Feasibility Study

2025

A Detailed Report

November 2025

Executive Summary

This document presents a comprehensive feasibility study on the potential for Mānuka honey production in the UK, examining the ecological, agricultural, and economic aspects of the endeavour.

According to the UK The Bee Farmer's Association[1], UK currently produces only around 14% of the honey consumed domestically, compared to the European average of approximately 60%. The study identifies suitable regions for cultivating Mānuka trees based on soil pH levels, with the ideal range being 5.5 to 6.5. Specific areas in East Anglia and parts of the southern and western England, are highlighted as particularly conducive for growth.

Critical role of pollinators in agriculture highlights the decline of bee populations and the potential of the bee farming industry to enhance crop yields through managed pollination services. Studies show that to produce one pound of honey-particularly from the nectar of Mānuka tree flowers-bees must visit approximately two million flowers.

The potential revenue from Mānuka honey production is estimated, suggesting that one acre could have 2-4 hives (Apiary) and could produce up to 60-80kg of honey that is £50kg per kilo that is £3,000 to £4,000 per acre per year, with the possibility of higher earnings in controlled environments. The Mānuka honey grading system, called the Unique Mānuka Factor (UMF), assesses the honey's antibacterial properties, with higher UMF ratings indicating greater potency. The study also examines the expected honey yield per hive placement to maximize production, estimating that a typical hive could produce around 35 kilograms of honey per season.

The study concludes that while there is potential for successful Mānuka honey production in the UK, challenges such as environmental conditions and market competition need to be considered.

[1] https://beefarmers.co.uk/about-bee-farming/what-is-bee-farming

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1. Introduction

The "Glass ceiling" term is used to describe artificial barriers created by attitudinal and institutional biases that avert qualified individuals to reach to their maximum (Mattis, 2004). According to the UK The Bee Farmer's Association[2], UK produces around 14% of the honey consumed by the domestic market. This compares with European average of around 60%.

This is widely known that most of the pesticide spray are harmful in pollination and damage the immune system of the insects that are needed for cross pollination. To increase the pollination, one needs to reverse the pollinator decline. Bee farming industry, through the provision of managed and targeted pollination services, is in a unique position to help improve crop yield and increase productivity.

According to Houses of Parliament report posted in Sep 2013[3], Pollination by insects enables the reproduction of flowering plants and is critical to UK agriculture. The reports states, the number of bumblebees, solitary bee and hoverfly species in the UK, Netherlands and Belgium has generally declined since 1950. Two bumblebee species are thought extinct in the UK and eight have undergone severe range contractions (POST, 2013).

https://manukora.com/blogs/honey-guide/tagged/land-bees

2. Description of Product and services (Mānuka Honey and by products)

2.1. Overview

There are four main pillars to ensure we are allowing the bees to live healthy, happy lives in their natural habitats[4]

1. We leave honey on the hivers for the bees to go through winter, which means the bees thrive s mother nature intended, so long as the weather is manageable, and no external support is needed

[2] https://beefarmers.co.uk/about-bee-farming/what-is-bee-farming
[3] https://researchbriefings.files.parliament.uk/documents/POST-PN-442/POST-PN-442.pdf
[4] https://manukora.com/blogs/honey-guide/the-art-of-ethical-beekeeping

2. No excessive hive transportation means our bees would never unsettle or shift to meet production needs. Hence the extraction process would be on the spot.
3. We would ensure our bees have abundance of nectar and pollen in close proximity
4. Honey would be free of glyphosate, GMOs and antibiotics and ensure to keep it 100% raw.

2.2. Mānuka Tree

Mānuka tree (Leptospermum scoparium) is New Zealand and Australia native tree that is famous for its flowers that are used to make Mānuka Honey. The tree typically grows between seven and 16 feet tall, but some can grow up to 30 feet tall. They have hard, red wood, and evergreen leaves that are small and prickly, measuring around half an inch in size.

2.3. Resilience

Mānuka tree has ability to survive in otherwise inhospitable areas, and they can withstand drought and frost once they are established. Another quality of this plant is that it prevents the soil erosion and provide the shade needed for slow growing native plants to establish.

2.4. Mānuka Flowers

Mānuka flowers bloom for two to six weeks each year during summer season and each bloom may only be open for around five days[5]. These sweet smelling white and pink flowers (refer Appendix 1) attract all kinds of pollinators, most notably, the honeybees responsible for the creation of Mānuka honey.

Each tree produces limited amount of nectar, and it takes a lot of nectar to produce a small amount of honey. Bees need to visit thousands of flowers to gather enough nectar for just a small amount of honey. According to School of Bees[6], on average bees need to visit about two million flowers to produce 1 pound (approx. 454 grams) of honey.

[5] https://manukora.com/blogs/honey-guide/Mānuka-tree
[6] https://schoolofbees.com/Mānuka-honey-the-complete-beginners-guide/

2.5. Mānuka Tree usage

Every part of the Mānuka tree is useful including its wood bark, leaves and flowers.

2.6. Mānuka Wood and Bark

Mānuka wood is hard, making it good for tools and housebuilding. Some people chew Mānuka bark to support sleep or brew it in a decoction to aid joint heath. Mānuka leaves

3. Innovative, Scalable and viable

In UK almost half of the Mānuka honey sold is not pure, according to Mānuka Doctor website[7], there are no reliable figures on exactly how much honey falsely labelled as Mānuka is sold in UK every year. But estimates based on New Zealand export figures suggest up to half of all honey sold as Mānuka may not contain what it claims on the jar.

Recent investigations and peer-reviewed reviews show alarmingly high levels of suspected adulteration in honey sold via large supply chains and retail outlets in the UK/ EU. The evidence supports a clear conclusion, there is a serious problem with honey fraud affecting much imported and supermarket-shelf honey, while small / local beekeeper honey is much less likely to be adulterated. According to EU Action report (Action, 2022), honey imported from the United Kingdom had higher suspicion rate 100%, likely the result of honey produced in other countries and further blended in the UK before its re-export to the EU. The report further says that the highest absolute number suspicious consignments originated from China that is 74%.

The plan is to grow Mānuka farm in 1 acre land to expand in next three years to 10 acres and then ultimate target is to expand the Mānuka farming into 100 acres land the achieve the economy of scale. In order to make the project viable during the gestation period of first two to three years, four more revenue streams are required to sustain the income stream.

1. Local honey extraction along with Mānuka honey
2. Mānuka tea from Mānuka dry leaves

[7] 5 ways to check your Mānuka Honey ISN'T fake - Mānuka Doctor

3. Mānuka confectionaries to sell along with Mānuka tea during Saturday and Sunday or in public holidays (onsite)
4. Mānuka plant nursery to grow for inhouse use and to sell in the market

4. Leptospermum Scoparium

There are over 14 species of Mānuka plants, seen in Annex 1. Mānuka shrub typically grows to 2-5m tall, but can grow into moderately sized tree, up to 15m or so in height. It is evergreen with dense branching and small leaves 7-20mm long and 2-6mm wide.

According to theplantcompany.co.nz[8], best Leptospermum for hedging is 'Red Damask'. It is fast growing evergreen shrub with dense foliage and bright red flowers.

4.1. Hardy Leptospermum Scoparium

Leptospermum is a hardy plant that can tolerate different land conditions such as can grow in wetlands, coastal areas and lowland forests. Most species of Leptospermum tolerate the temperature as low as -12 Celsius. Leptospermums are also drought tolerant and can thrive in a poor soil. However, they will grow best in a well-drained soil with full sun or partial shade.

