sale price in New Zealand. These details should be considered as an indication of likely returns. Further research should be conducted to ensure an accurate representation of the expenses for growing the very same herbs in New Zealand.

Income		
Item	Yield (kg/ha)	Income (\$/kg)
Dried root	6,000 kg over years	NZ\$ 50/kg

Expenses per hectare	
Item	Quantity
Seed	975 kg
Planting	180 hours of labour
Fertilizer (N,P,K)	1,500 kg
Weeding	150 hours of labour
Machinery Operating - Harvesting	450 hours of labour
Machinery Operating - Processing	TBD

CHALLENGES AND OPPORTUNITIES

- This plant reportedly requires soil with neutral pH value to thrive; therefore the proposed site (slightly acidic Taranaki soil) may need treatment to cater for this plant.
- As *Cornus Officinalis* is a perennial plant, the cost of upkeep and field management (labour/fertiliser/weeding) from the second year onwards will be half (50%) of the first year which is very beneficial.
- Less yield at 10 - 20 years of tree age, with yield increasing once tree reaches 20 - 50 years.
- Frost damage during the flowering period will severely reduce yields.
- There has been no effective way of harvesting fruits using machinery hence harvesting is more labour-intensive.
- As the fruit of *Cornus Officinalis* is smaller in size, it also requires more machinery, and procedures in order to process the fruits which may lead to higher costs.



6) Glycyrrhiza Uralensis (Liquorice Root)

PROFILE

Glycyrrhiza Uralensis is a perennial herbaceous plant in the Fabaceae family that is native to Asia. It is mainly grown in the north-eastern parts of China as well as the provinces of Gansu and Shanxi, and in inner Mongolia and Xinjiang. It usually grows between 30 - 120cm tall with ovate leaves and purple or white or yellow flowers. It prefers dry and cool climates.

BENEFITS AND USES

Liquorice, the sweet root and rhizome of Glycyrrhiza Uralensis, has a long history of medicinal use. The major constituents in it, including glycyrrhizin, flavonoids and polysaccharides that contain anti-inflammatory and antiviral properties. It is used to treat respiratory issues, skin disorders, hepatitis B and C, lung diseases and cirrhosis of the liver. It is also an important component of traditional Chinese medicine as it is believed to be able to clear heat and toxins from the body, relieve pain and cough and treat sore throat. Apart from pharmaceuticals, Glycyrrhiza Uralensis is used in various different industries, such as food and beverages, tobacco and cosmetics.



CLIMATIC AND SOIL REQUIREMENTS

Wild Glycyrrhiza Uralensis is usually found in very dry/drought conditions such as desert steppes, desert edges and hilly areas. It is best grown in thick sandy soil that is well drained, with plenty of sunlight and low rainfall. It is resilient to drought and severe cold and heat. Neutral or slightly alkaline soils are preferred.

PLANTING AND HARVEST TECHNIQUES

PLANTING

Glycyrrhiza Uralensis can be planted during spring, summer or autumn. It can be grown by either direct seeding or transplanting.

Direct seeding: seeds are planted into trenches or drilled pits, with spacing of 30 - 40cm between rows and 15cm within rows at a depth of 2 - 3cm.

Transplanting: seedlings are transplanted after 6 months - 1 year.

WEEDING

Weeding required 3 - 4 times annually.

PEST MANAGEMENT

Rust, brown spot, powdery mildew, which can damage leaves, are of biggest concerns. Preventative applications of calcium polysulfide or Bordeaux mixture may help. Aphids and red spiders are commonly found, where use of chemicals may be required.

HARVEST

Harvest approximately 3 years after sowing. Dig out roots in spring or autumn; preferably in autumn.

PROCESSING

Remove sand and dry under the sun for a few days. Cut the roots and rhizomes into long sections and dry under the sun until all moisture is removed.

FINANCIAL ASSESSMENT

The global demand for liquorice root extract is projected to grow from approximately US\$1 billion in 2021 to US\$ 2.7 billion by 2030. The pharmaceutical industry accounts for the largest segment in the market as it is an essential Chinese herbal medicine. The demand for Chinese herbal medicine is expanding in Europe and the United States, where liquorice root comprises of 70% of the market.

In New Zealand, the conservative estimation of demand for Glycyrrhiza Uralensis is 500kg per year. The price is NZ\$ 35 per kg.

The income and expenses for growers producing Glycyrrhiza Uralensis (via transplanting) is shown in the table below. The data are collected from consultants/working farmers from China. The yield and expenses are calculated based off a per hectare rate in China. On the other hand, the income of the product per kg is based off an estimated average retail sale price in New Zealand. These details should be considered as an indication of likely returns. Further research should be conducted to ensure an accurate representation of the expenses for growing the very same herbs in New Zealand.

Income		
Item	Yield (kg/ha)	Income (\$/kg)
Dried root	7,500 kg for 3 years	NZ\$ 35/kg

Expenses per hectare	
Item	Quantity
Seed	150 kg
Planting	150 hours of labour
Fertilizer (N,P,K)	2,250 kg
Weeding	150 hours of labour
Machinery Operating - Harvesting	150 hours of labour
Machinery Operating - Processing	75 hours of labour

CHALLENGES AND OPPORTUNITIES

- As Glycyrrhiza Uralensis is a perennial plant, the cost of upkeep and field management (labour/fertiliser/weeding) from the second year onwards will be half (50%) of the first year which is very beneficial.
- It grows poorly or even cannot grow in soils that are alkaline or with heavy salt. Lime powder can be used to neutralise the soil.



