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PROGRAMME

Small Scale Food Growers in New Zealand

and their role in New Zealand's sustainable food future

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1. Executive Summary

Environmental degradation resulting, in part, from globalised food systems, including New Zealand's practices, has led to an alarming failure in ensuring food security and community resilience. This degradation induced climate change, creating a self-destructive cycle (Dury et al., 2019). New Zealand, like many regions, grapples with the extensive repercussions of these issues. Addressing these challenges is paramount for the nation's security and economy.

In New Zealand, the predominant approach to address these issues centres on the existing industrial farming systems and strives for improvement through technology and innovation. However, it's not just incremental changes that are needed; a paradigm shift is required. Within the country a distinct group of small-scale food growers are utilising techniques aligned with international literature and practices.
The question arises: Can small scale food growers help New Zealand's domestic food security while simultaneously benefiting the environment and community resilience?

This study has a dual purpose: firstly, to comprehensively understand New Zealand's small-scale food growers, their integration into the landscape, ecosystems, and communities; and secondly, to underscore the significance of these growers in addressing New Zealand's present and future challenges.

To achieve these objectives, this research project combines a thorough literature review with an examination of a select group of ten small-scale food growers in New Zealand, operating on land blocks smaller than ten hectares. The research comprises twenty interviews, including thirteen growers, three thought leaders, two business representatives, and one consultant and facilitator each. These interviews undergo thematic analysis, which is later compared with the literature review's findings.

Key findings indicate that the current terminology associated with this group of growers and their land size is inconsistent and unrepresentative. Crop diversity, the primary technique used on small-scale food farms in New Zealand, has a positive impact on the natural environment.

Moreover, crop diversity leads to increased distribution diversity and enhanced community resilience.

Recommendations:

1. Create a robust identity to unite the small scale food grower sector
2. Quantify the produce impact of small scale growers in local communities, through investment in research
3. Sector leadership must participate in conversations for future domestic food security solutions
4. Use this report as a catalyst to initiate the above actions

2. Introduction

New Zealand boasts a unique island landscape that spans diverse ecosystems, from alpine summits to coastal interfaces and beyond. Scattered throughout this varied terrain are the country's quintessential "lifestyle blocks," which come in various shapes, sizes, and settings. These plots are often found on the outskirts of urban areas, and sometimes in more rural locations, contributing to New Zealand's distinctive way of life. Yet, they remain a subject of debate, as many of these lifestyle blocks typically don't maximise their land for productive purposes. However, it's worth noting that approximately 10% of lifestyle block owners are genuinely committed to realising the productive potential of their land (Fairweather & Robertson, 2000). Much of the remaining productive land in New Zealand is dedicated to industrial-style agriculture and horticulture, known for its adverse impact on the natural environment (Bloomer et al., 2019) . While industrial agriculture poses a global challenge, New Zealand is not exempt, and the horticulture sector has been implicated in the degradation of water quality (Bloomer et al., 2019).

New Zealand's economy heavily relies on exports from its primary production sector (MPI's Role in Exporting | NZ Government, 2023). Moreover, the nation's domestic food security is paramount for maintaining the social licence to export (Growth From Resolve and Resilience, 2022). Research has consistently shown that diverse, small-scale food production systems have a positive impact on both the environment and community resilience, factors closely tied to food security (MacFall et al., 2015).

Given the relatively small number of small-scale food growers in New Zealand, a significant question arises: can they make a meaningful impact on the country's domestic food system while simultaneously benefiting the environment and the communities? This research project aims to delve into the lives of individuals who genuinely focus on cultivating fresh produce on their lifestyle blocks with the aim of enhancing their local communities, preserving the environment, and fostering their own well-being. By understanding their roles in the landscape and New Zealand's food system, both currently and in the future, we seek to shed light on the significance and potential of their contributions.

3. Purpose and Objectives

3.1 Purpose

To understand small scale food growers and how they fit into New Zealand's landscape, ecosystems, communities.
To evaluate the importance and role that small scale food growers have in solutions for New Zealand's current and future food challenges.

3.2 Objectives

- To share an understanding of small-scale food crop growers in New Zealand
- To create engagement in conversation with small scale food crop growers
- To enable acceptance for collaboration with small scale food growers in pan-sector challenges, opportunities, and solutions

4. Scope

This research project encompasses the people who grow small scale food crops, along with business, physical environment, natural environment and community aspects of small-scale food crops in New Zealand.

Growing techniques, food security, food sovereignty, urban agriculture and other possible aspects of small-scale food crops, while interconnected, and very important, are mentioned, but details are outside the scope of this research report.