4.2. Apis Mellifera Honeybees

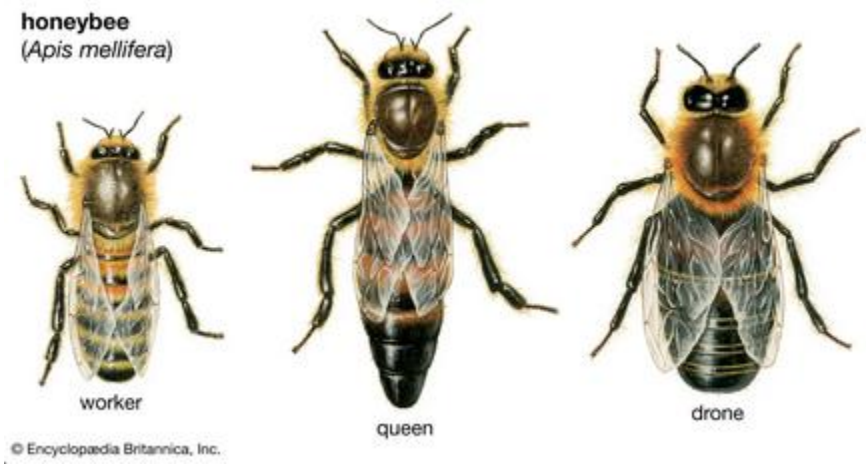
Mānuka honey the variety is produced by Apis mellifera honeybees, using Mānuka plants producing specific floral variety named as Leptospermum Scoparium (Johnston et al., 2018). Apis mellifera commonly known as Western honeybee or European honeybee. The specie, exhibits social behaviours with a caste system comprising a single fertile queen,

[8] https://www.theplantcompany.co.nz/shop/plants/latin/l/leptospermum-Mānuka

thousands of female worker bees, and seasonal male drones (Papa et al., 2022). Workers perform various tasks including foraging, brood care, and hive maintenance.

Other species of honeybees or native stingless bees elsewhere do produce honey, but it lacks the unique bioactive compounds (like methylglyoxal, MGO) characteristic of Mānuka honey. Differences in bee species impact honey flavour profiles and nutrients composition, but the critical factor of Mānuka honey quality is the Apis mellifera foraging on Mānuka flowers[9].

Figure 1: Apis Mellifera honeybee



5. MĀNUKA HONEY

The best variety of Leptospermum Scoparium is also known as Mānuka bush. Mānuka honey contains an active ingredient called methylglyoxal (MGO), which has been suggested to have antibacterial effects. The higher the MGO level, the more potent the honey is. In addition to MGO, Mānuka honey also contains vitamins, minerals, and amino acids. The properties make it a very versatile therapeutic agent.

NPA (non-Peroxide Activity) is an additional antibacterial factor found in Mānuka honey, adding to its unique antiseptic properties. According to the research done in 2009, DHC (Dihydroxyacetone) by itself has no antibacterial characteristics, but it can be converted

[9] https://manukora.com/blogs/honey-guide/bees-influence-honey-taste

into GMO through a series of chemical reactions. In this way, the potential for MGO in Mānuka honey can be estimated by evaluating DHA levels[10].

According to uk.steenshoney.com, Mānuka honey is useful in digestion related issues such as IBS or ulcers etc[11]. It also helps in scratchy throats, infected sinuses and a rundown immune system.

5.1. Theoretical Honey per Acre

The land of 1 acre can have 2-4 hives that is one apiary site. Each hive could produce 20kg of honey per season[12]. Market wholesale price of Mānuka Honey is £50 per kilogram that means total revenue expected is £2,000 to £4,000 per year per acre. However, in controlled environment (such as green house) this number could increase to double. In natural climate the risks are extended rainy season during the flowering period that is barely 2 to 6 weeks in a year.

The returns could increase if the quality of MGO is sufficient to be a medical grade Mānuka honey, else would end up on the toasts. On the other side in one acre of greenhouse could fetch well over $4,000 worth of vegetables each year, the likes of tomatoes etc.

5.2. Grading of Mānuka Honey

The grading system for New Zealand Mānuka honey is known as UMF (Unique Mānuka Factor). UMF number on the label represents the amount of MGO in the bottle. The higher the UMF rating, the more antibacterial activity Mānuka honey has, and the more potent it is (Johnston et al., 2018). The composition of Mānuka honey consists of carbohydrates, minerals, proteins, fatty acids, phenolic and flavonoid compounds. UMF grading tests for four markers in Mānuka including Methylglyoxal, NPA and Leptosperin.

[10] https://melora.co.uk/blogs/news/what-is-the-best-grade-or-quality-of-Mānuka-honey
[11] https://uk.steenshoney.com/en-gcc/pages/targeted-range
[12] https://www.rotorualakes.co.nz/vdb/document/1174?utm_source

Figure 2: Mānuka Honey Gradings

5.3. Mānuka Honey Extraction

According to Mānuka Honey[13] a normal beehive produces 35 kilograms of Mānuka honey during the season. Around 95% of bees will forage within 6 km of their hive. Hive needs to be placed with large monospecific stands of Mānuka. Ideally, 2-4 hive is needs in every 1 acre of land. Therefore, should we start the farming with 10 acres land would require to hives and expected to produce 100 kilograms to 140 kilograms of Mānuka Honey.

In UK MGO250+ is being sold at £13 per 100grams. DAWAAM is expected to produce 100kilograms of Mānuka honey by the end of 3rd year, if not the second year.

5.4. Hedgerow Management Rules

In Uk the hedgerow management rules aim to protect hedgerows on agricultural land as these are important ecological building blocks across the landscapes. According to the Buffer Strip Rules[14], maintain a green cover on land within 2 metres of the centre of a hedgerow. Rule further stipulates, must not cultivate or apply fertilisers or pesticides to

[13] Mānuka-honey-industry.pdf (nzca.com)
[14] https://www.gov.uk/guidance/hedgerow-management-rules-buffer-strips

land within 2 metres of the centre of a hedgerow covered by the hedgerow management buffer strip rules.

6. MĀNUKA NURSERY

There are over 14 varieties of Leptospermum scoparium (Mānuka). The most famous are see as following:

Martinii (MI) – High DHA concentration 3.4mg per µL nectar, produce honey often rates UMF 15+ to UMF 25+. Expected honey

Nanum Tui (NT) – DHA concentration 2-3mg per µL nectar, honey with moderately high MGO (UMF 10-15) and reliable flowering even under mild frost. (Clearwater et al., 2018). The plant has better cold tolerance levels.

Red Ensign (RE) – intermediate level of DHA concentration, produce honey often rates UMF 8-12. High nectar sugar concentration, ensuring strong honey yield per hive.

Wiri Kerry (WK)- generates UMF 5-10, depending on the season. Hower it can produce good total honey yield (though lower UMF).

RD (Red Damask) – Intense red flowers, hardy and cold tolerant but low nectar sugar and DHA 0.1mg per µL. Results low-MGO honey (UMF < 5)

BQ (Burgundy Queen) – bright pink/red flowers and bronzy foliage

SF (Snow Flurry) – double white flowers

PC (Pink Cascade) – trailing or ground cover

Table 1: DHA → MGO Conversion and Quality Ranking

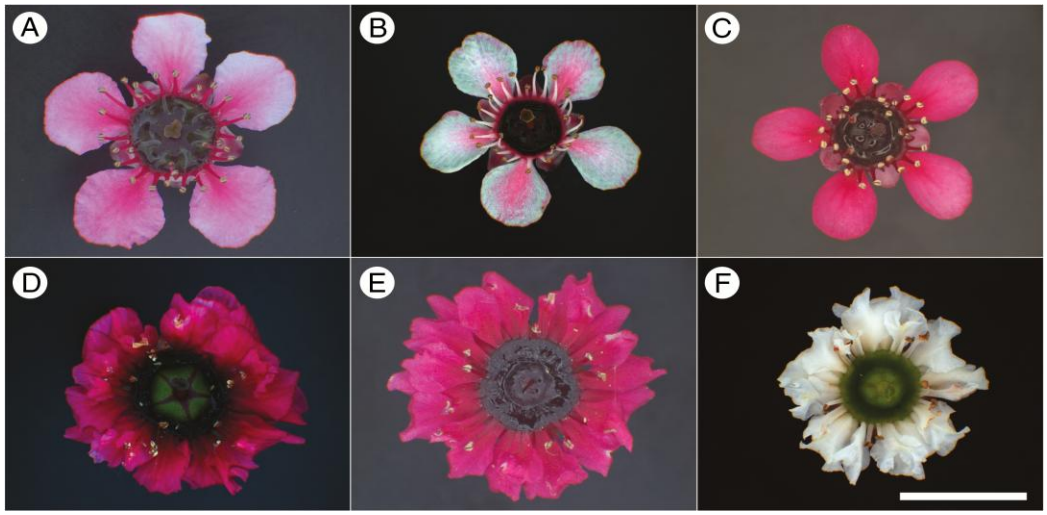
Cultivar	**Nectar DHA (mg µL^{-1})**	**Expected Honey MGO (mg kg^{-1})**	**Typical UMF**	**Relative Yield**
'Martinii' (MI)	3.5–4.0	400–850	15–25+	Medium
'Nanum Tui' (NT)	2.5–3.0	250–600	10–15	Medium–High