7) Forsythia Suspensa (Weeping Forsythia/Golden Bell)

PROFILE

Forsythia Suspensa is a perennial herbaceous plant in the Oleaceae family that is native to China. It is mainly grown in the Chinese provinces of Shanxi, Shaanxi, Henan and Gansu. It is a deciduous shrub that can grow up to 3m. It produces ovate leaves and golden flowers with 4 petals. It prefers warm and humid climates.

BENEFITS AND USES

The fruit of Forsythia Suspensa is of high medicinal use in traditional Chinese medicine. The fruits are found to have anti-bacterial and anti-viral properties. It is often used to treat common colds, dermatitis, lung issues and sores. In China, it is also processed with other types of Chinese herbal medicine into powdered and capsule products.



CLIMATIC AND SOIL REQUIREMENTS

Wild Forsythia Suspensa usually grows in bushes and forests at an altitude of 800 - 2100m. It is best grown in thick and fertile soil in sloped or hilly land, or in sandy loam that is well drained, with plenty of sunlight. It is resilient to drought and severe cold conditions. Being a resilient plant, it can be grown in different soil types, including alkaline or slightly acidic soils. Seeds will generally germinate between 15 - 20°C.

PLANTING AND HARVEST TECHNIQUES

PLANTING

Forsythia Suspensa can be planted during spring or autumn. It can be grown by either transplanting or propagation by layering.

Transplanting: seedlings are transplanted at 1 year of age, into pits that are 30cm wide and 30cm deep, in trenches with spacing of 1 - 1.5m between rows and 1 - 1.2m within rows; 1 - 2 seedlings per pit.

Propagation by layering: bend the drooping branches of the mother plant and press the middle segment of the branch into the soil, allowing it to grow into a new plant. In the next year, during spring, the branches are separated from the mother plant, and transplanted to a permanent location.

PRUNING

Pruning is carried out in winter. Diseased, weak and old branches are cut off. After pruning, apply 3kg of soil fertiliser or 0.1 - 0.2kg of compound fertiliser to each plant.

PEST MANAGEMENT

There is no serious pest or disease problems.

HARVEST

Harvest fruits in autumn when they first mature and are greenish in appearance.

PROCESSING

Remove foreign matter and dry under the sun.

FINANCIAL ASSESSMENT

Forsythia Suspensa is one of the most commonly used ingredients for traditional Chinese medicine. The demand for it in China has been significantly increasing since the Covid-19 pandemic as it can be processed into capsules with other Chinese herbal components to treat the illness. There has been a deficit in the market in China, causing the price to have gone up five-fold from 2019 to 2023. The annual consumption in China is around 7,000 tonnes which far exceeds the supply. The annual production in China was around 5,000 tonnes in 2022.

In New Zealand, the conservative estimation of demand for Forsythia Suspensa is 500kg per year. The price is NZ\$ 36 per kg.

The income and expenses for growers producing Forsythia Suspensa (via transplanting) is shown in the table below. The data are collected from consultants/working farmers from China. The yield and expenses are calculated based off a per hectare rate in China. On the other hand, the income of the product per kg is based off an estimated average retail sale price in New Zealand. These details should be considered as an indication of likely returns. Further research should be conducted to ensure an accurate representation of the expenses for growing the very same herbs in New Zealand.

Income		
Item	Yield (kg/ha)	Income (\$/kg)
Dried root	1,500 kg for over 5 years	NZ\$ 36/kg

Expenses per hectare	
Item	Quantity
Seed	240 kg
Planting	150 hours of labour
Fertilizer (N,P,K)	2,250 kg
Weeding	120 hours of labour
Machinery Operating - Harvesting	450 hours of labour
Machinery Operating - Processing	TBD

CHALLENGES AND OPPORTUNITIES

- As Forsythia Suspensa is a perennial plant, the cost of upkeep and field management (labour/fertiliser/weeding) from the second year onwards will be half (50%) of the first year which is very beneficial.
- There has been no effective way of harvesting fruits using machinery hence harvesting is more labour-intensive.
- The plant requires more machinery, and procedures in order to process the fruits which may lead to higher costs.
- The price point of this herb is relatively low in comparison with the rest of the herbs in the list, hence there may be difficulty to make this commercially viable.



8) Carthamus Tinctorius (Safflower)

PROFILE

Carthamus Tinctorius is an annual herbaceous plant in the Asteraceae family. Carthamus Tinctorius are grown in many countries, with India being the main producer. In China, it is mainly grown in Henan, Hebei, Zhejiang and Sichuan. It usually grows between 30 - 90cm tall with 1 - 5 orange-red, thistle-like flower heads extending from each branch. It prefers warm and dry climates.

