

Branching Out Blueprint

# Medicinal Plants (non-indigenous)

THE OPPORTUNITY FOR TARANAKI, NEW ZEALAND

**venture**  
TARANAKI  
Te Puna Umanga



# A blueprint for the future of food and fibre

Branching Out is a project that has been initiated and led by Venture Taranaki. It is underpinned by funding from the Ministry for Primary Industries' Sustainable Food and Fibre Futures fund (SFFF). It is supported by local sponsors as well as the region's three district councils – New Plymouth District Council, South Taranaki District Council and Stratford District Council. The project has identified a number of innovative, commercially viable food and fibre value chain opportunities for Taranaki. This work supports the region's strategy and long-term vision for a resilient, high-value, and low-emissions economy built on inclusivity and sustainability, as articulated by Tapae Roa and Taranaki 2050 – the guiding strategic documents for the region, co-created with the people of Taranaki.

Branching Out aims to strengthen and diversify the Taranaki economy and has taken input from a wide range of industry participants, from landowners to interested growers, manufacturers to food & fibre entrepreneurs and potential investors. Through a process of investigation, a shortlist of eleven feasible ventures have been selected. Crown Research Institutes and universities, including Massey and Lincoln, were engaged to provide robust research that underpins each venture selection. Work has also been undertaken with commercial partners to support the development of prototypes with significant market potential, and a core focus on sustainability and waste reduction.

The investigations, collaborations, and potential commercial pilot opportunities for the region that have been explored as part of this project are being presented

as Venture Blueprints. These blueprints aim to build investor confidence and serve as an informative and inspirational roadmap to kick-start complementary land-based activities and associated value chain enterprises in Taranaki.

The blueprints focus on traditional methods of assessing value, determined by comparing inputs (land, animals, machinery, time) and outputs (milk, meat, wool, other products). However, consumer expectations and an increased awareness of environmental degradation mean that thought should also be given to how the natural environment can be protected and what value this action can add to a developing sector.

## TE TAIAO

In 2020, the Primary Sector Council released their Food and Fibre Strategy, Fit for a Better World. This strategy adopted the Te Taiao framework, acknowledging that Te Taiao is all of the natural world that contains and surrounds us (land, water, air, and biological life). It is a uniquely New Zealand perspective that is underpinned by three guiding principles:

- Our land, water, air, and biological life must be able to thrive without over-use
- Any use is a privilege, not a right
- If something is not healthy or well, we must fix it.

Developing or participating in a new value chain is an opportunity to consider your business's relationship with Te Taiao. It is a chance to farm, produce and engage in a way that safeguards the mana and integrity of the natural world. If the whenua (land), and the entities that are connected to it, are to be nourished and thrive, then it must be cared for and protected. Each blueprint opportunity should be considered with Te Taiao in mind.

## DISCLAIMER

This document, produced by Venture Taranaki, provides an overview of opportunity for commercial production and processing of medicinal plants in Taranaki, and an indication of potential returns. It does not constitute investment advice. Professional advice should be sought if you wish to explore this opportunity further. This blueprint is correct to our knowledge and based on the best information we could access as of June 2022. However, this work is ongoing, and we welcome new or emerging information about this opportunity. For more information or for input, please contact [branchingout@venture.org.nz](mailto:branchingout@venture.org.nz).

**How to reference:** Venture Taranaki – Branching Out, *Medicinal plants: The opportunity for Taranaki*, June 2022

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# Medicinal plants: A snapshot

## UNTAPPED POTENTIAL

- Medicinal plants are high value products with domestic and international markets.
- New Zealand has the ability to grow a wide variety of quality medicinal plants at a price point that can compete globally, as has been proven by a variety of other export horticultural crops.
- High quality organic product grown in New Zealand would meet an international market demand.
- Medicinal plants are key ingredients in a range of products, including pharmaceutical, cosmeceutical, nutraceutical and food and beverage.
- There is a relatively low cost to grow medicinal plants with promising annual returns.
- Initial assessments indicate that the three most promising varieties of medicinal plant that could be grown in Taranaki are: Echinacea, Ashwagandha, and Calendula.

## WHY NOW?

- Taranaki has an engaged community of local growers with an interest in seeing the establishment of a local, profitable industry.
- Strong international growth is expected for the industry within the next ten years, particularly in key markets such as America, Europe and Asia.
- There is increased consumer interest in health and wellbeing as a result of the recent COVID-19 disruptions.
- Global demand for natural health products has been rising for many years due to a number of market drivers which include: aging populations; increasing evidence for the effectiveness of natural interventions for a wide range of health conditions; increasing consumer appetites for natural wellness aids and plant-based products, rise in chronic & non-communicable diseases, and wealth in baby boomer generation.
- The effectiveness of medicinal plants in preventing a wide range of serious and increasingly common medical conditions has been shown in a growing body of research published in peer-reviewed scientific journals.

## IN-REGION INFRASTRUCTURE OPPORTUNITIES

There are currently no at-scale drying or processing facilities for medicinal plants in Taranaki, however these can be initially designed for small scale operations without need for significant capital investment. Over time and with enough demand from small or medium-sized growers, it is hoped that there may be an opportunity to construct or install drying, and other value-add processing facilities in region.

## WHY TARANAKI?



Taranaki has climate and pastures suitable to the growth of high-value medicinal crops.



There is an established community of growers and naturopaths in Taranaki with strong connections to experts and industry bodies.



A highly transparent supply chain could differentiate Taranaki as a high-quality producer and command a price premium on crop/product.



There is a high level of trust in New Zealand grown organic products from international consumers.

## WHO SHOULD BE INTERESTED?



Existing Taranaki growers looking to expand their offering or connect with other interested parties.



Taranaki landowners considering how best to make use of their property.



Investors or entrepreneurs considering future trends and growth markets in the food and fibre sector.



Manufacturers or service providers looking to support the development of an emerging sector.

## SECTOR TURNOVER AND GROWTH TARGETS

The global medicinal plant and herb market was worth approx. USD\$185b (2019); expected to be worth approx. USD\$430b by 2028.

The global echinacea extract market was valued at USD\$1.5b (2019); projected to grow to approx. USD\$2.9b by 2027.