'Red Ensign' (RE)	1.0–2.0	100–300	8–12	High
'Wiri Kerry' (WK)	0.5–1.0	80–150	5–10	Very High
'Red Damask' (RD)	0.1–0.2	< 80	< 5	Very High

Table 1 shows the potential of various species of Leptospermum scoparium to extract Mānuka honey. According to a research report (Clearwater et al., 2018), The sugar content MI (Martini) is the highest 1.36mg, NT 0.85mg, RE 0.54mg, RD 0.14mg and SF 0.01mg. However, higher sugar level doesn't mean high MGO but high DHA (Docosahexaenoic Acid, a type of omega 3 fatty acid) in nectar converts MGO in honey. Two of the higher DHA content species are MI (Martinii) and NT (Nanum Tui).

https://pmc.ncbi.nlm.nih.gov/articles/PMC9206949/?utm_source

Figure 3: Morphology of Stage 3



Morphology of Stage 3 open flowers of the six mānuka (Leptospermum scoparium) genotypes used in this study. (A) 'Martinii' (MI); (B) 'Nanum Tui' (NT); (C) 'Red Ensign' (RE); (D) 'Red Damask' (RD); (E) 'Wiri Kerry' (WK); (F) 'Snow Flurry' (SF). Scale bar = 10 mm.

7. Mānuka Shopping Store and Café

Cafés in farm or natural rural settings capitalise on increasing interest in local food, sustainability, and the "farm-to-table" movement, attracting both locals and tourists who seek authentic, quality food and drink offerings with countryside ambiance. Location evaluation considers visibility, accessibility, footfall, and proximity to suppliers and target customers.

7.1. Mānuka Tea Production and Shopping Store

Mānuka tea is an infusion made from dried leaves of Leptospermum Scoparium, the same plant used in producing Mānuka honey. Apart from traditional/ ethnobotanical uses, recent scientific reviews identify the leaves and leaf-derived essential oil as sources of bioactive terpenes and phenolics with antimicrobial, antioxidant and anti-inflammatory properties, which underpins the functional-tea value proposition (Mathew et al., 2020). Traditional Māori practice and early European settlers brewed leaves of this plant for fever-reduction, urinary complaints and inhalation of the vapour. of New Zealand, the tea is valued for its soothing aroma and potential antimicrobial and anti-inflammatory properties (Hoang & Vuong, 2024).

In the UIK context, producing Mānuka tea provides an additional revenue stream by utilising non-nectar parts of the plant, especially during the non-flowering months, thereby maximising the return per acre of cultivation.

7.2. Raw Material and Processing

Mānuka leaves can be harvested twice yearly, typically late spring and early autumn, without damaging the tree. Fresh leaves are washed, shade-dried for 24-48 hours at temperatures <40 °C to preserve volatile oils, polyphenols, and then gently crushed or milled. Low temperature drying gives better retention of aroma and bio-actives (Alsaud et al., 2021). Careful pruning that removes leaves but preserves floral buds allows dual output (honey + leaves). Genotype and growth stage affect leaf chemistry, so schedule harvests to match target chemistry (Clearwater et al., 2018).

Leaves may be sold loose or packed into biodegradable tea bags. For higher value export, stream-distilled Mānuka essential oil (EO) and leaf extracts contain terpenes such as β-caryophyllene and other components with demonstrated antimicrobial activity, blended back into premium tea for aroma/functional claims, or used in cosmetic/therapeutic lines (Mathew et al., 2020).

7.3. Product Characteristics and Quality Metrics

Published work demonstrates substantial variation in chemistry and nectar/leaf composition across genotypes, this implies yield and quality trials are required for local UK cultivars. The use of moderate plantation density (800-1,000 shrubs/acre) and conservative per shrub dry leaf yield of 0.4-0.6kg per year. One acre block could yield 300kg to 600kg dry leaf per year (Hoang & Vuong, 2024). However, yield would vary substantially by cultivar, pruning regime, site and climate and therefore must be validated by field trials.

7.4. Safety, efficacy and regulatory notes

Mānuka leaf products are not graded by UMF. Any claims about antimicrobial or therapeutic activity must be carefully worded and supported by lab data, essential oils and concentrated extracts have stronger bioactivity in vitro but require safety / toxicology and regulatory checks for food or cosmetic use. Several recent papers document in-vitro antimicrobial and bioactive effects of leaf extracts and essential oil, promising for functional claims but not a substitute for regulatory compliance (Mathew et al., 2020).

7.5. Value-added and market opportunities

There is various way to achieve the value-added products such as;

Tea-honey crossover products, blended tea sachets with sachet of Mānuka honey in a gift pack. Premium, single-origin herbal teas can command strong retail prices; revenues depend on packaging, branding and channel (farm shop, online, export). The pricing of botanical tea market varies by positioning and certifications (organic, provenance) (Hoang & Vuong, 2024).

Essential oil lines, small batch EO for aromatherapy / topical formulations (requires cosmetic/therapeutic compliance).

Functional beverages and RTD, cold brew Mānuka leaf infusion for premium RTD market (requires shelf-life, microbial and packaging validation).

Certification / provenance, organic, provenance labelling and cultivar disclosure are important for premium positioning. Recent botanical reviews recommend genotype transparency because phytochemical profiles vary by genotype. Bee Propolis Throat spray[15] is herbal spray that is useful in throt infection, and many others are already in the market.

7.5.1. Supermarket Prices

In UK, the supermarket prices are as following;

Tesco:

Tesco Clear Honey 454g: £1.70 that means 1kg is £3.75

Rowse Pure Clear Honey 454g: £2.50 that means 1kg is £5.51

Rowse Mānuka (imported) Honey MGO 400+ 250g: £24 that means 1kg is £96

Sainsbury's:

Sainsbury's Clear Honey 454g: £1.65 that means 1kg is £3.64

Sainsbury's SO Organic Honey 340g: £2.85 that means 1kg is £6.27

Sainsbury's Mānuka (imported) Honey MGO 850+ 250g: £59 that means 1kg is £236

Waitrose:

Waitrose Clear Honey 340g: £2.20 that means 1kg is £6.47

Local Honey Hive & Keeper 227g: £5.5 that means 1kg is £24.23

Pure French Lavender Honey 250g: £6.50 that means 1kg is £26

[15] https://comvita.com/collections/bee-propolis

7.6. VALUE-ADDED AND MARKET OPPORTUNITIES

There is various way to

8. BEE FARMING IN UK

According to the Bee Farmers' Association (BFA), which represents professional bee farming businesses in the UK, states that its members collectively manage over 75,000 colonies (hives) (Bee Farmers Association, 2025). The UK produces only 13% of the honey consumes (Open Government License v3.0, 2020). UK national honey production figures are modest; one estimate puts UK production at around 9,800 tonnes in 2024 (slightly down from 9,900 tonnes in 2023). Total honey imports in UK are 50,917 tonnes in 2023 (CBI, 2024).

8.1. HILLTOP HONEY (MID WALES)

Largest honey producer in UK is Hilltop Honey, founded by Scott Davies in 2011, based in Newtown, Mid-Wales. The company states it is the second largest honey brand in UK by volume. Annual turnover of the company is £33 million. Company has processing plant capable of over 30,000 tonnes per year[16]. According to their website Hilltop does sale Manuka honey but that is imported from New Zealand[17] not the locally produced.