BENEFITS AND USES

Carthamus Tinctorius has a variety of uses; oil can be extracted from its seeds to make safflower oil. Its petals contain yellow pigments and red pigments, which can be used as a natural dye. Its flowers have medical uses as well; in traditional Chinese medicine, it is mainly used to promote blood circulation, and therefore used to treat dysmenorrhea, amenorrhea as well as coronary heart disease, chest pain and pain of joints.



CLIMATIC AND SOIL REQUIREMENTS

Carthamus Tinctorius is best grown in sandy and fertile soil that is well drained, with plenty of sunshine. It is resilient to drought and severe cold. Being a resilient plant, it can be grown in different soil types.

PLANTING AND HARVEST TECHNIQUES

PLANTING

Carthamus Tinctorius can be planted in spring or autumn. It can be grown by either direct seeding or transplanting. Seeds are planted in trenches, with spacing of 45cm at a depth of 4 - 5cm.

PEST MANAGEMENT

Carthamus Tinctorius is sensitive to moisture. High humidity level may cause gram pod borer and safflower bud fly. Preventative applications of prochloraz or Bordeaux mixture may help. Anthracnose, rust and bacterial blight are of biggest concerns, where use of chemicals is required.

HARVEST

Carthamus Tinctorius is an annual plant and the length of growing season is 120 days in average. Harvest in summer when corollas turn from yellow to red.

PROCESSING

Dry in shaded areas or under the sun.

FINANCIAL ASSESSMENT

The multi-functionality of Carthamus Tinctorius is an important driving factor for its increased global demand. It has numerous uses in various industries for its different components. Among these uses, pharmaceutical and the food and beverages industries share the largest market share.

In New Zealand, the conservative estimation of demand for Carthamus Tinctorius is 350kg per year. The price is NZ\$ 100 per kg.

The income and expenses for growers producing Carthamus Tinctorius (via direct seeding) is shown in the table below. The data are collected from consultants/working farmers in China. The yield and expenses are calculated per hectare in China. On the other hand, the income of the product per kg is based off an estimated average retail sale price in New Zealand. These details should be considered as an indication of likely returns. Further research should be conducted to ensure an accurate representation of the expenses for growing the very same herbs in New Zealand.

Income		
Item	Yield (kg/ha)	Income (\$/kg)
Dried root	750 kg	NZ\$ 100/kg

Expenses per hectare	
Item	Quantity
Seed	60 kg
Planting	150 hours of labour
Fertilizer (N,P,K)	1,500 kg
Weeding	150 hours of labour
Machinery Operating - Harvesting	750 hours of labour
Machinery Operating - Processing	TBD

CHALLENGES AND OPPORTUNITIES

- High temperatures and humidity, as well as excessive water supply or waterlogged soil can damage the plant.
- There has been no effective way of harvesting flowers using machinery hence harvesting is more labour-intensive.
- The plant requires more machinery, and procedures in order to process the final product which may lead to higher costs.
- The price point of this herb is relatively low in comparison with the rest of the herbs in the list, hence there may be difficulty to make this commercially viable.



9) Scutellaria Baicalensis (Baical skullcap)

PROFILE

Scutellaria Baicalensis is a perennial herbaceous plant in the Lamiaceae family that is native to China, Korea and Siberia. In China, it is mainly grown in the northern regions such as inner Mongolia and provinces of Hebei, Shanxi and Liaoning. It usually grows between 30 - 120cm tall with spear-shaped leaves and bluish-purple flowers. It prefers warm and dry climates.

BENEFITS AND USES

The root of Scutellaria Baicalensis is one of the 50 fundamental herbs in traditional Chinese medicine. Its root contains flavones such as baicalin, baicalein and wogonoside, which reportedly possess anti-inflammatory, anti-cancer and antioxidant properties. It can be used in the treatment of cancer, allergies, inflammation, inflammatory bowel disease, arthritis, respiratory infections and insomnia.



CLIMATIC AND SOIL REQUIREMENTS

Wild Scutellaria Baicalensis is usually found in sunny and dry places such as mountain tops, hillsides and forest edges. It is best grown in thick sandy loam that is well drained, with plenty of sunlight. It is resilient to drought and severe cold. Neutral or slightly alkaline soils are preferred.

PLANTING AND HARVEST TECHNIQUES

PLANTING

Scutellaria Baicalensis can be planted in spring or autumn. Scutellaria Baicalensis can be grown by either direct seeding or transplanting.

Direct seeding: seeds are planted into trenches with spacing of 30 - 40cm at a depth of 2 - 3cm.

Transplanting: seeds will germinate in 7 - 10 days. Seedlings can be transplanted after 4 - 6 leaves have grown.

WEEDING

Regular hoeing and weeding should be sufficient to keep the topsoil loose and weed-free. Weeding required 3 - 4 times annually.

PEST MANAGEMENT

Few diseases and pests are found. Leaf blight and root rot are of biggest concerns. Preventative applications of carbendazim or Bordeaux mixture may help.

HARVEST

Harvest approximately 1 year after sowing. Dig out roots in autumn.

PROCESSING

Remove soil, sand and cork and dry under the sun until all moisture removed.