The global ashwagandha extract market was worth USD\$10.5m (2019); expected to grow at a rate of 6.4% with a forecast value of USD\$16.5m by 2026.

The global calendula extract market was worth approx. USD\$16m in 2017.

## VALUE ADDED OPPORTUNITIES

Plant material is most valuable in extract form, so an element of processing needs to occur in order to realise this opportunity. A starting point would be to connect with existing domestic and international manufacturers and producers in the wider natural health and wellbeing sector for materials to be included as ingredients in their products. There also are considerable opportunities for R&D in relation to the use of these plants in value-added products.

### LAND FINANCIALS<sup>1</sup>

	Echinacea	Ashwagandha	Calendula
Minimum viable land:	1 hectare	1 hectare	1 hectare
Initial investment required <sup>2</sup> :	\$24,178	\$10,353	\$18,605
Returns per hectare:	\$15,822	\$4,647	\$10,995

## RISKS AND SENSITIVITIES

- There is often a lack of quality research into the effectiveness and safety of medicinal plants and products they are included in.
- There can be some regulatory hurdles associated with including plants in food or medicinal products.
- Processing infrastructure will be required to extract value from the crop.
- Supply and demand will need to be carefully managed and there can be a risk of over-supply.
- It will be crucial to position Taranaki product as pure and high quality to ensure differentiation and highest possible market price.
- Large-scale cultivation will require skilled labour and long-term investment of time and money into assessing, testing, and establishing a supply chain.
- There is an absence of appropriate regulations for the local natural health product industry that would ensure best practice.

## TARANAKI BRANCHING OUT SCORECARD

Opportunity rating  
1 = low, 5 = high.

*This scorecard is intended to act as a quick comparison between blueprint opportunities. These scores are subjective and based on information available at the time of publishing. Further professional investment advice should still be sought.*

### Development Opportunity

Suitable growing conditions in Taranaki	4
Suitable land available at reasonable cost	4
Existing investment interest	3
Local development experience	4
Circular economy opportunities	4
Established local, domestic, and international demand	5

### Product Opportunity

Large and growing demand for high quality medicinal plant raw materials and products	5
New Zealand medicinal plant products differentiated in key markets	4
Contribution to health and wellness of the consumer	5
Established sustainable/ regenerative growing practices, including water usage	4
Reduced greenhouse gas emissions compared to existing land uses	5

### Postharvest and Processing Opportunity

Postharvest and processing facilities available now in Taranaki	2
Opportunities for development of added value products, particularly from waste products	4

<sup>1</sup> Based on a financial model provided by The Agribusiness Group.

<sup>2</sup> Assuming that land is already available.

# Medicinal plants in New Zealand and internationally

## HISTORY, CONTEXT, AND USE

Healing with medicinal plants and herbs (medicinal plants) is as old as humankind itself, with the oldest recorded evidence of their use able to be traced back to Nagpur, India, more than 5,000 years ago<sup>3</sup>. Around the world, medicinal plants have been used in traditional healing practices for generations to cure ailments, relieve pain and improve wellbeing.

Many plants contain a complex mix of phytochemicals that have natural functions of protecting against microbes and disease. Approximately 25% of all pharmaceutical drugs are derived or developed from plants and their constituents.

Medicinal plants are processed in a number of different ways and can be used as ingredients in a wide range of other products including:

- Pharmaceutical (e.g., creams, balms, ointments, tablets, capsules, lozenges).
- Nutraceutical (e.g., dietary supplements, vitamins, minerals, herbs, amino acids).
- Cosmeceutical (e.g., skin creams, essential oils).
- Food and beverage (e.g., whole foods, energy bars, drinks, protein powders).

## NEW ZEALAND CONTEXT

In New Zealand, there are a number of traditional Māori plants and herbs that are utilised for their medicinal properties<sup>4</sup>. However, this blueprint focuses on non-native plant species, in particular Echinacea, Ashwagandha and Calendula which have been selected for reasons outlined later in the Blueprint. The medicinal plant industry in New Zealand is in its infancy, however, there is an opportunity to connect with and further develop the established natural health product industry by cultivating medicinal plants.

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<sup>3</sup> <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC3358962/>

<sup>4</sup> The opportunity for traditional Māori ingredients in Taranaki is detailed in a separate Branching Out blueprint.



As a country, New Zealand is extremely well positioned to take advantage of this global trend, and has an ability to grow, process, and manufacture, a wide range of herbal medicines. The success of this industry would be underpinned by our unique combination of geographical, soil and climatic attributes. Our natural resources, rich fertile soil and suitable climate provide an opportunity to grow plants and develop products whose bioactivity parameters rank them very highly comparative to the quality of products produced elsewhere in the world<sup>5</sup>. In addition to this, the skills and reputation of various research institutes, universities and R&D providers who specialise in agricultural sciences provide an opportunity to produce, test and provide scientific rigour to the industry.

### POINT OF DIFFERENCE

New Zealand has a strong international reputation of producing high-quality and unique products, such as, wine, lamb, merino, honey, kiwifruit and cheese. In the medicinal plant market, there is an opportunity to differentiate products created in Taranaki and New Zealand by developing a high-quality product, with highly transparent supply chains, underpinned by the New Zealand grown story. We already have good quality parameters for many medicinal plants grown here and our 'clean and green' international image is ideal for marketing natural health products offshore. These points of difference should allow companies the opportunity to carve out a niche for their product.

### MANUFACTURING AND EXPORTING REQUIREMENTS

Growing medicinal plants for use in value-added products or for export will require growers/processors to ascertain whether they need to meet any regulatory standards or requirements in New Zealand or overseas. Currently in New Zealand there is a lack of local regulations that ensure best practice, however, overseas different countries have some market access requirements. Many, such as Europe, UK, USA, China, and Japan have various pharmacopeial standards that need to be met. These help ensure the quality and safety of essential medicines by providing analytical methods and appropriate limits for testing and assessing the active pharmaceutical ingredients, excipients and finished products.

Raw material tests are useful to factor into the cultivation process to ensure ongoing quality. These tests assess plant quality by authenticating plant species, determining botanical characteristics, quantifying foreign material (i.e, soil or other plant material), and detailing what heavy metals and pesticide residues are present in the product. Obtaining certificates of analysis can also support to simplify the regulatory process by confirming many of the details from testing, as well as describing provenance.