Cultural inclusion is also incredibly important, respected and encouraged, but limited in this report.

5. Literature Review

The focus of this project is on a specific group of food growers in New Zealand who operate on 10 hectares of land or less. Their primary aim is to provide fresh produce to their local communities in a manner that prioritises sustainability for the environment, the growers themselves, and the communities they serve. The literature review is designed to shed light on the fresh produce industry in New Zealand and to investigate where small-scale growers fit within New Zealand's landscape spaces, as well as the broader aspirations of the country's food production sector.

During the academic literature search, it became evident that there were very few results available concerning New Zealand small scale food growers. A broader search revealed a multitude of New Zealand food producers who share their narratives and take pride in their work. However, it was a challenging task to differentiate between those who were producing various food products and those specifically dedicated to growing fresh produce for local consumption, those operating on 890 hectares through to those on under one hectare.

5.1 Food Growing - the Environment and Communities

In recent decades, the globalisation of food systems has had devastating self-destructive consequences, notably contributing to climate change, environmental degradation, the overexploitation of natural resources, and the pollution of air, water, and soils. This expansion has also led to significant disparities in food access, resulting in various nutritional and social issues (Dury et al., 2019). This troubling scenario paints a bleak picture for the future of both our planet and humanity.

Various sources have reported on food security in New Zealand, highlighting the multifaceted nature of the issue. For instance, a study conducted by Auckland University has revealed that 15% of 12-year-olds in New Zealand experience moderate food insecurity, underscoring the need for improvements in food security (Gerritsen et al., 2023). The KPMG Agribusiness Agenda 2022 also acknowledges the risk associated with failing to provide food security, which is defined as ensuring sustainable, accessible, affordable, and nutritious food options for every New Zealander. This failure could jeopardise the country's premium export positioning (Growth From Resolve and Resilience, 2022, pg. 41).

In response to these pressing challenges, the development of local food systems emerges as a suitable solution to address the inequities and to foster food security and resilience in communities (Feenstra, G., 1997) . These local food systems should prioritise economic viability for both farmers and consumers while also incorporating environmentally sustainable cultivation practices, robust, diverse distribution infrastructures, and the integration of cultural values that promote social equity and democracy across all communities (Feenstra, G., 1997).

5.2 Food growing - Landscape, Land Use, Land Management

5.2.1 Land area - smallholdings / lifestyle blocks - and food production

A research report funded by the Ministry of Science and Innovation under the Ecosystem Services for Multiple Outcomes program 2009-2011 (Auckland Council 2023) explores urbanisation and lifestyle blocks in the context of constraining productive land. It notes that lifestyle blocks encompass 873,000ha of New Zealand's land, with 143,000ha being prime land suitable for food production. While lifestyle blocks lack a specific definition, they are generally characterised as larger than typical residential allotments, primarily situated in rural areas.

Fairweather and Robertson (2022) report that between 8% and 11% of lifestyle/smallholdings in Canterbury prioritise land use for production over lifestyle aspects, earning an annual income exceeding $50,000 from their land (pg 50). Their land use encompasses animals, horticulture, and forestry. Thus, it's reasonable to estimate that a significant portion of the 14,300ha (10% of lifestyle blocks on high-class land) in New Zealand could be categorised as smallholdings available for food production.

The research recognizes a distinction between small farmers and lifestylers, despite both being landowners of smallholdings, with smallholdings being up to 20 hectares in size (Fairweather & Robertson, 2022). The terms lifestyle block and smallholdings seem to have comparable and interchangeable loose definitions. In the international context, Ritchie reports that 55% of the world's food is produced on farms up to 10ha (Ritchie, H. 2021), as depicted in Figure 1 below. This is a larger proportion than New Zealand and highlights the difference between the local and global food growing systems.