FINANCIAL ASSESSMENT

The global market demand for *Scutellaria Baicalensis* has been on the rise since it is reported to have significant effects on the treatment of Covid-19. The global sales reached 10,000 tonnes in 2020. The demand for and price of it have been increasing in China as well. The annual demand was 3,000 tonnes in 2022.

In New Zealand, the conservative estimation of demand for *Scutellaria Baicalensis* is 500kg per year. The price is NZ\$ 35 per kg.

The income and expenses for growers producing *Scutellaria Baicalensis* (via transplanting) is shown in the table below. The data are collected from consultants/working farmers from China. The yield and expenses are calculated based off a per hectare rate in China. On the other hand, the income of the product per kg is based off an estimated average retail sale price in New Zealand. These details should be considered as an indication of likely returns. Further research should be conducted to ensure an accurate representation of the expenses for growing the very same herbs in New Zealand.

Income		
Item	Yield (kg/ha)	Income (\$/kg)
Dried root	4,500 kg over 3 years	NZ\$ 35/kg

Expenses per hectare	
Item	Quantity
Seed	75 kg
Planting	180 hours of labour
Fertilizer (N,P,K)	1,500 kg
Weeding	180 hours of labour
Machinery Operating - Harvesting	75 hours of labour
Machinery Operating - Processing	75 hours of labour

CHALLENGES AND OPPORTUNITIES

- Excessive water supply or waterlogged soil can damage the plant.
- The plant reportedly requires neutral or slightly alkaline soils to thrive; therefore the proposed site (slightly acidic Taranaki soil) may need treatment to cater for this plant.
- As *Scutellaria Baicalensis* is a perennial plant, the cost of upkeep and field management (labour/fertiliser/weeding) from the second year onwards will be half (50%) of the first year which is very beneficial.
- The price point of this herb is relatively low in comparison with the rest of the herbs in the list, hence there may be difficulty to make this commercially viable.

European Medicinal Herbs



Overview

The following report provides a high-level assessment on the potential for growing eight European herbs (garlic, hops, hemp, calendula, ashwagandha, echinacea, arnica and St John's Wort) in the Taranaki region as a potential alternative land use option to current.

There is limited data available to support this assessment, particularly in relation to potential financial returns. A summary table is provided, followed by more detail on each of the herbs. A reference list is provided at the end of the report.

The European Commission for Public Health define 'herbal medicinal products'¹ as *“any medicinal product, exclusively containing as active ingredients one or more herbal substances, one or more herbal preparations, or a combination of the two.”* This definition has been used in this assessment. The herbs assessed are all able to be grown in Taranaki conditions as outlined in Venture Taranaki reports².

¹ https://health.ec.europa.eu/medicinal-products/herbal-medicinal-products_en#:~:text=EU%20legislation%20on%20pharmaceutical%20products,a%20combination%20of%20the%20two.

² Venture Taranaki – Branching Out, Medicinal plants: The opportunity for Taranaki, June 2022

Summary Table

	Growing Requirements	Market	Financial Information (estimates based on best data available)	Opportunities	Challenges
Garlic	<ul style="list-style-type: none"> • Free draining soils. • Plant cloves in late autumn/winter. • Pests and diseases – rust. • Harvest – summer. 	<ul style="list-style-type: none"> • World market US\$21.59b. • China largest producer. • NZ market NZ\$5.5m. 	Farm gate return \$8,760/ha	<ul style="list-style-type: none"> • High quality product to local and international markets. • Further promote health benefits and develop value-added products. 	<ul style="list-style-type: none"> • Competitors low-cost structure means NZ struggles to compete internationally. • Difficult to get high yields. • Technology, labour, processing capabilities.
Hops	<ul style="list-style-type: none"> • Well drained, loam soils. • Direct sunlight. • Plant rhizomes in early spring. • Pests and diseases – low. • Flowers reach maturity in Feb-Mar. 	<ul style="list-style-type: none"> • World market US\$31.1b. • USA largest producer. • NZ produces 1,500t. 	\$36/kg	<ul style="list-style-type: none"> • Emerging nutraceutical opportunities. • NZ key comparative advantage of clean production (low incidence of pests & diseases). 	<ul style="list-style-type: none"> • Small domestic market currently. • Lack of knowledge & experience in the North Island. • Lack of international relationships to sell.