It is recommended that growers/processors considering the following acronyms when preparing to cultivate medicinal plants:

- GAP - Good Agricultural Practice
- GMP - Good Manufacturing Practice
- GLP - Good Laboratory Practice

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5 Information provided by Phil Rasmussen.



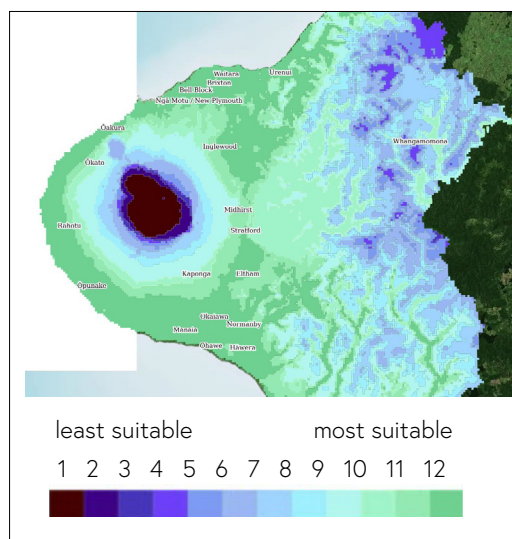
# The opportunity for Taranaki

## STRATFORD HERB SOCIETY

The [Stratford Herb Society](#) was established in 1985 and is a member of the Herb Federation of New Zealand. They have 22 active members and an additional 43 associate members. The Society is very active and, working with Venture Taranaki, identified a long list of medicinal plants that grow well in Taranaki<sup>6</sup>. 46 growers, some with commercial aspirations, submitted data that included plant husbandry, yields and end uses. Local naturopaths, as well as larger herbal medicine companies, also provided input.

This data was then captured on a geographical information system (GIS) map by [Envision](#) to identify opportunities for organised collaboration. The GIS map integrates the location data of where the medicinal plants are currently growing with climatic, soil and geographic factors, to assist the decision-making of the growers. The map below indicates suitable locations around Taranaki to grow medicinal plants in general, and in particular, ashwagandha.

The aspiration of the group is to establish a co-operative system where smaller growers can grow herbs that suit their land and climate, but where there are communal drying and packing facilities available<sup>7</sup>.



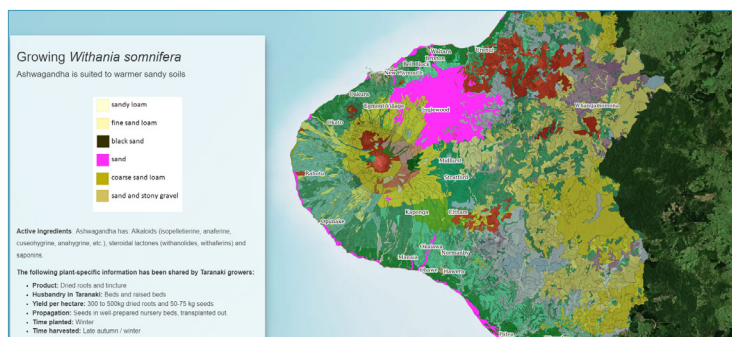
Suitable locations around Taranaki to grow medicinal plants.

## ABACUSBIO REPORT

[AbacusBio](#) were then commissioned to investigate new plant-based options for land-use in Taranaki. The long list (which can be found at **Appendix A**) provided by the local growers was then shortened to a final six plants presented. Further information has since been sought about the three most promising opportunities outlined in this blueprint, Echinacea, Ashwagandha and Calendula.

AbacusBio narrowed down the long list to the final six plants based on assessment against four key criteria:

- Agronomic characteristics,
- Evidence for medicinal benefits,
- Market assessment, and
- Potential value and ease of production.



Ashwagandha is suited to warmer, sandy soils.

6 AbacusBio report – 2022

7 <https://www.stuff.co.nz/business/farming/agribusiness/300429885/medicinal-herb-project-gets-underway-in-taranaki>



## ENVIRONMENTAL CONDITIONS

Taranaki's growing conditions are such that it is often said that 'you can grow almost anything in Taranaki'. One of the earliest marketing slogans devised for the region was: 'Taranaki – Garden of New Zealand.' This phrase captures the Taranaki region's fortuitous mix of temperate climate, rich volcanic soil and bountiful rainfall, which contribute to a landscape that has the potential to support a range of horticultural endeavours<sup>8</sup>.

Recently there has been considerable publicity regarding Taranaki achieving the highest number of sunshine hours in the country in 2021, and Taranaki has often been within the top few contenders for this title. As a general summary of these conditions, according to Chappell (2014), Taranaki has a temperate climate with prevailing north-westerly winds bringing warmer air from the Tasman Sea. It experiences over 2,000 sunshine hours annually with reduced sunshine hours on the hill country areas due to the high elevation which results in cloud formation.

Temperatures around Taranaki are between 20°C-22°C in summer with a mean annual temperature of 13.5°C. However, Venture Taranaki's land and climate report suggests that Taranaki would be extremely lucky to hit 19 degrees Celsius as a summer average.<sup>9</sup>

The southern part of the region typically receives less than 1,500mm of rainfall per year, whereas the northern part receives over 2,000mm of rain.

Different areas of the region experience different wind speeds and direction due to the topography of the region. In the west, an average annual wind speed of 18.9 km/hr is experienced annually. However, the eastern part of Taranaki experiences lower average wind speed of 15.3km/hr annually due to the mountain acting as a wind shelter.

The region is well known for its volcanic history which has produced fertile soils. Taranaki's allophanic soils are free draining due to the mixture of black loam and clay soils. Taranaki soils have pH values of 5.7 to 6.5 which are acidic due to the volcanic origins<sup>10</sup>. Taranaki soils have also been known for their high phosphate retention ability with free draining and compaction resistance qualities. All of the above factors position Taranaki well as a general growing context for the identified medicinal plants.

8 *Venture Taranaki, The Potential for Horticultural Development in Taranaki, 2014)*

9 <https://www.venture.org.nz/assets/Uploads/Taranaki-Land-Climate-Report-Nov-2020.pdf>

10 *Burgess & Davies, 1951)*







## PROMISING PLANT VARIETIES

Three plants were identified in the AbacusBio report as having the greatest opportunities for growth in Taranaki. A short summary for each plant is below.