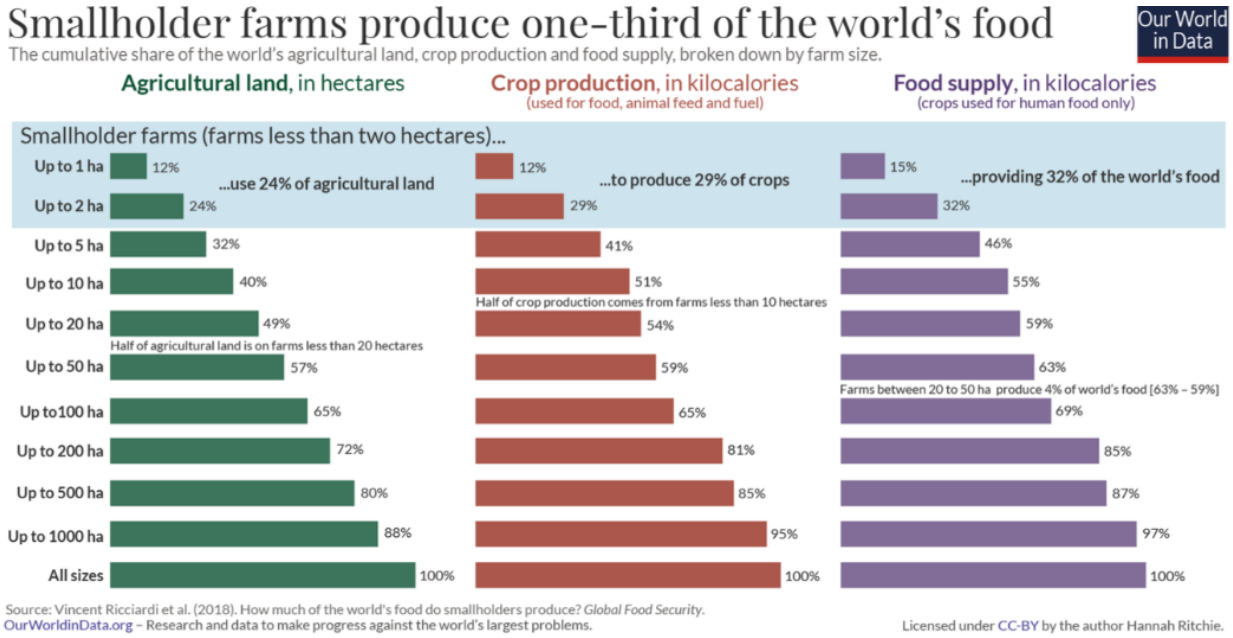


Figure 1. Food produced on land size (Ritchie, 2021)

5.2.2 Landscape

In October 2023, research from a National Science Challenge project shed new light on rural land conflicts and the vital role of peri-urban zones – the lands around urban areas – for New Zealand's communities, ecology, and economies (Goodall, 2023). The report highlights a stark contrast in New Zealand's demographics: 85% of the population lives in urban areas, while 100% of the food comes from rural regions. This disparity has sparked concerns about limited access to local, affordable food and a strong desire for stronger connections with food producers.

Peri-urban zones bridge urban and rural landscapes and offer potential for enhanced food production, housing, and well-being through innovative designs. To explore this, researchers surveyed residents and farmers near Christchurch, testing five design options. The most favoured design integrates public green spaces with food production and recreation, with two designs innovatively blending small-scale food farms with housing and recreation while separating them from conventional export-style farms in the rural zone (Goodall, 2023).

5.2.3 Land use

Horticultural land use in New Zealand varies depending on the activities involved. HortNZ (2023) estimates around 80,000 hectares of land, but Kirk et al (2022) suggests a larger figure of 132,717 hectares, encompassing fruit, vegetables, nuts, and flowers (Horticulture New Zealand, 2023). The six largest land area crops are wine grapes 35,580ha, kiwifruit 15,520ha, followed by potatoes, apples, onions, and squash, decreasing to 5,590ha (Granwal, 2022). Fresh Facts (*Fresh Facts 2023, New Zealand's Fresh Fruit and Vegetable Industry*, 2023) provides an annual detailed analysis of horticultural crops in New Zealand, including land use for 27 fruit types but excluding land areas for the vegetable sector. Unfortunately, no further information on horticultural land use distribution in New Zealand is available. However, it is known that horticultural land use is concentrated in areas such as the Bay of Plenty, Hawkes Bay, Gisborne, Pukekohe, Kerikeri, Otago, Nelson, and parts of Waikato. Most areas have limited crop diversity; for example, Te Puke, Bay of Plenty, is predominantly dedicated to kiwifruit.

International literature conveys a clear message about land use and food. The global commission on economy and climate's report, with a focus on food and land use (*Food and LandUse - NCE 2018*, 2018), warns that if current global food and land use systems persist, ecological systems worldwide, including biodiversity and human social and health status, will be undermined. Reforming policies, agriculture, and financial instruments could reduce climate change effects by one third and enhance socioeconomic parameters. The report emphasises that no country should ignore the shift toward sustainable food and land use systems.