	Growing Requirements	Market	Financial Information (estimates based on best data available)	Opportunities	Challenges
Hemp	<ul style="list-style-type: none"> Well drained, weed free soils with moderate rainfall and good fertility. Plant seedlings in Oct-mid Nov. Maturity 110-150 days. Harvest when 60% of seed is mature. Bird & pest damage is a risk. 	<ul style="list-style-type: none"> World market US\$5.1b. USA is fastest growing market. 	<p>Grower margin \$2,000/ha less transport costs</p>	<ul style="list-style-type: none"> Develop export strategy. Increasing demand for sustainable products. Food & personal care products – greatest potential growth area. 	<ul style="list-style-type: none"> Limited processing facilities. No local varieties – all seed is imported. Specific machinery & storage needed. Feasibility of growing in NZ.
Calendula	<ul style="list-style-type: none"> Well drained soils. Cool temperatures – filtered sun. Transplanting preferred. Pests and diseases – powdery mildew & aster yellows. Harvest after 70 days. Flower heads harvested. 	<ul style="list-style-type: none"> World market US\$16m. Main market for supply is Egypt. 	<p>Gross margin \$10,995/ha</p>	<ul style="list-style-type: none"> International demand growing – NZ could produce high quality and organic products. Investment into research & development. 	<ul style="list-style-type: none"> Crop needs careful management as plant does reseed. Little known about processing infrastructure required.
Ashwagandha	<ul style="list-style-type: none"> Tropical temperatures. Full sun or part shade. Sandy loam soils – good aeration, drainage, and fertility. Transplanting preferred. Planted in spring. Few pests and diseases. Harvest after 150-180 days. Roots harvested. 	<ul style="list-style-type: none"> World market US\$10.5m. India largest producer & market. 	<p>Gross margin \$4,647/ha</p>	<ul style="list-style-type: none"> International demand growing with increased use of dietary supplements. Opportunity for organic high-quality products. Investment into research and development. 	<ul style="list-style-type: none"> No existing supplier relationships. Little known about processing equipment required. Excessive rainfall is harmful.

	Growing Requirements	Market	Financial Information (estimates based on best data available)	Opportunities	Challenges
Echinacea	<ul style="list-style-type: none"> • Warm area, sensitive to cold. • Loam soils – good aeration, drainage, and fertility. • Transplanting preferred. • Planted in spring. • Needs good weed control. • Few pests and diseases. • Harvest after 90-120 days. • Roots, leaves and stems harvested. 	<ul style="list-style-type: none"> • World market US\$1.5b. • Europe & Asia largest market. 	<p>Gross margin \$15,822/ha 40-50% more expensive to grow than overseas</p>	<ul style="list-style-type: none"> • NZ can grow a high quality and trusted product to extract high prices. • Investment into research and development. 	<ul style="list-style-type: none"> • Risk of oversupply as crop is seasonal. • Requires long-term investment of time and money into supply chain. • Little known about processing equipment.
Arnica	<ul style="list-style-type: none"> • Cool lowland conditions. • Sandy, well drained soils. • Propagated by seed or division. • Needs good weed control. • Pests and diseases – phytophthora, phoma, green looper & rabbits. • Harvest Dec-Jan. • Flowerheads harvested. 	<ul style="list-style-type: none"> • Annual demand 300MT. • Romania largest producer. • NZ market in short supply. 	<p>Farmgate return \$4000/ha</p>	<ul style="list-style-type: none"> • Commercially cultivate arnica flowers and roots for the international market. • Ability to trade on our reputation and high-quality produce. 	<ul style="list-style-type: none"> • High-cost hand harvesting. • Limited experience of crops in NZ and it is currently small scale. • Incoming regulations.
St John's Wort	<ul style="list-style-type: none"> • Tolerates any conditions apart from shade. • Likes open areas. • Seeds dispersed by wind, water, and animals. 	<ul style="list-style-type: none"> • World market US\$20.71m. 	<p>Unprocessed St John Wort in NZ as of 2017 was around \$22/200g</p>	<ul style="list-style-type: none"> • Growing international demand. • Grows easily in NZ. 	<ul style="list-style-type: none"> • Toxic to livestock. • Spreads easily so risk to the agricultural sector.

Garlic

Allium sativum is a perennial bulbous flowering plant of the *Amaryllis* family and is native to Central Asia and grown wild in Italy and Southern France. It is a natural source of many nutrients including trace elements (selenium and germanium) and antioxidant minerals. Garlic is commonly used as an anti-inflammatory, for cardiovascular disease and cancers, diabetes, high blood pressure, high cholesterol, coronary heart disease, heart attack and immune support.



Growing Requirements

- Best grown in free draining soils.
- Temperatures need to be above 14°C for the plant to start growing.
- Site needs to have decent moisture over the winter and spring and a dry summer.
- Planted between April-July.
- Garlic gloves are broken into individual cloves and are planted 15cm apart and 5cm deep.
- Shoots will emerge one month after planting.
- Keeping area weed free is essential.
- Main threat – rust which can be eliminated by altitude or earlier growing varieties.
- Harvest occurs when the base of the top is soft – normally summer.
- The tops are left on after harvest and kept in a warm place out of direct sunlight to dry-off further.
- 8 varieties in New Zealand – each variety has variation in maturity date. Between varieties there is a 2-3 month spread for harvest date and 3-4 month spread for planting dates.
- Two main types of garlic – hardneck and softneck, hardneck has higher yields but is more labour intensive and has a shorter shelf life.



Market

- The global market is worth US\$21.59b in 2023 and is forecast to grow to \$35.85b by 2023.
 - China is the largest producer of garlic.
 - Market demand in New Zealand and internationally is high.
 - New Zealand is unable to compete with other countries on cost – China imports garlic at \$10/kg.
 - French Polynesia, New Caledonia and Vanuatu accounted for 67% of exports from New Zealand.
- In 2020, 178ha of garlic was cultivated producing 1,200t at a market value of NZ\$5.5m.

Financial Information

- Pricing done per bulb or per kg – price varies depending on market channel and type of garlic.
- Organic garlic premium \$40/kg.
- Conventional garlic \$25-30/kg.
- Supermarkets \$12/kg.