### **Echinacea (*Echinacea Angustifolia*)**

Also known as the Purple Coneflower, the root of Echinacea is primarily used for the prevention or treatment of upper respiratory tract infections, such as influenza and the common cold. Traditionally it was used to reduce inflammation such as sore throats, swollen gums, and abscesses<sup>11</sup>. Echinacea is a flowering plant sown in spring that thrives in moderately rich, well-drained soils. It accounts for approximately 5% of the total global herbal supplement market.

### **Ashwagandha (*Withania somnifera*)**

Ashwagandha is an herb native to India and the subcontinent, used as a tonic and treatment for a wide range of health conditions, including anxiety and stress relief and sexual function<sup>12</sup>. It is also one of the most

important herbs of Ayurveda, a traditional medicinal system used in India. As a result, India holds the largest international market demand, however, demand from North America and Europe is expected to grow substantially due to the increase in the use of dietary supplements. Ashwagandha grows well in sandy loam soil with good drainage.

### **Calendula (*Calendula officinalis*)**

Also known as Pot Marigold, the flowers of Calendula have long been used to heal minor cuts, grazes and slow healing wounds. The plant is approved by the European Medicines Agency as a traditional medicinal product and a range of clinical studies published in recent years have helped to validate its usefulness<sup>13</sup>. Usually grown in North America and Europe, Calendula can be grown easily in sunny conditions in any kind of soil. International consumer demand is moderate, with preference for a dried product.

11 Echinacea – a useful herb for allergies, The Herb Blurb, Phil Rasmussen, 14 July 2018 - <https://herbblurb.com/2018/07/14/echinacea-a-useful-herb-for-allergies/>

12 Withania improves sexual satisfaction in women, The Herb Blurb, Phil Rasmussen, 3 August 2016 - <https://herbblurb.com/2016/08/03/withania-improves-sexual-satisfaction-in-women/>

13 Calendula – a powerful healing herb, The Herb Blurb, Phil Rasmussen, 23 October 2020 - <https://herbblurb.com/2020/12/23/calendula-a-powerful-healing-herb/>

## SHARED DRYING FACILITY

There is currently no drying or processing facilities for medicinal plants in Taranaki. Over time and with enough demand from small or medium-sized growers, it is hoped that there may be an opportunity to construct or install drying, and other value-add processing, facilities in region. A drying facility is necessary to convert raw material (roots and other plant material) into high-value products. Echinacea root for example, is approximately 75% moisture when harvested, however it needs to be dried to less than 10% moisture to have any significant market value.

Initial feasibility of drying equipment indicates that the cost of purchase starts at \$145,000 (+ GST)<sup>14</sup>. This size of dryer would be capable of drying up to 450kg of roots at once, taking approximately 24 – 48 hours to fully dry. This cost would not be prohibitive if it were a shared asset by a collective of small local growers, as suggested by the Stratford Herb Society. Although a modest initial set up, it could be scaled up until such time as a larger facility is needed. Further consideration should also be given to the supporting facilities and processes required to operate the dryer, such as a building and post-drying packaging equipment.

## WASTE MANAGEMENT

Not every aspect of each plant can be used for medicinal benefits and the handling of waste should also be considered as it can be leveraged as a further opportunity. Effective recycling of residual biomass or waste from medicinal plants will not only increase economic gain, but will also create practical, sustainable solutions for disposal. Recycling waste and incorporating aspects of a circular economy should be a foundation of the development of any new medicinal plant industry.

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<sup>14</sup> This cost is current at the time of writing, and includes three drying racks that would be the minimum requirement. More details can be found at <https://dryingsolutions.co.nz/products-systems/>.



# Medicinal plant supply chain

The medicinal plant industry in New Zealand is still in its infancy, however, the broader natural health and wellbeing sector is well established. Some key players that in this sector that could connect with the emerging medicinal plant industry include:

SUPPORT	CHANNELS TO MARKET	SERVICES AND PROCESSING
<p><b><u>CONSUMER HEALTHCARE PRODUCTS NZ</u></b></p> <p>CHPNZ is the voice of the consumer self-care industry. They represent manufacturers and distributors of non-prescription healthcare products with the aim ensuring safe, effective self-care products are accessible for all New Zealanders. CHPNZ plays an important advocacy role for the industry, as well as informing and facilitating discussion between their 30+ members.</p> <p><b><u>HERB FEDERATION OF NEW ZEALAND</u></b></p> <p>The Herb Federation is dedicated to promoting the knowledge and use of herbs through educational programmes, research and sharing experiences of its members throughout the community. They support the ongoing activities of a dozen local herb societies across New Zealand, including the Stratford herb Society.</p> <p><b><u>NATURAL HEALTH PRODUCTS NZ</u></b></p> <p>Natural Health Products NZ is a national industry organisation representing the natural products, functional foods, complementary medicines, cosmeceuticals, and nutraceuticals industries in New Zealand. They were established in 2002 by industry with support from New Zealand Trade and Enterprise and now more than 80% of all companies involved in New Zealand's natural product industry, including all major brands and manufacturers, are members.</p> <p><b><u>NATUROPATHS &amp; MEDICAL HERBALISTS OF NEW ZEALAND</u></b></p> <p>NMHNZ is a member-based organisation that aims to provide support and to progress and protect the development of naturopathic medicine in New Zealand. They do this by ensuring -naturopathy is visible and accessible to all New Zealanders, providing a publicly available resource of qualified and professional members, and promoting naturopaths as valuable partners in the health care system.</p>	<p>Below is a snapshot of some of the leading natural product brands available in NZ. A more complete list can be viewed on the <a href="#">Natural Health Products NZ website</a>.</p> <p><b><u>ARTEMIS</u></b></p> <p>Artemis was founded in 1998 with a primary focus on using the power of nature for healing and health care. They produce a range of plant remedies, which combine traditional formulations with the validation of modern scientific evidence. Artemis has seen significant growth over the last decade on the back of export sales in China.</p> <p><b><u>BLACKMORES</u></b></p> <p>Blackmores is one of Australia's leading natural health companies, founded in 1932. They manufacture and sell a range of vitamins, minerals, herbal and nutritional supplements primarily to the Asia-Pacific market. Their ingredients are sourced from all around the world.</p> <p><b><u>GO HEALTHY</u></b></p> <p>Go Healthy is one of New Zealand's leading supplement brands, with a range of products that feature medicinal plants, including echinacea and ashwagandha. Produced in Auckland and exporting to an international market, they source their ingredients from New Zealand and around the world.</p> <p><b><u>PHYTOMED (INCLUDING KIWHERB)</u></b></p> <p>Phytomed Medicinal Herbs Ltd was established in 1998 by founder Phil Rasmussen. The company's practitioner range covers more than 200 different liquid extracts and tinctures, dried herbs and tea blends. Phytomed pursues a rigorous New Product Development and Research &amp; Development programme and is a certified Good Manufacturing Practice (GMP) manufacturer.</p> <p>Phytomed also manufactures and markets the Kiwiherb consumer range of herbal products. Clinically formulated and unique, this practitioner strength range provides families with reliable products for natural healthcare.</p>	<p><b><u>ASSUREQUALITY – KAITIAKI KAI</u></b></p> <p>AssureQuality provides a broad range of food assurance services across the entire supply chain of Aotearoa's food and primary production sectors. Their independent, impartial, and internationally accredited inspection, certification, verification, and testing services allows customers to access the world's largest markets. They operate across a number of different industries, including food manufacturing, horticulture and pharmaceuticals.</p> <p><b><u>NATUROPATHIC COLLEGE OF NEW ZEALAND</u></b></p> <p>NCNZ is the country's leading provider of education relating to natural medicine. Based in New Plymouth, Taranaki, they have been operating since 1979. They offer a range of study options for people considering entering a natural health-based career. Their level 7 Advanced Diploma in Health Services allows people to practice as Naturopaths and Nutritionists.</p>