8.2. ROWSE HONEY (MID WALES)

Rowse Honey Ltd is a longstanding UK honey brand founded in 1954 and part of the wider food group Valeo foods. Rowse is a major brand and supplier for retail and wholesale, it appears to rely significantly on sourcing / imported honey and blending, rather than only UK origin hive volumes. According to the company registry profile, Rowse Honey Limited had a turnover of about £154.26 million for the year ending 31 March 2024[18]. Since the company

[16] https://www.thegrocer.co.uk/news/hilltop-honey-agrees-10m-banking-package-to-back-overseas-expansion/694846.article?utm_source
[17] https://lovehilltop.com/products/manuka-honey?_pos=1&_sid=6f5ec91f2&_ss=r
[18] https://open.endole.co.uk/insight/company/01024018-rowse-honey-limited?utm_source

does not segregate the revenue from local produces honey and imported honey that's why it is difficult to ascertain the exact value of local production.

8.3. Denrosa (Scotland)

Denrosa is Scotland's largest producer of Heather Honey and comb honey. Company also breeds own highly regarded lines of queen bees and supply well-priced hive parts and wax foundation. Denrosa sell honey in bulk, the bees and beekeeping equipment[19].

8.4. Viktor Foods Llc

Since the extraction of Mānuka honey is only 2 to 6 weeks in a year. Rest of the time I require to establish other apiaries from starting from 20 in 2026 to double every year. The revenue stream is in line with other local producers such as Viktor Foods Llc. According to Viktor Zaichenk's interview has around 2,000 beehives in the Costwold in the UK[20].

8.5. Various Beekeepers

According to the market research report (marketresearch.com, 2025), there are various other smaller players in the market such as The London Honey Company and Tiptree. In UK the honey market is projected to grow from £208 million in 2024 to £369 million by 2035, driven by increasing demand for organic and medicinal honey products and online sales growth.

9. Conducive Land Identification

According to survey conducted by UK CEH21, the result is seen in Figure 1 (left hand side). Mānuka requires pH level between 5.5 to 6.5, that's why the most probable site to grow the plants is seen in Figure 1 (right hand side). The soil Countryside Survey topsoil pH and bulk density (g-cm-3) data is representative of 0-15cm soil depth (Henrys et al., 2012). The UK national Ecosystem Assessment (UKNEA 2011) recognises soil pH as a key component of

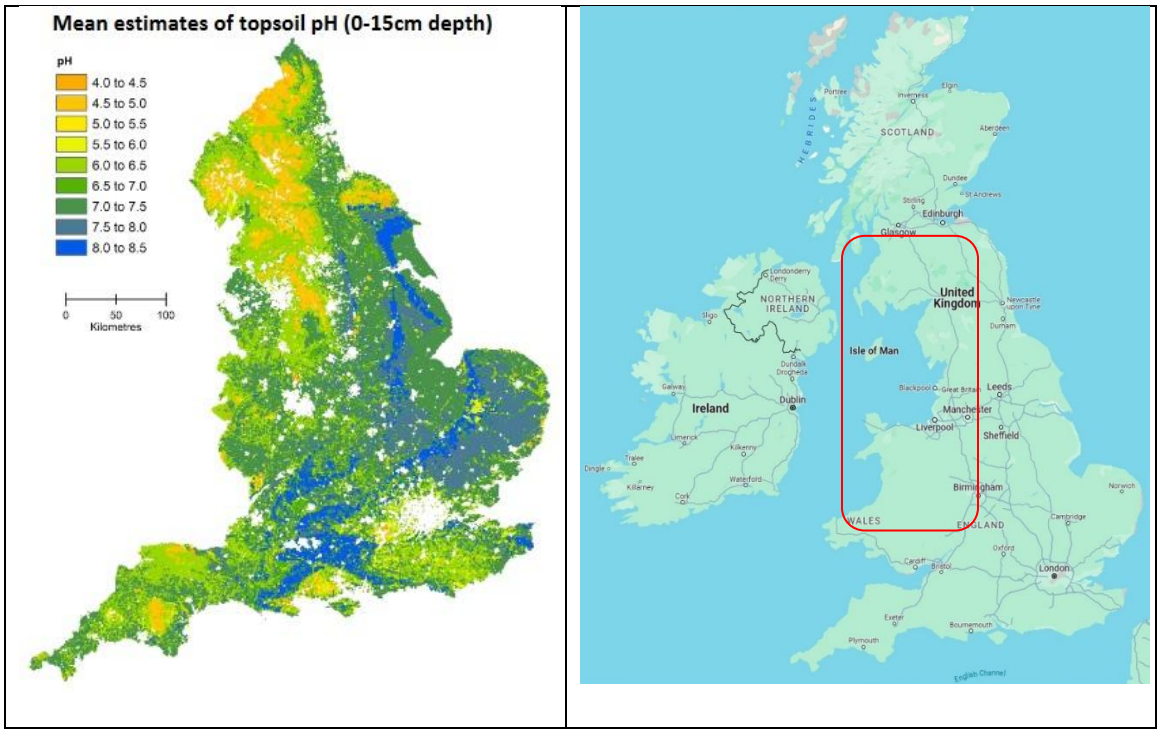
[19] https://www.denrosa.com/
[20] https://www.honeymakers.co.uk/
[21] https://catalogue.ceh.ac.uk/documents/5dd624a9-55c9-4cc0-b366-d335991073c7

natural capital for supporting ecosystem services, in particular nutrient cycling, as well as soil formation and primary production.

Land survey is required to be conducted to identify the most suitable place for Mānuka tree (Leptospermum scoparium). There are various organisations that can carry out such survey such as:

- UK Centre for Ecology & Hydrology (UKCEH)[22]
- Cranfield University[23]
- James Hutton Institute[24]
- Natural England, Natural Resources Wales, and Nature Scot[25]

Figure 4: UK Soil Survey

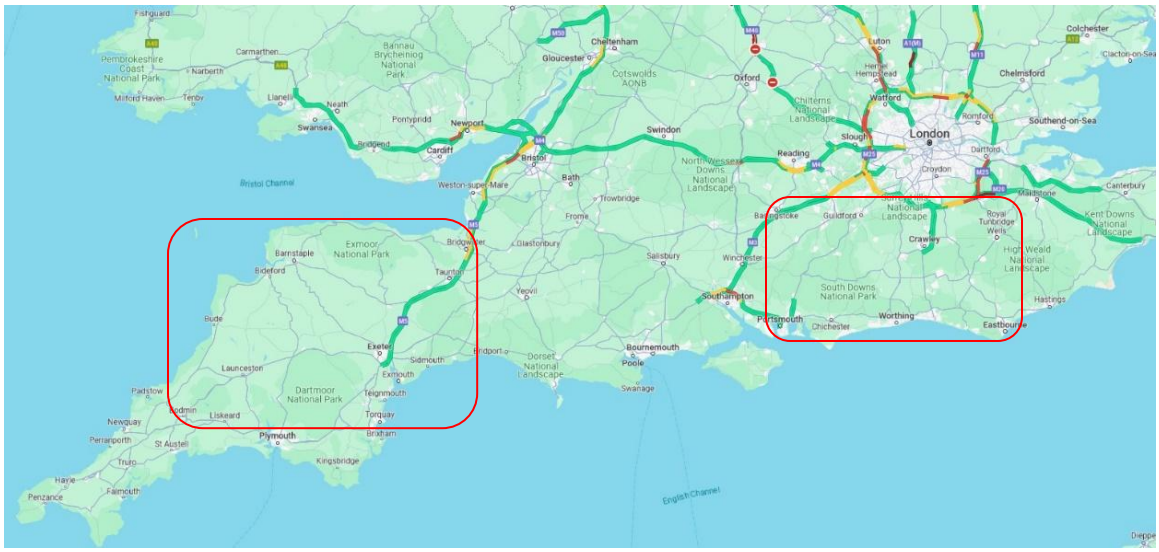


According to the soil report, higher pH is in East Anglia and lower pH in in upland areas in the Northwest. However, few scattered places in extreme south below London (on below

[22] https://www.ceh.ac.uk/
[23] https://www.cranfield.ac.uk/academic-disciplines/soil-analysis
[24] https://www.hutton.ac.uk/
[25] https://www.nature.scot/

mentioned map) and on the west between Exmoor National Park and Dartmoor National Park are conducive for Mānuka faming.