- Conservative farmgate return – \$8,760/ha for 6000kg/ha of dried bulbs.

Opportunities

- Produce high quality local products for the local and international market.
- Focus on direct supply to consumers and low chemical input systems.
- Further promote health benefits for garlic.
- Growing demand for value added garlic products.

Challenges

- Other countries have a lower cost structure due to lower labour costs and therefore, New Zealand is unable to compete on price.
- Difficult to get yields as garlic is grown on a small scale.
- Supply of plants (seed), technology for growing and maintaining crop including specialised harvesters, labour, processing capabilities, distribution channels and demand.
- Small level of domestic consumption.
- Maintaining control of rust diseases.

Hops

Humulus lupulus is an herbaceous perennial climber from the *Cannabaceae* family and is native to West Africa, Europe, and North America. Hops are the dried, flowering part of the plant and is known for its use for anxiety, sleep disorders, restlessness, tension, excitability, nervousness, irritability, hormone balancing and symptoms of menopause.



Growing Requirements

- Best grown in a well-drained, rich loam soil.
- Grown in full direct sunlight with long day lengths.
- Site needs to be flat to gently undulating, have plenty of room for vertical growth and critically, protection from wind.
- Preferred soil pH of 6.0-7.0.
- Requires easy access to water especially during fast growth periods in spring and summer.
- Hop vines are vines called bines which are trained to grow up strings suspended from an overhead trellis system.
- Minimum of 120 frost free days to produce flowers.
- Winter low temperatures below 4°C for at least six weeks.
- Hops are planted by either rhizome cuttings or rooted cuttings.
- Planting begins with rhizomes in early spring. In colder climates rhizomes are started in pots and transplanted into ground in December.
- Every season the plant dies back in winter, then grows and flowers again from the root stock the following spring.
- Pests and diseases – pressure is considered low.
- Flowers grow on the lateral branches during summer and reach maturity in February-March.
- Reach maturity in 2-3 years.
- Hop quality is dependent on timing harvest cones at the correct time, and then picking and drying before they deteriorate.



Market

- Global market is worth US\$31.1b.
- USA is the largest international producer, followed by Germany.
- New Zealand produces approximately 1,500t per annum (1% of global production) – 85% is exported to 40 countries for \$40m, remaining 15% is for the local market (225t). No figures to distinguish hops used for medicinal and beer purposes.

Financial Information

- Can produce 500-1250g of dried flowers per plant.
- \$36/kg return of T90³ pelletised hops.



³ Form by which most hops are sold.

Opportunities

- Beer brewing is the core market, but there are emerging nutraceutical opportunities.
- Research and development into management techniques.
- Comparative advantage of clean production of New Zealand hops due to the low incidence of pests and diseases.

Challenges

- Small market for fresh hops; presently, most are dried and pelletised.
- Lack of knowledge and experience of hops meaning skill and workforce development is required beyond the current market.
- Gaining access to optimal varieties could be challenging with plant variety rights.
- Developing new relationships to international markets with no prior connections will present challenges.

Hemp

Hemp is annual herbaceous plant from the cannabis family and is native to Central Asia, particularly China. Hemp contains all the essential amino acids for the body, as well as fatty acids including Omega 3 and Omega 6. Seeds are nutrient dense with 20-25% protein, 25-30% oil and 10-15% insoluble fibre and can be manufactured into natural health products, food supplements and powders. Hemp is known for its use in the health of hair, skin, the immune system, and heart function, and reduces inflammation and arthritis.



Growing Requirements

- Best grown in well drained, weed-free soils with moderate rainfall and good fertility.
- Hemp does not tolerate droughts, flooding, saturated or saline soils,
- Planted in October-mid November to lower the risk of frost damage.
- Seedlings require 75-100mm of rain/irrigation in first month of growth.
- Nice fine seed bed required to ensure good germination.
- Planted when soil conditions reach at least 6- 8°C.
- Specialist cultivar used for growing seeds – plants are shorter and have heavier yields.
- Male and female are separate plants – male bears the pollen, female grows the seeds.
- Requires little use of pesticides, herbicides, and fungicides.
- Maturity is 110-150 days after planting.
- Timing of seed harvest is critical – harvest should be when 60% of seed is mature.
- Bird and pest damage is a risk, the longer seed remains unharvested the higher the risk.
- Seed needs to be dried as soon as it is harvested.



Market

- Highest returns are from specialised seed crops.
- Global hemp seed market valued at US\$5.1b in 2022 and is projected to reach US\$11.7b by 2032.
- USA is the fastest growing consumer market for Hemp products.
- Growing demand in Australia, parts of Asia and Europe.

Financial Information

- Average yield is 900kg/ha but can range from 0-2,000kg/ha depending on crop.
- Average crop at \$5,000/t will provide a gross income of approximately \$4,500/ha.
- Operational costs at \$2,500/ha the grower margin sits at \$2,000/ha less transport costs.
- Annual licensing cost of \$511.11.
- Low yields can occur due to bird damage, harvesting issues or weather events.