# Drivers of industry growth

The global demand for herbal medicines and their raw materials has been rising for many years and has been spurred on by COVID-19. The medicinal herb market was estimated to be approximately USD\$185 billion in 2019 and is expected to reach USD\$430 billion in 2028<sup>15</sup>. This projected growth is driven by a number of key factors including:



15 <https://www.fortunebusinessinsights.com/herbal-medicine-market-106320>

# Assessing the options

## – which variety should you grow?



### ECHINACEA

*Echinacea Angustifolia* (Narrow-leaved purple coneflower)

#### Profile

Echinacea is a flowering plant that is a member of the sunflower family. Native to North America, the history of the plant goes back to North American native tribes that used it as a remedy for a range of ailments and to treat pain. Planted in spring and harvested in early-mid summer, echinacea is mainly tap rooted and usually grows to between 30 – 60cm tall. Echinacea prefers warmer areas and is sensitive to cold and extreme weather conditions.

#### Benefits and uses

Three parts of the echinacea plant can be harvested, the roots, leaves and stems. However, compared to the leaves and stems, the roots have a higher concentration of favourable compounds, such as alkylamides<sup>16</sup>, and are the primary output.

When growing echinacea it is important to understand alkylamide levels. Alkylamides are a class of compounds present in the genus Echinacea (Asteraceae), which have been shown to have high bioavailability and immunomodulatory effects. The higher the level of alkylamides, the better. Roots typically have high levels of alkylamides, but there is also a market for flowering tops, particularly in Europe, although this price is usually cheaper. Both roots and tops can be harvested, however, the financial assessment only considers harvested roots.

The AbacusBio assessment considered the existing scientific research and trials that have been undertaken for each plant. They noted that moderately reliable 'in vitro' studies<sup>17</sup> had been completed for echinacea.

Echinacea is manufactured into a wide range of products including ointments, lotions, creams, tinctures, liquid and dry extracts, and toothpaste. The use of echinacea as a medicinal herb is typically for the enhancement of immune activity and the reduction of the duration of illness. It is thought to have the following medical effects:

- Stimulation of phagocytosis process that eliminates small foreign particles that enter the body.
- Increases cell proliferation and creation of new cells, enhancing immune response and tissue growth.
- Stimulate production of interferon, proteins that detect germs and trigger a heightened response from nearby anti-viral defences.
- Prevents hyaluronidase enzymes from breaking down hyaluronic acid in the body that supports healthy skin, tissue, joints and eyes.
- Prevent the growth of fungi and bacteria.
- Reduce levels of blood sugar and anxiety.

Echinacea can be made into capsules, ointment, and creams. Common applications also include food and beverages, pharmaceuticals, nutraceuticals, ornamentals, cosmeceuticals, and essential oils.

#### Financial assessment

Echinacea is the bestselling medicinal plant worldwide and accounts for approximately 5% of all herbal supplements and remedies sold globally. The global echinacea extract market was valued at USD\$1.5b in 2019 and is projected to grow to USD\$2.9b by 2027.

Internationally, the quality of existing echinacea products is inconsistent and often poor. Although the cost of New Zealand grown extract can be 40 – 50% more expensive, there is demand for trusted, high-quality product produced in a transparent way, which may allow for the growth of the New Zealand market.

The potential gross margin for growers producing echinacea is shown in the table below. Created by The Agribusiness Group, the gross margin has been created with reference to overseas data which the costs have been adapted for the costs that would occur in New Zealand with the only New Zealand created data being in relation to the yield and price. These details should be considered as a likely indication of returns from a one-hectare field, rather than an accurate representation of returns, and further professional advice should be sought.

<sup>16</sup> Alkylamides are a group of bioactive natural compounds that support a range of biological functions, such as immunomodulatory, antimicrobial, and antiviral activities.

<sup>17</sup> In vitro refers to tests completed in a lab (e.g. in a test tube or petri dish) which in vivo refers to tests completed using a whole living organism (e.g. humans or animals).