Aligning Land Use with Land Potential

"The Role of Integrated Agriculture" (Liebig et al., 2019) strongly advocates the necessity for sustainable food production to synchronise land use with its inherent potential. The prevailing industrial agriculture systems, reliant on "energy-intensive inputs through relatively uniform production systems across variable landscapes," are deemed unsustainable due to their reliance on simplification, specialisation, and concentration. The authors propose a shift towards aligning

land use at the appropriate intensity within specific locations. This approach allows for the innovative management of food production systems, fostering a better integration with natural ecosystem services and safeguarding against exceeding landform thresholds. The implementation of Integrated Agriculture Systems (IAS) is proposed to achieve this. While IAS is acknowledged to introduce added complexity in comparison to current systems, its benefits encompass the harmonisation of food production with environmental constraints and opportunities, ultimately leading to more sustainable land use and improved social and economic outcomes. Figure 2 below provides a visual representation of this concept.

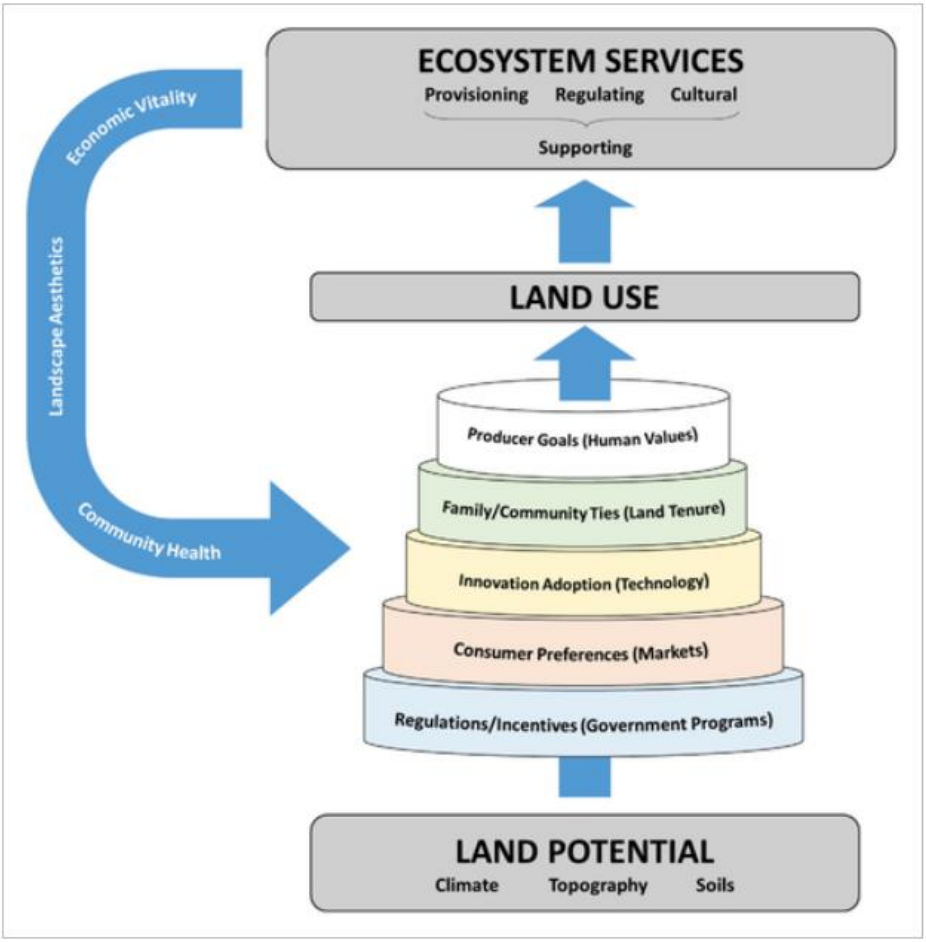


Figure 2. Conceptual model reflecting 'translation filters' affecting the expression of land potential into land use, with accompanying ecosystem service outcomes and feedbacks (Liebig et al., 2019)

5.2.4 Land use, biodiversity, and infrastructure

Food growing systems have a profound impact on biodiversity and landforms, both positively and negatively. The research conducted by MacFall et al., (2015) places a significant emphasis on diversity, including biodiversity, within land designated for food production. Negative effects on biodiversity tend to emerge from conventional and monocrop systems, while diverse growing systems, such as biointensive methods, can substantially enhance biodiversity. This is not limited

to an increased number of species within the system but extends to diverse root and soil environments, the creation of climatic microclimates, and the promotion of insect life. The greater diversity achieved in these systems also leads to a reduced risk of pest and disease pressure.

The research provides an example of a ten-hectare plot, with 200 crops cultivated on three hectares and the remaining seven hectares dedicated to diverse trees and grassland. This approach enhances water use efficiency, productivity, and overall yield volume while simultaneously reducing fossil fuel energy inputs in these diverse food growing systems.