Opportunities

- Develop an export strategy which will position New Zealand well in the international market.
- Food and personal care products are the greatest potential growth area for New Zealand.
- Promote New Zealand's brand as it aligns with the characteristics of hemp products.
- Increasing demand for sustainable products.
- Development and investment in the local supply chain.
- Further research and development to identify or develop suitable varieties to suit our climate.

Challenges

- Limited processing facilities – meaning high transport costs.
- No local varieties - currently all seed is imported which creates issues with reliability and timing.
- Specific machinery and storage needed.
- Lack of knowledge and expertise in hemp cultivation.
- Feasibility of growing in New Zealand – might be cheaper to import as competitors have economy of scale.

Calendula

Calendula officinalis is a short-lived herbaceous perennial commonly known as pot marigold from the daisy family and is native to Mediterranean Europe. Calendula is known for its use in wound and skin health treating infections, inflammation, cuts, wounds, and rashes.



Growing Requirements

- Grows between 40-45cm tall.
- Best grown in well drained soils – wet soils are not preferred as it can cause root rot.
- Grown in cool temperatures with filtered sun or shady areas so flowers last longer.
- Preferred soil pH of 6.0-7.0.
- Planted via direct seeding or transplanting – transplanting preferred to ensure even root production.
- Transplanted between 4-6 weeks of age.
- Planted in spring with spacing of 70cm between rows and 25cm within rows.
- Pests and diseases – powdery mildew and aster yellows.
- Weeds should not interfere with flower production – cultivation and hoeing should control any weed population.
- Harvest occurs 70 days after sowing – this occurs three times at fortnightly intervals.



Market

- Commercial value is for dried flower heads including petals.
- Moderate international demand – preference is for the dried product.
- Global market was worth \$16m in 2017.
- Main market for international supply is Egypt – supply is low quality and not organic (even though it claims to be).
- Commonly grown in North America, Europe, India, and China.

Financial Information

- \$18,605/ha cost.
- \$29,600/ha income based on 0.8t/ha root yield and \$37,000/t price for dried flower heads.
- \$10,995/ha gross margin.



Opportunities

- International demand growing meaning potential for New Zealand to benefit from producing high quality and organic produce.
- Further investment into research and development – develop new products and improve growing and processing methods and efficiencies.

Challenges

- Crop requires careful management as plants readily reseed.
- Little known about processing infrastructure required.

Ashwagandha

Withania somnifera is an annual evergreen shrub from the nightshade family and is native to India, the Middle East, and parts of Africa. Ashwagandha is known for its use as a tonic and treatment for a range of health conditions including anxiety and stress relief.



Growing Requirements

- Grows between 150-170cm tall.
- Suited to tropical temperatures (20-35 degrees Celsius) or other areas with reasonable rainfall.
- Sites should be in full sun or part shade.
- Best grown in sandy loam soils and loose topsoil with good aeration, drainage, and fertility.
- Preferred soil pH of 7.5-8.0.
- Planted via direct seeding or transplanting – transplanting preferred as ensures even root production.
- Transplant occurs at 4 weeks of age.
- Plant in spring with spacing between rows of 20-25cm and 10-15cm within rows.
- Few pests and diseases – seedling blight, leaf blight, mites, and aphids.
- Bush habit and rapid plant growth should outcompete weeds, otherwise other management techniques may be required to control weeds.
- Harvest occurs 150-180 days after sowing.
- Roots of the plant are harvested.



Market

- Largest market is India as it has the largest international demand.
- Market supply is dominated by produce grown in India.
- India has product that is not organic and has traces of pesticides and heavy metals.
- Valued at USD\$10.5m in 2019 and is projected to grow to USD\$16.5m by 2026.
- Demand from North American and European markets are growing.

Financial Information

- \$10,353/ha cost.
- \$15,000/ha income based on 0.5t/ha root yield and \$30,000/t price.
- \$4,647/ha gross margin.



Opportunities

- Increased use of dietary supplements means international demand is growing, specifically in North America and Europe.
- Further investment into research and development to increase yields and quality.
- Opportunity to produce organic high-quality products.
- Potential to promote the health benefits more widely.

Challenges

- Excessive rainfall can be harmful to the crop.
- No existing supplier relationships as India dominates the market and already has existing relationships.
- Little known about processing equipment required.

Echinacea

Echinacea angustifolia is commonly known as the Narrow Leaved Coneflower. It is a flowering plant from the daisy family and is native to North America. Echinacea is known for its enhancement of the immune system and reduction of illness duration. It is manufactured into products including supplements, liquids, and creams.



Growing Requirements

- Suited to warm areas, but sensitive to cold and extreme weather events.
- Best grown in rich and loose loam topsoil with good aeration, drainage, and fertility.
- Preferred soil pH level of 5.9-8.0.
- Planted via direct seeding or transplanting – transplanting preferred as ensures even root production and easier management of weeds.
- Plant in spring with spacing between rows of 30cm and within rows 15cm.
- Requires good weed control as plant is slow to germinate which is managed by hoeing or stem treatment.
- Few pests and diseases – sclerotinia stem, root rot, leafhoppers, and aphids.
- Harvest occurs 90-120 days after sowing – early to mid-summer.
- Three parts of plant can be harvested – roots, leaves, and stems with roots the primary output.