Income			
Item	Yield (tonnes/ha)	Price (\$/tonne)	Total income (\$)
Dried roots	0.5	\$80,000	\$40,000
<b>Expenses</b>			
Item	Unit price	Quantity	Sub-total
Seed	\$500/kg	1.25	\$625
Plugs	\$0.06/individual plug	100,000	\$6,000
Planting	\$30/hour	130	\$3,900
Fertiliser	\$525/application	1	\$525
Chemicals	\$64/application	2	\$128
Machinery operating	\$2,500/hour	1	\$2,500
Weeding	\$30/hour	150	\$4,500
Harvesting/cleaning/drying	\$30/hour	200	\$6,000
<b>Total</b>			<b>\$24,178</b>
<b>Balance</b>			
Item	Value		
Income	\$40,000		
Expenses	\$24,178		
<b>Gross margin</b>	<b>\$15,822</b>		

The above financial assessment is determined based on a yield of 0.5 tonne of root from a one-hectare field, with the price set at \$80,000/tonne. The below table considers variability to both yield and market price and indicates a range of gross margins<sup>18</sup>:

Dried root yield per hectare (tonnes)						
		0.4	0.45	0.5	0.55	0.6
Price per tonne of root (\$)	\$70,000	\$3,822	\$7,322	\$10,822	\$14,322	\$17,822
	\$75,000	\$5,822	\$9,572	\$13,322	\$17,072	\$20,822
	\$80,000	\$7,822	\$11,822	\$15,822	\$19,822	\$23,822
	\$85,000	\$9,822	\$14,072	\$18,322	\$22,572	\$26,822
	\$90,000	\$11,822	\$16,322	\$20,822	\$25,322	\$29,822

### Challenges and opportunities

There are a range of challenges and opportunities to take into account when considering whether to grow echinacea in Taranaki including:

- Processing (drying) infrastructure will be required to extract value from the crop.
- There can be a risk of over-supply as the crop is very seasonal.
- Customers can easily be misled if products are mislabelled, especially if multiple species are used.
- Crucial to position Taranaki product as pure and high quality to ensure differentiation and highest possible market price.
- Large-scale cultivation will require skilled labour and long-term investment of time and money into assessing, testing, and establishing a supply chain.
- It is expected that further value can be added by investing in R&D to develop new products and improve processing methods and efficiencies.

<sup>18</sup> Assuming expenses remain at the same level.



## ASHWAGANDHA

*Withania somnifera* (ashwagandha)

### Profile

Ashwagandha is an annual evergreen shrub from the nightshade family that is traditionally grown in India, the Middle East and parts of Africa. It can grow to between 150cm – 170cm, producing approximately 10cm long leaves with small bright orange berries that contain multiple seeds.

It is one of the most important herbs of Ayurveda, a natural system of medicine used in India. It has been used for millennia as part of a technique called Rasayana, intended to invigorate the body and lengthen lifespans.

### Benefits and uses

Ashwagandha is considered to be one of the best rejuvenating agents and is used in the treatment of a wide range of illnesses including:

- Reduction of stress/calming of the nervous system.
- Regulating and reducing blood sugar levels.
- Reducing the incidence of cancer.
- Anti-inflammatory and analgesic properties.
- Improving memory.
- Attention deficit hyperactivity disorder.

The AbacusBio assessment considered the existing scientific research and trials that have been undertaken for each plant. They noted that many studies looking at the antistress and adaptogen potential of ashwagandha had been completed which found the plant to have neuroprotectant properties.

### Financial assessment

The global ashwagandha extract market was valued at USD\$10.5m in 2019 and is expected to grow to approximately USD\$16.5m in 2026. The largest share of international market demand is from India, however, demand from North America and Europe is expected to grow owing to the increase in the use of the plant in dietary supplements and various R&D activities.

The current international market supply is dominated by ashwagandha grown in India. However, this product is often not organic and has considerable traces of pesticides and heavy metals. A New Zealand based supply chain centred around an organic, high-quality product has the potential to benefit from international growth in demand over the next decade.

The potential gross margin for growers producing echinacea is shown in the table below. Created by The Agribusiness Group, the gross margin has been created with reference to overseas data which the costs have been adapted for the costs that would occur in New Zealand with the only New Zealand created data being in relation to the yield and price. These details should be considered as a likely indication of returns from a one-hectare field, rather than an accurate representation of returns, and further professional advice should be sought. It is expected that further value can be added by investing in R&D to develop new products and improve growing and processing methods and efficiencies.

Income			
Item	Yield (tonnes/ha)	Price (\$/tonne)	Total income (\$)
Dried roots	0.5	\$30,000	\$15,000
<b>Expenses</b>			
Item	Unit price	Quantity	Sub-total
Seed	\$100/kg	5	\$500
Plugs	\$0.06/individual plug	60,000	\$3,600
Planting	\$30/hour	65	\$1,950
Fertiliser	\$375/application	1	\$375
Chemicals	\$64/application	2	\$128
Machinery operating	\$1,250/hour	1	\$1,250
Weeding	\$30/hour	30	\$900
Harvesting/cleaning/drying	\$30/hour	55	\$1,650
<b>Total</b>			<b>\$10,353</b>
<b>Balance</b>			
Item	Value		
Income	\$15,000		
Expenses	\$10,353		
<b>Gross margin</b>	<b>\$4,647</b>		

The above financial assessment is determined based on a yield of 0.5 tonne of root from a one-hectare field, with the price set at \$30,000/tonne. The below table considers variability to both yield and market price and indicates a range of gross margins<sup>19</sup>.

Root yield per hectare (tonnes)						
		0.4	0.45	0.5	0.55	0.6
Price per tonne of root (\$)	\$20,000	-\$2,353	-\$1,353	-\$353	\$647	\$1,647
	\$25,000	-\$353	\$897	\$2,147	\$3,397	\$4,647
	\$30,000	\$1,647	\$3,147	\$4,647	\$6,147	\$7,647
	\$35,000	\$3,647	\$5,397	\$7,147	\$8,897	\$10,647
	\$40,000	\$5,647	\$7,647	\$9,647	\$11,647	\$13,647

### Challenges and opportunities

There are a range of challenges and opportunities to take into account when considering whether to grow ashwagandha in Taranaki including:

- Excessive rainfall can be harmful to the crop.
- Little is known about the processing infrastructure required.
- There is potential to further promote the health benefits of the product. and increase the health.
- Not all product manufacturers are monitored, and some product contents may be misleading, resulting in lower levels in trust for other products in market.
- India is the primary market of production, and trusted local sources may be preferred due existing supplier relationships. However, investment into R&D in New Zealand may result in increased yields or plant quality compared to Indian sources.