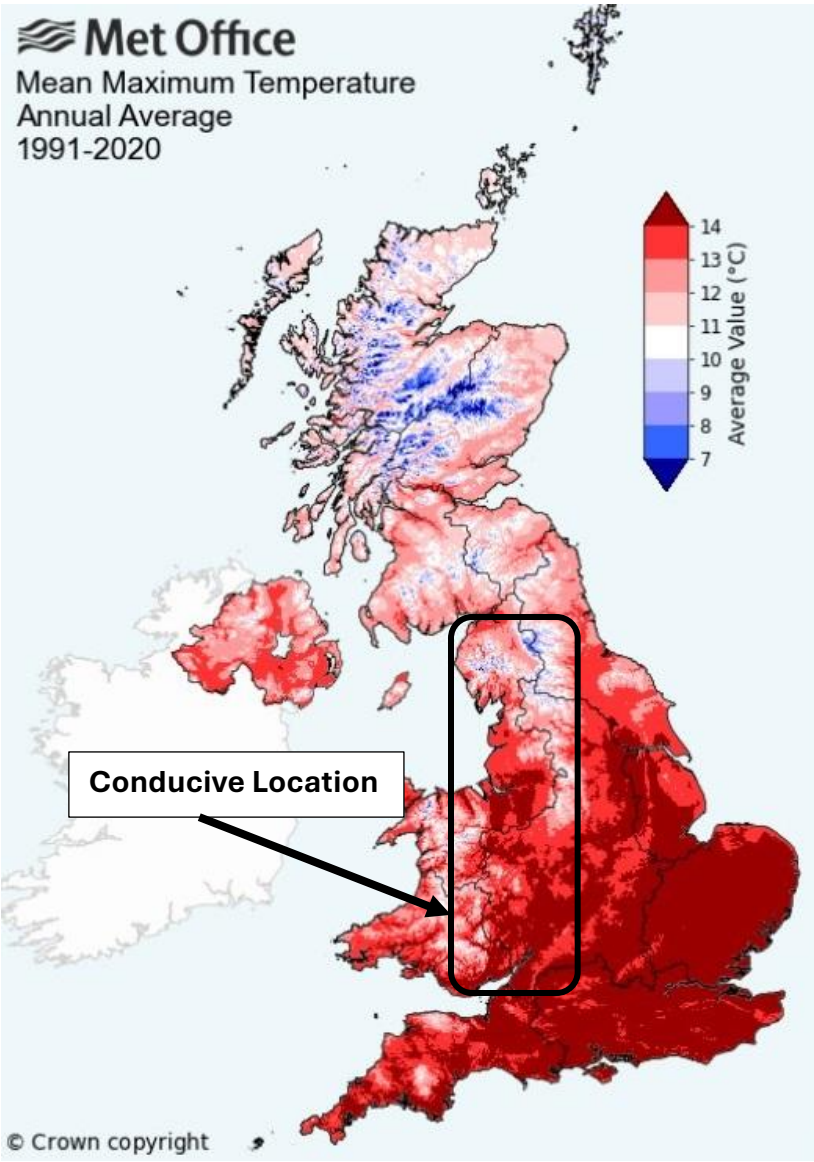
Figure 5: Low Alkaline with moderate Acidic soil



Therefore, Mānuka plant requires acidic soil over the alkaline and the most suitable land is seen in Figure 2, where the pH level is between 5-6.5. Although the plant is hardy but to protect in initial phase from cold winds and harsh frost, we would seek UK Met Office figures of past 30 years seen in Figure 3[26] and determine the best probable place for Mānuka Farming.

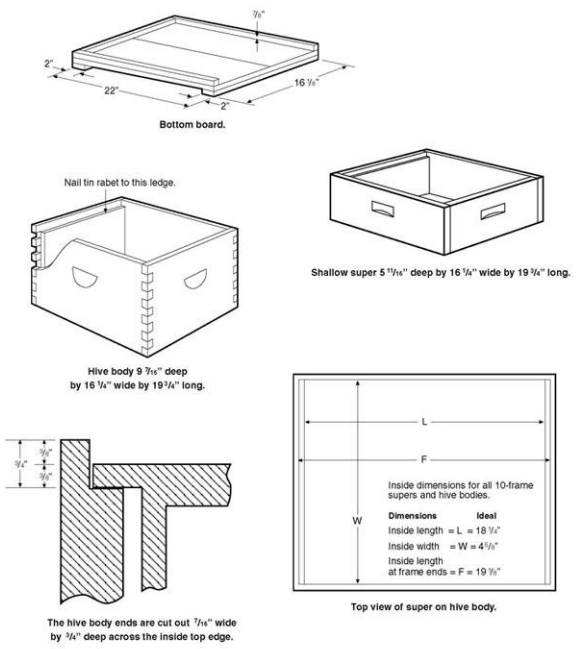
[26] https://www.metoffice.gov.uk/research/climate/maps-and-data/uk-climate-averages/gcpsvg3nc

Figure 6: Met Office Avg Temperature 1991-2020



10. Standard Hive Size

Typical dimensions and structure of a hive (Longstroth style) suitable for collecting Mānuka honey. Mānuka operations generally use standard hive bodies ("brood boxes") plus supers (honey storage boxes) that match, so the hive fits together well and the bees have enough space when the Mānuka flow happens. Detailed sixes are seen in Appendix II.



Source: Bee Health[27]

Area of brood chamber and supers is shown in Appendix III. In that two deep or three medium supers are recommended as the best brood-rearing space. One deep and a medium could also be used and one deep plus a shallow would be the minimum amount of brood rearing space. Four to six supers are usually required for honey production. Amazon.com offers $140 for a brood box[28] that includes beeswax, beehive frames and waxed foundations.

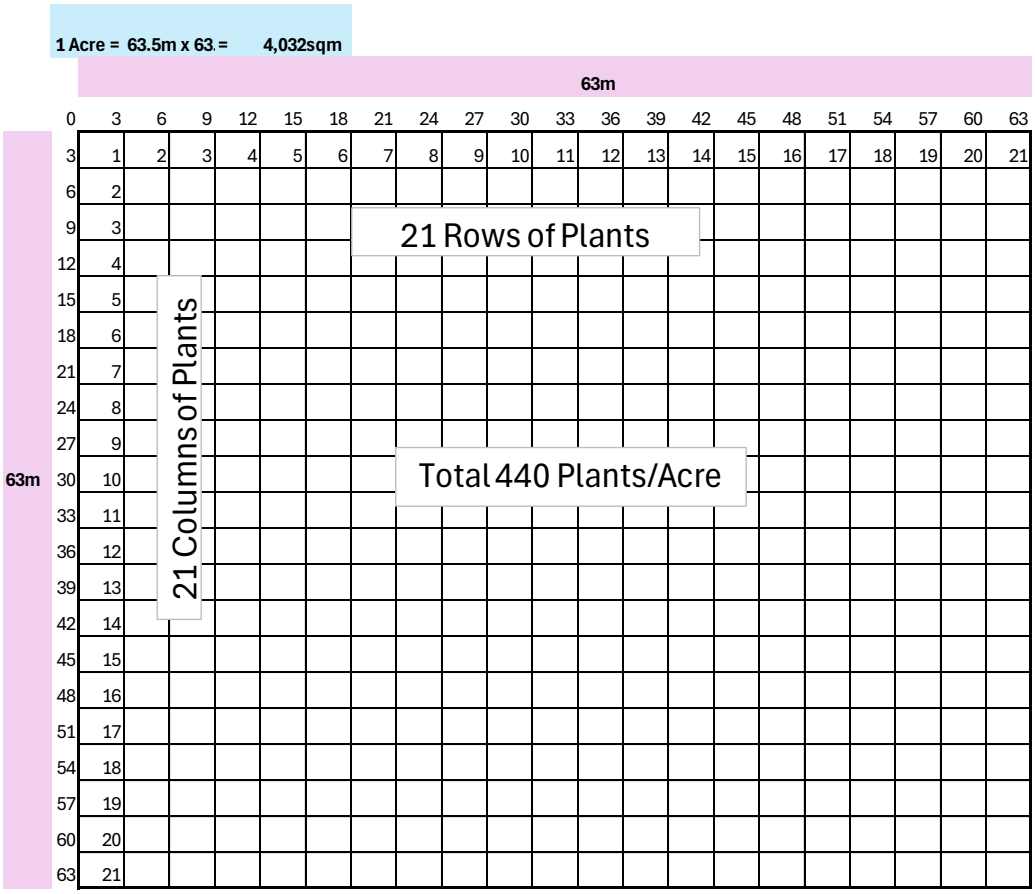
During the Mānuka flowering, bees swarm with activity and nectar flow can be heavy; having enough super space above the brood chamber means honey doesn't get stored in brood area (which would disrupt brood rearing) or get abandoned. Deep brood boxes give room for raising enough bees before the bloom, so the colony is strong when flower nectar is available. Shallow or medium supers are easier to lift especially when full of honey and is useful in steep or remote areas.