Market

- Best-selling medicinal plant worldwide.
- Accounts for 5% of all herbal supplements.
- Largest market is Europe and North America.
- Valued at USD\$1.5b in 2019 and is projected to grow to USD\$2.9b by 2027.
- Products are often of poor and inconsistent quality.
- Demand for trusted, high-quality produce that consumers can trust – opportunity for the growth of the New Zealand market.

Financial Information

- New Zealand grown is 40-50% more expensive to produce than overseas production systems.
- \$24,178/ha cost.
- \$40,000/ha income based on 0.5t/ha root yield and \$80,000/t price.
- \$15,822/ha gross margin.



Opportunities

- Grow a high quality and trusted product to extract highest market price.
- Finding niche markets is key to success.
- Further investment into research and development to develop new products and improve processing methods and efficiencies.

Challenges

- Risk of oversupply as crops are seasonal.
- Large scale cultivation requires skilled and long-term investment of time and money into assessing, testing, and establishing a supply chain.
- Little known about processing (drying) equipment required.

Arnica

Arnica montana is an herbaceous perennial from the daisy family and is native to Central Europe. It has a dark brown cylindrical rhizome with green foliage. Arnica is known for its use in niche high value medicinal and pharmaceutical products manufactured into a range of products including anti-inflammatory (bruises and sprains), cosmetics, and oils.



Growing Requirements

- Suited to cool lowland conditions with moist, sandy, well drained soils – can tolerate drought conditions.
- Very sensitive to soil conditions.
- Preferred soil pH 5.5-7.5.
- Plants are propagated by seed or division – normally planted in spring.
- Requires good weed control (biggest problem) as plant is slow growing – controlling weeds before planting is key.
- Pests and diseases – phytophthora, phoma, green looper and rabbits.
- Flowering occurs between November-February.
- Flower crop is harvested between December-January and roots are a potential for oil production.
- Harvested flowerheads are dried on-farm and then supplied to a domestic manufacturer.



Market

- Annual demand for dried arnica is 300 metric tonnes.
- Over half of the global trade quantity is produced from wild collection in Romania.
- Romania exports mainly to Germany, Italy, France, and Switzerland, with Germany accounting for 80% of Romania's arnica exports.
- Commercial cultivation is not enough to satisfy market demand.
- Majority of world production is dependent on wild sources. Abundance of arnica reduced in the wild in Europe due to loss of habitat, changing ecological conditions and over-harvesting.
- New Zealand market is in short supply of arnica.
- Demand from the world market continues to rise.

Financial Information

- Demand from the New Zealand market could be up to 3t of dried flowerheads at \$100/kg.
- Wild harvested flowerheads could reach \$47.30/kg when exported.
- Based on 500kg dried flowerhead/ha at \$20/ha price, conservative farmgate returns are \$4000/ha.



Opportunities

- New Zealand has an opportunity to commercially cultivate arnica flowers and roots for the international market – ability to trade on our reputation and high-quality produce.

- To reduce the dependency on wild harvested Northern Hemisphere products is an opportunity for New Zealand to increase supply of a cultivated product.

Challenges

- Local producers would have high-cost hand harvesting until development of mechanical harvesting.
- Limited experience of the crop in New Zealand and low productivity presents challenges.
- Small scale of the industry required to meet local demand limits the potential investment in research and development and innovation.
- Incoming regulatory challenges placing higher cost on producers and requires increased reporting.

St John's Wort

Hypericum perforatum, commonly known as St John's wort, is a flowering plant in the family *Hypericaceae*. It is a perennial plant that grows up to one metre tall. It is native to temperate regions across Eurasia and North Africa, and has been introduced to East Asia, Australia, New Zealand, and parts of North and South America. In many areas where it is not native, it is considered a noxious weed. St John's wort is known for its effectiveness in addressing symptoms for mild to moderate depression, mood disorders and symptoms of menopause and pain.



Growing Requirements

- Given it can be a noxious weed in places, it grows readily in open areas, forest, riparian margins, grasslands, pasture, plantations, wasteland, roadsides.
- Tolerates cold to hot temperatures, damp to drought conditions, wind, and damage, but is intolerant of shade.
- Seeds require light for germination and seedling growth is much slower than for most other grassland plants.
- Seeds dispersed by wind, water, and animals. Vegetative spread from rhizomes. Human-mediated dispersal through dumping of garden waste, deliberate plantings and movement of contaminated soil, machinery and produce.



Market information

- Europe largest market about 81.34% of the global market as of 2017.
- Valued at US\$20.71m and is expected to grow 4.88% per annum to 2027.

Financial information

Limited information available, but suggestion that the current price of dried unprocessed St John Wort in NZ as of 2017 was around \$22/200g and Farmers were able to get a tonne of dried heads a hectare.



Opportunities

- Growing international demand.
- Grows easily in New Zealand.

Challenges

- Toxic to livestock, especially if eaten in large quantities when other food is scarce.
- Spreads easily so a potential risk to the agricultural industry.
- Introduction of the St John's wort beetle can have devastating effects on St John's wort crops.
- Can interact with other medications.
- More research needs to be completed about the effects on the body.

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