<sup>19</sup> Assuming expenses remain at the same level.





## CALENDULA

*Calendula officinalis* (Marigold)

### Profile

Calendula is a flowering plant from the daisy family that is commonly grown in North America, Europe, India and China. It is a short-lived aromatic herbaceous perennial with sparsely branched lax or erect stems that can grow to between 40cm – 45cm tall. It has a long tap root with numerous secondary roots and alternate leaves with yellow to orange flowers. Calendula prefer cool temperatures and it's flowers last longer in filtered sun or shady areas.

### Benefits and uses

Calendula's main commercial value is in the form of dried flower heads, including petals. These parts of the plant can be used in a variety of cosmetic, medicinal and chemical products with various clinical trials showing the plant can support:

- Wound healing in skin tissue for minor cuts and grazes.
- Increased flavonoids (that support good cholesterol).
- Increased antimicrobial and antiviral activity.
- Inflammation of the mouth and pharynx.
- Skin tightness and moisture levels to reduce the appearance of aging.

The AbacusBio assessment considered the existing scientific research and trials that have been undertaken for each plant. They noted a range of 'in vivo' studies have shown to modulate hepatotoxicity and nephrotoxicity and extract bioactive compounds shown to scavenge radical oxygen species. They also noted that a vast number of research papers are continuing to look at the potential medical benefits of calendula. In addition to this, the plant has already been approved by the European Medicines Agency as a traditional medicinal product.

### Financial assessment

The international demand for calendula is moderate with a global market worth USD\$16m in 2017. The main market for international supply of calendula is Egypt, however, products from Egypt described as organic are often low quality and not organic. New Zealand grown calendula, is of good quality which can be hard to access. A New Zealand based supply chain centred around an organic, high-quality product has the potential to benefit from international growth in demand over the next decade.

The potential gross margin for growers producing calendula is shown in the table below. Created by The Agribusiness Group, the gross margin has been created with reference to overseas data which the costs have been adapted for the costs that would occur in New Zealand with the only New Zealand created data being in relation to the yield and price. These details should be considered as a likely indication of returns from a one-hectare field, rather than an accurate representation of returns, and further professional advice should be sought.

Income			
Item	Yield (kgs/ha)	Price (\$/kg)	Total income (\$)
Dried flower heads	800	\$37	\$29,600
<b>Expenses</b>			
Item	Unit price	Quantity	Sub-total
Seed	\$100/kg	12	\$1,200
Drilling	\$170/hour	3	\$510
Fertiliser	\$3425/application	1	\$425
Chemicals	\$110/application	2	\$220
Machinery operating	\$250/hour	1	\$250
Weeding	\$50/hour	5	\$250
Harvesting (drying flowers)	\$30/hour	525	\$15,750
<b>Total</b>			<b>\$18,605</b>
<b>Balance</b>			
Item	Value		
Income	\$29,600		
Expenses	\$18,605		
<b>Gross margin</b>	<b>\$10,995</b>		

The above financial assessment is determined based on a yield of 800kg of dried flower head from a one-hectare field, with the price set at \$37/kg<sup>20</sup>. The below table considers variability to both yield and market price and indicates a range of gross margins<sup>21</sup>.

Dried flower head yield per hectare (kgs)						
		700	750	800	850	900
Price per kg of dried flower head (\$)	\$25	-\$1,105	\$145	\$1,395	\$2,645	\$3,895
	\$31	\$3,905	\$4,645	\$6,195	\$7,745	\$9,295
	\$37	\$7,295	\$9,145	\$10,995	\$12,845	\$14,695
	\$43	\$11,495	\$13,645	\$15,795	\$17,945	\$20,095
	\$49	\$15,695	\$18,145	\$20,595	\$23,045	\$25,495

### Challenges and opportunities

There are a range of challenges and opportunities to take into account when considering whether to grow calendula in Taranaki including:

- Crop needs careful management as plants readily re-seed and too many plants in the same area can stunt or slow growth.
- There is little known about processing infrastructure required, however, alcohol, brine and oil can be used to preserve the calendula's properties.
- Flower heads need to be dried in a dryer at a low temperature which can take up to a week.
- It is expected that further value can be added by investing in R&D to develop new products and improve growing and processing methods and efficiencies.

<sup>20</sup> Other sources have indicated a willingness to pay higher for quality, organic material.

<sup>21</sup> Assuming expenses remain at the same level.