[27] https://bee-health.extension.org/wooden-components-of-a-modern-bee-hive
[28] https://www.amazon.com/BeeCastle-Langstroth-Beeswax-Beehive-Foundations/dp/B0B3DDB6MN?utm_source

11. Proposed Design of a Land

The proposed plantation model is as seen in table 2. We expect to plant nearly 450 plants of Mānuka (*Leptospermum scoparium*). We will ensure the top three species o Mānuka. However, in the nursery we will over 16 species of Mānuka plants and provide facility to further research work on better yielding plant.

Table 2: Proposed Plantation Model



12. Financials

There are various revenues streams I would follow such as Mānuka (during the flowering season) and conventional honey after and before that season.

12.1. Honey Extraction Apart from Mānuka

In UK, average year the expected honey from one hive is between 9-14kg and apiary of hives that is up to 5 hives could fetch 45-70kg honey. Out of this around 35% needs to leave in

the colony of its own honey to survive the winter. Other option is to replace with sugar syrup. Therefore, the net honey is expected from one apiary is 29-45kg. Market average 1kg price is £3.7/kg.

I am expected to have 20 hives in year 2 and 40 hives in year 3 and 100 hives in year 4 and target to achieve over 200 hives in 5 years. My expected revenue from it is as below.

Table 3: Honey Extraction Apart from MĀNUKA

	Year 1	Year 2	Year 3	Year 4	Year 5
Beehives	0	20	40	100	200
Per Hive Honey - KG		9.75	9.75	9.75	9.75
Price per Kg		£ 3.00	£ 3.00	£ 3.00	£ 3.00
Total Honey Extraction		**£ 585**	**£ 1,170**	**£ 2,925**	**£ 5,850**

12.2. HONEY EXTRACTION FROM MĀNUKA

In UK, the extraction of Mānuka honey is unprecedented and there is not a single commercial scale Mānuka honey extraction is available. That is the reason I will set the benchmark once the full-scale production is in the market. From year 4 the full-scale production is expected; the delay can happen due to consistent bad weather during the extraction period.

Table 4: Honey extraction from MĀNUKA

Manuka Honey	Year 1	Year 2	Year 3	Year 4	Year 5
Beehives	0	4	8	16	32
Per Hive Honey - KG		15	15	15	15
Price per Kg		£100.00	£100.00	£100.00	£ 100.00
Total Honey Extraction		**£ 6,000**	**£12,000**	**£24,000**	**£ 48,000**

12.3. MĀNUKA TEA FROM LEPTOSPERMUM SCOPARIUM LEAVES

In UK, the Mānuka tea leaf can be extracted after the flowering season. According to a report[29], fresh foliage per acre per year is between 600-1,200 kg. Dried leaf (approx.) after

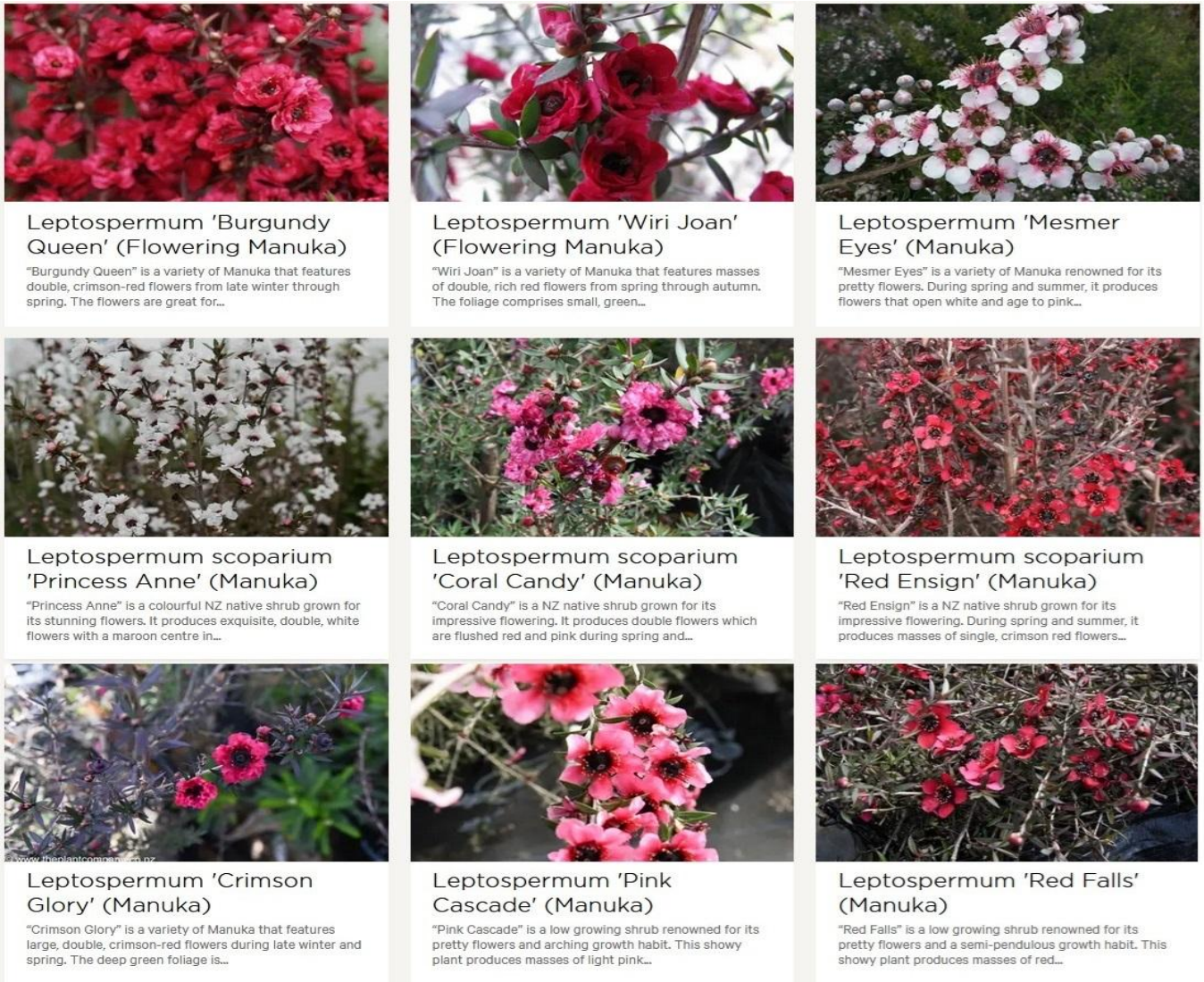
[29] https://www.nzffa.org.nz/farm-forestry-model/tree-grower-articles/february-2017/manuka-a-rapidly-growing-industry/?utm_source

processing (assuming 25% dry yield from fresh foliage) is 150-300 kg dry leaf per acre per year. In one cup of tea, it requires 2g dry leaf, that means 85,000 to 170,000 cups per acre. This above assumption is derived from the report, published by Mānuka Research Partnership Limited (MRPL) and Massey University (Douglas et al., 2019). However, most of the reports are related to essential oil, biomass or ecological aspects instead of dried leaf fields per acre for "tea". Therefore, I expect to charge £ 0.50 per tea and serve the customers Mānuka honey GMO 400+.