Benefits of these diverse growing systems extend to processing and distribution, fostering community well-being and socioeconomic stability through the aggregation of small, diverse growing units. This contributes to the overall resilience of local food systems and communities, enabling them to rebound effectively from stressors like climate events. Additionally, MacFall et al., (2015) note that when small growers retain all aspects of their business, including growing, processing, and distributing directly to consumers within their small operations, it can reduce wealth diversity within the community. Mitigating this concern involves diversifying a grower's customer base and having small grower units aggregate, which effectively spreads greater wealth diversity across communities. Figure 3 below illustrates this concept, showing the central role of diversity in this context.

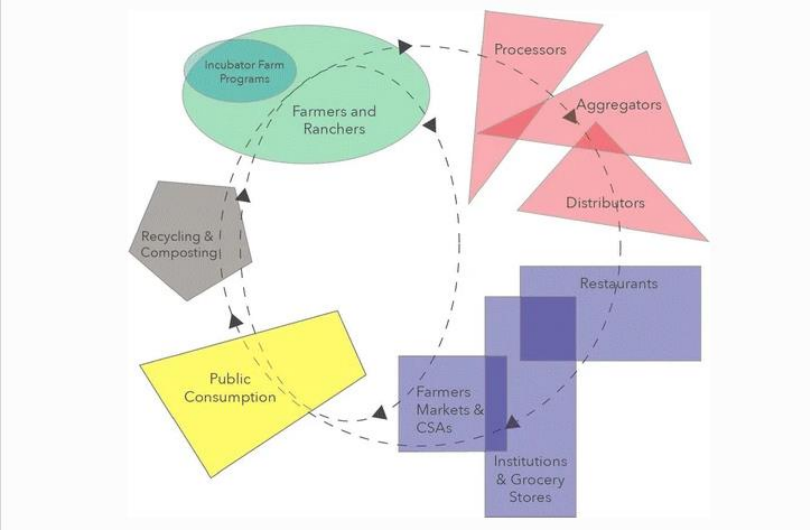


Figure 3. Spreading wealth diversity through communities (MacFall et al., 2015).

5.2.5 Land use management changes

Transitioning from current industrialised, extraction-based land management practices to sustainable food production systems is undeniably challenging. Kirk et al., (2022) have delved into this complexity in their study on farmers' adaptive capacity in their work titled "Shifting Knowledge Practices for Sustainable Land Use." Their research underscores how the intricacies

involved in these changes can significantly affect the time required for farmers and growers to comprehend potential changes and realise their subsequent impacts and benefits.

Environmental degradation stemming from food production systems, particularly concerning water quality, has spurred international pressure for New Zealand to institute changes. Figure 4 below illustrates the cyclical process essential for bringing about these changes, with the assessment phase being notably complex due to its multifaceted nature, consequently impacting the speed at which change can occur (Kirk et al., 2022).

The willingness and confidence to embrace change are closely tied to how information is presented. Some farmers and growers have refrained from utilising advisors because they felt the advisors tended to "tell rather than listen." Decision-making and practice changes are often deeply intertwined with peer-to-peer support groups, neighbours, contractors, and family members. Figure 5 below provides a visualisation of the current information presentation system, a result of the fragmentation of advisory systems within New Zealand's primary industry since the 1980s (Kirk et al., 2022).

Understanding the motivations and processes that farmers and growers engage with is paramount when considering programs aimed at promoting the adoption and adaptation of sustainable land use practices (Kirk et al., 2022).

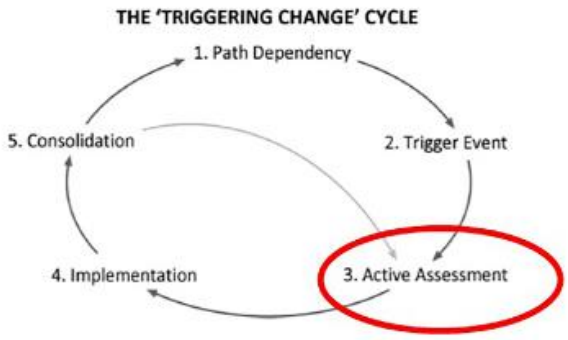


Figure 4. Triggering Change Cycle industry advisory system (Kirk et al., 2022)

Figure 5. New Zealand's primary (Kirk et al., 2022)

5.3 Fresh Produce Industry in New Zealand

Horticulture New Zealand (HortNZ) serves as the representative body and advocate for New Zealand's commercial fruit and vegetable growers, working towards a goal of "creating an enduring environment where growers thrive" and envisioning a future of "healthy food for all, forever" (*About Us*, 2023). The horticulture industry is a significant contributor to New Zealand's economy, with an annual value exceeding $7 billion.