## CULTIVATION COMPARISON

	Echinacea	Ashwagandha	Calendula
<b>Soil and climate</b>	Best grown in loose topsoil with good aeration, drainage and fertility - preferred soil pH level between 5.9 – 8.0.	Most suited to tropical temperatures ranging from 20°C – 35°C but also suitable in other regions with reasonable rainfall. Best grown in loose topsoil with good aeration, drainage, and fertility – preferred soil pH level between 7.5 – 8.0.	Best grown in a well-drained soil as wet soil can cause root rot – preferred soil pH level between 6.0 – 7.0.
<b>Planting</b>	Should be planted in spring - spacing of 30cm between rows and 15cm within rows at a depth of 5mm - populations of 88,000 – 110,000 plants/ha are ideal.	Should be planted in spring – spacing of 20 – 25cm between rows and 10 – 15cm within rows (approx. 15 – 25kg/ha).	Should be planted in spring – spacing of 70cm between rows and 25cm within rows.
<b>Direct seeding vs. Transplant</b>	Can be grown either way - transplanting allows for easier management of weeds and can ensure even root production.	Can be grown either way - transplanting can ensure even root production.	Can be grown either way - transplanting can ensure even root production.
<b>Transplanting</b>	Transplant at 10 weeks of age.	Transplant at 4 weeks of age.	Transplant between 4 – 6 weeks of age.
<b>Fertility management (It should be noted that organic methods are likely to enhance product marketability)</b>	Application of range of fertiliser recommended prior - Nitrogen (112kg/ha) phosphorus (56kg/ha), potassium (190kg/ha) and sulphur (22kg/ha).	Application of nitrogen (15kg/ha) and phosphorus (15kg/ha) beneficial for higher production.	Application of range of fertiliser recommended to support maximum flower yield - Nitrogen (90kg/ha), phosphorus (100kg/ha) and potassium (75kg/ha).
<b>Pest management</b>	Few diseases and pests - Sclerotinia stem, root rot, leafhoppers and aphids are of biggest concern but leave little productive damage to crop.	Few diseases and pests – seedling blight, leaf blight, mites and aphids are of biggest concern by leave very little productive damage to crop.	Powdery mildew ( <i>Sphaerotheca fuliginea</i> and <i>Erysiphe cichoracearum</i> ) which damages flowers during cool periods is a problem – preventative applications of sulphur or baking soda sprays may help but can be treated with neem oil or horticultural sprays.  Aster yellows (which cause stunting and flower deformation) infection can be high – controlled by measuring leafhoppers with sweep nets and neem oil sprays but only reactionary treatment is to remove infected plants.
<b>Weeds</b>	Biggest problem with crop. Inter row hoeing or stem treatment only way to successfully manage them.	Rapid growth and bushy habit will usually outgrow weeds – hand weeding, inter row hoeing or steam treatment ways to successfully manage weeds.	If planted in rows, regular cultivation and hoeing should be sufficient to keep weeds down to levels that do not interfere with flower production or harvest.
<b>Harvest</b>	Harvest approx. 90 – 120 days after sowing - best to harvest using adapted potato farming equipment.	Harvest approx. 150 – 180 days after sowing – best to harvest using adapted potato farming equipment.	Harvest three times at fortnightly intervals starting approx. 70 days after sowing – best to harvest by hand as to not damage the flower heads, estimated picker can pick between 12 – 20kg/hour.
<b>Processing</b>	Drying is important to reduce moisture from 75% to 10% - best method is to use dryer that has constant air movement but doesn't exceed 30°C.	Cleaning/washing of roots very important - drying is important to reduce moisture from 75% to 10%.	Drying important, heads should be spread on screen no more than one layer thick – a brief period of 50°C – 60°C (to remove surface moisture) should be followed by sustained period of not more than 35°C.
<b>Hydroponic growing<sup>22</sup></b>	Potential to grow hydroponically to reduce amount of labour in tending crop and controlling growing environment.	Potential to grow hydroponically to reduce amount of labour in tending crop and controlling growing environment.	Relatively easy to grow in a hydroponic system.

22 Hydroponic growing involves growing plants without soil by using a water-based mineral nutrient solution

# Next steps

## YOUR SUPPORT TEAM

**Setting up a commercial medicinal plant cultivation can be challenging and will require a range of supporting services and advice. Initial contact should be made with:**

- Stratford Herb Society.
- Existing players within the medicinal plant value chain in New Zealand, such as Natural Health Products New Zealand.

As the industry is in its infancy in New Zealand, many of these supporting services might initially be provided from outside the region.

## FUNDING OPPORTUNITIES

**The source or sources of funding for development of a medicinal plant cultivation or industry will depend on the circumstances of the party or parties carrying out the development and the structure of the proposed investment.**

- Several New Zealand banks have teams with experience in assessing opportunities and providing loans for agriculture developments.
- Some projects are funded by the landowner – perhaps using equity and cashflow from an existing farming or land use operating in conjunction with medicinal plant development.
- There are also developments part-funded by syndicators where equity is provided from multiple investors.
- Other sources of funding may also be available for specific activities such as R&D. Venture Taranaki can advise on whether there are other such funding opportunities available.

## CHECKLIST AND ACTION GUIDE FOR INTERESTED INVESTORS

If you are a/an:

- Existing Taranaki grower looking to expand your offering or connect with other interested parties.
- Taranaki landowner (with a small amount of land) considering how best to make use of your property.
- Investor or entrepreneur considering future trends and growth markets in the food and fibre sector.
- Manufacturers or service provider looking to support the development of an emerging sector.
- Register your interest with Venture Taranaki.

## REVIEW FURTHER INFORMATION

- AbacusBio report commissioned by Venture Taranaki
- AgriBusiness Group report commissioned by Venture Taranaki
- The online [Herb Blurb](#) blog, regularly updated by Phil Rasmussen
- [Herbal Harvest, Commercial organic production of quality dried herbs. by Greg Whitten, Tasmania, Australia, Bloomings Books 2004](#)
- [www.nutraingredients.com](http://www.nutraingredients.com) – global trends & news
- [www.naturalhealthproducts.nz](http://www.naturalhealthproducts.nz) – national industry body
- [www.nzamh.org.nz](http://www.nzamh.org.nz) – NZ Association of Medical Herbalists

**Get in touch, email [branchingout@venture.org.nz](mailto:branchingout@venture.org.nz)**



# Appendices

## APPENDIX A: LONG LIST OF MEDICINAL PLANTS

Below is a long list of the medicinal plants growing in Taranaki, as identified by 46 local growers. This activity was facilitated by the Stratford Herb Society.

The information was then provided to AbacusBio for further analysis based on agronomic, market scientific, and supply chain perspectives.

Nigella sativa (black cumin)
Echinacea angustifolia (narrow leafed coneflower)
Withania somnifera (ashwagandha)
Leonurus cardiaca (motherwort)
Calendula officinalis (marigold)
Passiflora incarnata (passionflower)
Scutellaria baicalensis (skullcap)
Filipendula ulmaria (meadow)
Melissa officinalis (lemon balm)
Bacopa minnieri herb (brahmi)
Sambucus (elderberry)
Artemisia annua (sweet wormwood)
Valerian
Rehmannia glutinosa (Chinese herb)
Hydrastis canadensis (golden seal)
Ginkgo biloba (maidenhair)
Centella asiatica (gotu kola)
Astragalus
Hypericum (St John's Wort)
Ginger
Scutellaria lateriflora (skullcap)
Kawakawa
Usnea
Marrubium vulgare (white horehound)
Mahonia aquifolium (Oregon Grape)
Althea officinalis (marshmallow)



## ABOUT VENTURE TARANAKI

Venture Taranaki is the regional development agency for Taranaki. The organisation is responsible for regional development strategy, enterprise and sector development, investment and people attraction, and major project initiatives which contribute to the inclusive and sustainable growth of the region. Venture Taranaki is a registered charitable trust and a New Plymouth District Council Controlled Organisation, supported by the three District Councils of the Taranaki region.

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