13. CONCLUSION

Appendix I

Figure 7: Mānuka Plants Varieties



Leptospermum 'Burgundy Queen' (Flowering Manuka)

"Burgundy Queen" is a variety of Manuka that features double, crimson-red flowers from late winter through spring. The flowers are great for...

Leptospermum 'Wiri Joan' (Flowering Manuka)

"Wiri Joan" is a variety of Manuka that features masses of double, rich red flowers from spring through autumn. The foliage comprises small, green...

Leptospermum 'Mesmer Eyes' (Manuka)

"Mesmer Eyes" is a variety of Manuka renowned for its pretty flowers. During spring and summer, it produces flowers that open white and age to pink...

Leptospermum scoparium 'Princess Anne' (Manuka)

"Princess Anne" is a colourful NZ native shrub grown for its stunning flowers. It produces exquisite, double, white flowers with a maroon centre in...

Leptospermum scoparium 'Coral Candy' (Manuka)

"Coral Candy" is a NZ native shrub grown for its impressive flowering. It produces double flowers which are flushed red and pink during spring and...

Leptospermum scoparium 'Red Ensign' (Manuka)

"Red Ensign" is a NZ native shrub grown for its impressive flowering. During spring and summer, it produces masses of single, crimson red flowers...

Leptospermum 'Crimson Glory' (Manuka)

"Crimson Glory" is a variety of Manuka that features large, double, crimson-red flowers during late winter and spring. The deep green foliage is...

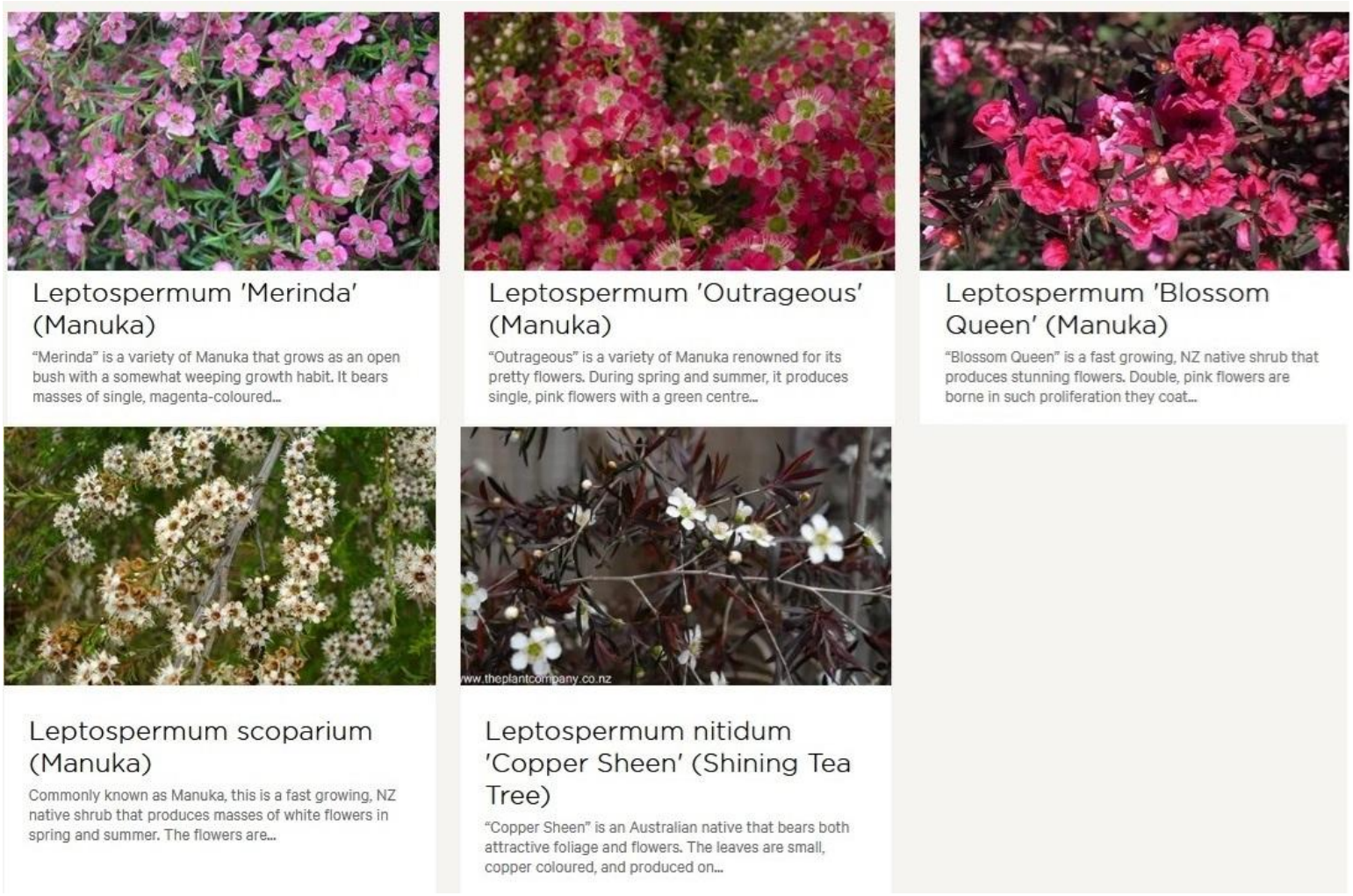
Leptospermum 'Pink Cascade' (Manuka)

"Pink Cascade" is a low growing shrub renowned for its pretty flowers and arching growth habit. This showy plant produces masses of light pink...

Leptospermum 'Red Falls' (Manuka)

"Red Falls" is a low growing shrub renowned for its pretty flowers and a semi-pendulous growth habit. This showy plant produces masses of red...

Figure 8: Mānuka Plants Varieties



Appendix II

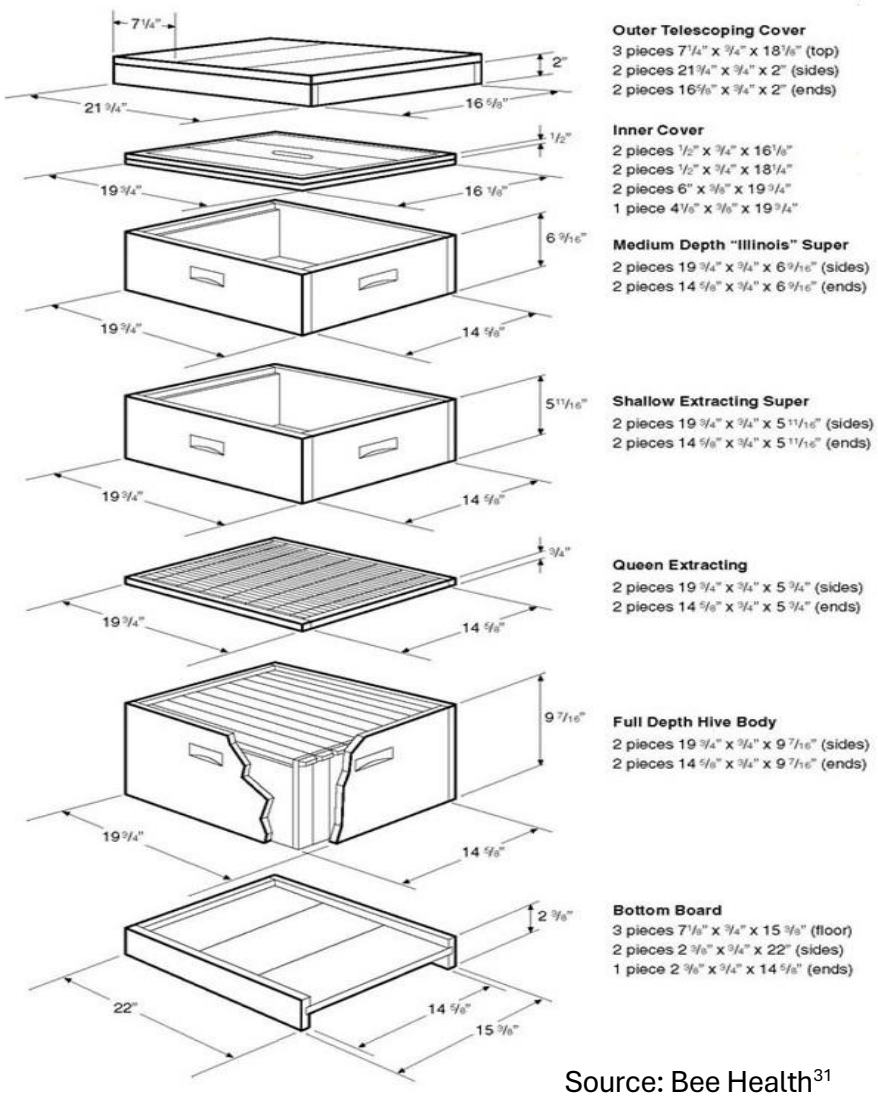
TABLE 1. Measurements for the 10-frame Langstroth hive (imperial measurements in inches, metric measurements in millimetres)