New Zealand's horticultural production encompasses a wide variety of approximately 100 different fruits and vegetables, cultivated both for export and domestic markets. Notably, 80% of vegetables and 20% of fruit are grown for the domestic market, (Horticulture New Zealand, 2023) as depicted in Figure 6 In February 2023, HortNZ unveiled their Aotearoa Action Plan - Growing together 2035 (*Growing Together 2035*, 2023). This ten-year roadmap aims to ensure the commercial horticulture sector meets its financial targets while enhancing grower returns. Additionally, it acknowledges the importance of addressing climate change and social licence concerns. The plan focuses on five critical outcome areas, including sustainable growth and the development of human resources. A specific commitment to partner with Māori communities for robust participation in horticulture is also emphasised.

The "grow sustainably" objectives encompass the adoption and optimization of environmentally friendly cultivation practices, enhancing water resilience, bolstering crop protection (through management and biosecurity), transitioning to low emissions, optimising land use adaptability, and supporting horticulture through sound policies. Crop protection strategies encompass both new chemical and biological controls.

Optimising outcomes involves diversifying market access, promoting trade, bolstering the domestic market, enhancing production and value chain innovation, and embracing digital tools and data sharing. The plan recognizes the unique challenges smaller and emerging product groups face when developing domestic and export market plans.

In the realm of underpinning the industry with science and knowledge, HortNZ is committed to facilitating the swift and effective development of crops that generate less than $100 million annually from exports. This initiative aims to bolster regional growth and development, enhance economic activity, and strengthen community resilience.

The "nurturing people" aspect of the plan centres on creating an appealing industry in which the right individuals are working in the right roles while championing diversity and development.

Figure 6. Diagram comparing produce exports and domestic sales.

5.4 Thought Leaders

The Ministry for Primary Industries (MPI) has published a comprehensive long-term insight briefing titled "The Future of Aotearoa New Zealand's Food Sector," which delves into demand opportunities for 2050 (*The Future of Aotearoa New Zealand's Food Sector: Exploring Demand Opportunities in the Year 2050*, 2023). This publication builds upon government initiatives addressing climate change and technological challenges within the sector. However, it takes an innovative approach by focusing on a third critical aspect—changes in consumer preferences. The report grounds its exploration in the understanding that food serves as the foundation of New Zealand's export economy.

The report profiles future consumers, identifying their needs and preferences, thereby uncovering probable opportunities for New Zealand's exports. Importantly, this forward-looking perspective extends well beyond fresh produce, encompassing elements such as sustainability, ethics, and sovereignty, which are increasingly viewed as essential components in the world of food.

The significance of sustainability in the eyes of consumers cannot be understated, with 80% currently expressing concerns in this area, and the focus on sustainability is projected to expand further in the future, particularly concerning water use, carbon, and farm/food production emissions. Ethical considerations may not be at the forefront of consumer food choices presently, but given their growing importance in other aspects of life, the prediction is that ethics will increasingly shape consumer food choices, especially in matters related to animal welfare.

"Food Sovereignty" is a movement championing the rights of communities to define their own food, agriculture, livestock, and fisheries systems. Rising awareness and concerns in this realm will inevitably influence food choices, particularly with a focus on indigenous rights and the impact of corporate control.

To conceptualise tomorrow's consumers, six avatars have been crafted: the locavore, back to nature enthusiast, direct-to-me advocate, experience seeker, the evolver, and individualist (*The Future of Aotearoa New Zealand's Food Sector: Exploring Demand Opportunities in the Year 2050*, 2023). However, it's essential to consider the risks to New Zealand, including potential constraints on choices and reduced produce volumes. Notably, this publication is framed within the context of New Zealand's current industrialised systems for food exports.

KPMG releases an annual Agribusiness Agenda, and the 2022 edition, titled “Growth from Resolve and Resilience,” dedicates one of its six main sections to the theme of "A Food System That Works for all New Zealanders" (*Growth From Resolve and Resilience*, 2022). The report also acknowledges the existence of two distinct food systems in New Zealand, each requiring different business models to enhance the resilience of the domestic food system. These two systems exhibit varying degrees of accessibility to capital, talent, innovation, and supply channels. Importantly, the report underscores a disconcerting fact – while we proudly discuss one system (export), the other (domestic) remains largely overlooked.