	Metric Langstroth hives			*Imperial Langstroth hives*					*Adopted metric New Zealand*[20]
	France	*Greece*	*Mexico*	*Australia*[13]	*USA*[4,11]	*California*[14]	*Britain*[7,9]	*New Zealand*[21]	
Hive body									
External length	506	507	515	20 508·0	20 508·0	20 508·0	20 508·0	20 508·0	505
External width	506	417	405	16 406·4	16 3/8 415·9	16 1/4 412·8	16 1/4 412·8	16 406·4	405
Internal length	452	465	477	18 1/4 463·6	18 1/4 463·6	18 1/2 469·9	18 1/4 463·6	18 1/4 463·6	465
Internal width	452	375	367	14 1/4 362·0	14 3/8 371·5	14 3/4 374·7	14 1/2 368·3	14 1/4 362·0	365
Depth, standard body	258	244	—	9 1/2 241·3	9 1/2 241·3	9 5/8 244·5	9 9/16 242·9	9 1/2 241·3	238
Depth, honey super	—	—	150	6 5/8 168·3	— —	6 5/8 168·3	6 5/8 168·3	7 1/4 184·2	185
Depth, section super	—	—	—	4 3/4 120·7	4 3/4 120·7	4 5/8 117·5	— —	5 1/4 133·4	133
Frame									
Top-bar length	—	480	495	19 482·6	19 482·6	19 482·6	19 482·6	18 15/16 481·0	482
Bottom-bar length	436	450	450	17 5/8 447·7	17 5/8 447·7	17 5/8 447·7	17 5/8 447·7	17 13/16 452·4	450
End-bar length, Hoffman	228	230	—	9 1/8 231·8	9 1/8 231·8	9 1/8 231·8	9 1/8 231·8	9 1/8 231·8	230
End-bar length, Manley	—	—	141	6 1/4 158·8	— —	6 1/4 158·8	6 1/4 158·8	6 7/8 174·6	177
End-bar width, Hoffman	—	36	33	1 3/8 34·9	1 3/8 34·9	1 3/8 34·9	1 3/8 34·9	1 5/16 33·4	33
End-bar width, Manley	—	—	42	1 11/16 42·9	— —	— —	— —	— —	43

Source: Beekeeping in New Zealand[30]

[30] https://www.beekeeping.co.nz/nzbkpg/metric.htm

Appendix III



Source: Bee Health[31]

[31] https://bee-health.extension.org/wooden-components-of-a-modern-bee-hive

Bibliography

Action, E. (2022). *EU coordinated action "From the Hives" (Honey 2021-2022).* Retrieved from https://food.ec.europa.eu/food-safety/eu-agri-food-fraud-network/eu-coordinated-actions/honey-2021-2022_en?utm_source

Alsaud, N., Shahbaz, K., & Farid, M. (2021). Application of deep eutectic solvents in the extraction of polyphenolic antioxidants from New Zealand Manuka leaves (Leptospermum Scoparium): Optimization and antioxidant activity. *Journal of Molecular Liquids, 337*. https://doi.org/https://doi.org/10.1016/j.molliq.2021.116385

Bee Farmers Association. (2025). *Biosecurity at the Border.* Bee Farmers Association (APH0147). Retrieved from https://committees.parliament.uk/writtenevidence/135940/pdf/?utm_source

CBI. (2024). *The European market potential for certified honey.* Government of the Netherlands. Retrieved from https://www.cbi.eu/market-information/honey/certified-honey/market-potential?utm_source

Clearwater, M. J., Revell, M., Noe, S., & Manley-Harris, M. (2018). Influence of genotype, floral stage, and water stress on floral nectar yield and composition of mānuka (Leptospermum scoparium). *Annals of Botany, 121*(3), 501-512. https://doi.org/https://doi.org/10.1093/aob/mcx183

Douglas, B., Carey, A., Archer, R., Lee, S., & Olsen, M. (2019). *HIGH PERFORMANCE MĀNUKA PLANTATIONS PGP PROGRAMME.* Mānuka Research Partnership (NZ) Limited (MRPL) and Massey University. Retrieved from https://www.mpi.govt.nz/dmsdocument/37392-high-performance-manuka-pgp-programme?utm_source

Giulia Papa 1, 2. R., Lucarini, M., Karabagias, I. K., Plutino, M., Bianchetto, E., Aromolo, R., . . . Negri, I. (n.d.).

Henrys, P., A.M., Robinson, D., & Emmett, B. (2012). *Model Estimates of topsoil pH and bulk density.* Environmental Information Data Centre - UK.

Hoang, P. L., & Vuong, Q. V. (2024). A Comprehensive Review of the Botany, Bioactive Compounds and Health Benefits of Leptospermum. *Chemistry and Biodiversity, 22*(4). https://doi.org/https://doi.org/10.1002/cbdv.202401335

Johnston, M., McBride, M., Dahiya, D., Owusu-Apenten, R., & Nigam, P. S. (2018). Antibacterial activity of Manuka honey and its components: An overview. *AIMS Microbiol, 27*(4), 655-664. https://doi.org/https://doi.org/10.3934/microbiol.2018.4.655

marketresearch.com. (2025). *2025 United Kingdom Apiculture Market Revenue Opportunities Report.* Wharry Sharpe Research. Retrieved from https://www.marketresearch.com/Wharry-Sharpe-Research-v4244/United-Kingdom-Apiculture-Revenue-Opportunities-42238447/

Mathew, C., Tesfaye, W., Rasmussen, P., Peterson, G. M., Bartholomaeus, A., Sharma, M., & Thomas, J. (2020). Mānuka Oil—A Review of Antimicrobial and Other Medicinal Properties. *MDPI - National Liberary of Medinine, 13*(11), 23. https://doi.org/https://doi.org/10.3390/ph13110343

Mattis, M. (2004). Women enterpreneurs: out from under the glass ceiling. *Women in Management Review, 3*(19), 153-163.

Open Government License v3.0. (2020). *Healthy Bees PLan Review.* Department for Environment, Food & Rural Affairs. Retrieved from https://www.nationalbeeunit.com/assets/PDFs/4_Bee_Health_Improvement/HBP_2030/HBP_Review_English.pdf?utm_source

Papa, G., Maier, R., Durazzo, A., Lucarini, M., Karabagias, I. K., Plutino, M., . . . Negri, I. (2022). The Honey Bee Apis mellifera: An Insect at the Interface between Human and Ecosystem Health. *PMC PubMed Central , 11*(2), 24. https://doi.org/https://doi.org/10.3390/biology11020233

POST. (2013). *Reversing Insect Pollinator Decline.* London: Parliamentary Office of Science & Technology.

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