Despite domestic food prices remaining relatively stable, the cost of producing food has increased, putting pressure on the margins for growers. It's vital to recognize that the horticulture export sector relies on the viability of domestic produce growers to ensure domestic food security and maintain the social licence required for exports. Disruptions in New Zealanders' food security could have far-reaching consequences, impacting the export system that is a cornerstone of the country's economy (*Growth From Resolve and Resilience*, 2022).

The most recent Agribusiness Agenda, 2023, bearing the title "Energising a World of Anxiety," shifts its focus, although it's worth noting that food insecurity features prominently in two of the top ten priority rankings (*Agribusiness Agenda 2023*, 2023). Notably, "Quickly work to reduce food insecurity in New Zealand" ranked third among executive managers but only 33rd among governors. KPMG's Emerging Leaders ranked this priority fourth.

These Emerging Leaders paint a vivid vision of the future, characterised by boldness and creativity. They aspire to bring science and creativity together and seek collaboration with unconventional partners. They envision a future where children associate food more with a laboratory than a farm, where pressing challenges like biodiversity loss, food insecurity, and resource depletion become obsolete, and "farming" as it exists in 2023 becomes a niche concept.

Researchers at New Zealand's Plant and Food Research Centre are embarking on an innovative project, as reported by The Guardian (*In the Face of Climate Change and Food Insecurity, New Zealand Considers Lab-Grown Fruit*, 2023). Their goal is to cultivate fruit tissue in a laboratory setting for human consumption. This pioneering endeavour holds promise as a potential game-changer in the realm of sustainable agriculture, offering a solution to the growing challenge of food insecurity exacerbated by climate change.

In their quest, these scientists are not merely content with replicating fruit; they are striving to create lab-grown fruit tissue that faithfully mimics the taste, smell, and texture of the real thing while eliminating the typically inedible parts, such as cores and pith. This concept of "lab-fruit" represents a ground-breaking innovation, although it comes with inherent uncertainties at this early stage.

The research process will necessitate extensive food safety testing, involving costly and time-consuming trials to ensure the product meets stringent safety standards. It's worth noting that while older generations may exhibit resistance to such novel food development, younger generations show a more open-minded approach, as they are willing to explore new foods that not only offer nutritional benefits but also align with environmentally sustainable practices.

5.5 The Gap in Academic Literature

The literature review uncovers recurring themes in the context of sustainable land use and small-scale food production. However, it's worth noting that the academic literature pertaining to New Zealand predominantly focuses on industrial farming and horticulture methods, and the country's

future aspirations, all viewed through a similar lens. This body of research underscores the dominance of large-scale agriculture in New Zealand.

In this context, a noticeable gap is apparent regarding small-scale food production in New Zealand. While the review identifies common themes in sustainable land use, it reveals a striking absence of research which addresses the challenges faced by small-scale food growers, and opportunities they can offer to the country. This underscores the need for further exploration and analysis in this area, as small-scale food production could hold solutions for the future stability of domestic food security which impacts on New Zealand's' food export licence.

6. Methodology

6.1 Interviews

In September 2023, a total of twenty semi-structured interviews were conducted as part of this research initiative. Within this interview pool, ten of the participants were small-scale food crop growers in New Zealand. This selection was crucial in capturing the authentic, real-life perspectives and first-hand experiences of individuals engaged in small-scale food production within the country.

To provide a view of mainstream horticulture in New Zealand, two interviews featured large-scale growers, allowing for a comparison of differences and similarities between the two distinct segments of the industry. These insights served to contextualise the experiences of small-scale growers within the broader agricultural context.

Given the limited availability of formal literature on the subject and the forward-looking nature of this project, thought leaders emerged as vital contributors to the interview research. Their topic was focused on economies of scope and economies of scale, which added valuable input, helping to shape and guide the exploration of the underrepresented topic of small-scale food growing in New Zealand.

Additionally, to introduce a more objective and impersonal perspective on financial matters, interviews were conducted with participants specialising in business and finance. These participants were chosen as finance-related questions were considered too sensitive for growers participating at this research level.

The interview line-up also included a consultant and facilitator to offer insights into the availability of advice and learning methods suitable for small-scale growers. Their perspectives shed light on the support systems and educational resources required for the success of small-scale food producers.

Lastly, a lifestyle block owner was incorporated into the interview roster to serve as an illustrative example of potential barriers and constraints faced by individuals who may not engage with small-scale food production due to pinch points in the existing systems. This diverse array of interviewees aims to enrich the research by providing a multifaceted view of the challenges, opportunities, and potential pathways within the domain of small-scale food growing in New Zealand.

The breakdown of interviews is:

- Ten small growers from nine different crop types
- Two large growers, 1 from Tier 1 and 1 from Tier 2 categories as described by HortNZ (*Growing Together 2035*, 2023)
- Three thought Leaders in the food and fibre, and future productive landscapes, sectors
- Two people from a business perspective - one form the banking sector, and one from a Regional Business Growth and Coaching Centre
- One Sustainable Agronomist Consultant
- One Facilitator / Author in the food and fibre sector
- One lifestyle block owner who has a “serious attitude” to using the land for food production, but has hesitated to commit

6.2 Data Analysis

Content from the interviews has been analysed using thematic analysis. Thematic analysis is a method “for identifying, analysing, and reporting patterns (themes) within data” (Braun & Clarke, 2006). Importantly, this process is inductive and free of observational biases created by academic theories or researcher perceptions (Braun & Clarke, 2006).
Themes have been distilled, commonalities explained and relationships identified.

7. Interview Thematic Analysis

Among the 20 interviewees, the researcher had a prior acquaintance with six of them, four maintained a more distant association, while ten were entirely unknown to the researcher. For the tomato grower, relevant information was drawn from the HortNZ website. In terms of the interview process, two participants opted to submit their responses in writing due to time constraints, while all other interviews were conducted either via Zoom or phone calls. For a comprehensive list of all interview questions, please refer to Appendix A.

7.1 Analysis of the Short Answer Questions - Grower Interviews

The growers' responses on the crops they cultivate, the land size, secondary crops, business descriptions, the types of markets they supply, and production volumes (where interviewees

provided such information) are conveniently summarised in Table 1 below. Notably, questions related to yield and financial aspects were not asked of the interviewees, given their sensitivity within the industry, but where they offered such information it has been included in the table. It's also important to mention that the two large-scale growers are featured in the table and are distinguishable by the use of green text for easy identification.

Table 1 - Summary of short answer interview results from growers.

Crop Type	Land size used for crop (Ha)	Secondary crop, with land size (Ha)	Business Description and Main source of income Y / N	Types of Markets Supplied	Volume of produce indicated
Truffles	4		Part of a greater industry (N)	Hospitality Hope for export	
Hazelnuts (1)	8		Part of a greater industry (N)	Local Processor	Need 2 x current yield to be profitable
Passionfruit	.5	Tamarillo, Chilli (?)	Boutique (Y)	Domestic - w/sale, retail, direct to custom, gate, some export passionfruit	10 tonne from .5ha **when producing well**
Tamarillo	6		Part of a greater industry (Y)	Domestic	
Market Garden	.8 total .1 vegetables only	Microgreens Seedlings (.7)	Boutique (Y) Business and Social Enterprise	Retail, hospitality, direct to customer	10's of 1000's of vegetable items/yr 125-250g = veg item
Hazelnuts (2)	4	Summer Fruit (1)	Boutique (N)	Cracked nuts to speciality stores, direct to customer, small food producers as ingredients. Fresh fruit direct to customer	
Mixed Fruit	5	Summer Vegetables	Boutique (N)	Local consumers through road-side shop	
Macadamias	6	Trial Orchard (1) Tree Nursery (3)	Part of a greater industry (Y)	Nuts - domestic w/sale, retail, high end consumers. Trees unused Māori land, large corporates, and all land owners	1500 trees = 20 tonnes
Tomatoes	.4		Part of a greater industry (Y)	MG Marketing (w/sale)	
Feijoa	1.5	Chestnuts (1) Figs (.2) Macadamia (.5) Maize lease (3.5)	Boutique (Y)	MG Marketing (w/sale) Supermarkets direct	
Kiwifruit	11 (canopy Ha)		Part of a greater industry (Y)	Export	
Avocados	24 + 30		Part of a greater industry (Y)	Export - main Domestic - shoulder	

7.1.1 Points of importance from short answer grower interview questions

Land area
In terms of land area all the small-scale food growers interviewed operate on blocks of 8 hectares or less. However, the extent of land varies depending on the type of crops they cultivate. Growers specialising in tree crops typically manage a minimum of 3 hectares, whereas those focusing on vegetable crops can effectively operate with as little as 0.5 hectares dedicated to food production.

This distinction assumes significance when establishing a profile for or delineating the characteristics of small-scale food growers. Moreover, it holds substantial relevance in the context of exploring and strategizing suitable spaces for future food production initiatives.

Part of a greater industry, or boutique
During the interviews, growers were presented with the opportunity to categorise themselves as either operating within a boutique framework or as integral parts of a larger industry. The responses revealed an even split, with half identifying as boutique growers. Notably, the growers who primarily sold their produce to wholesalers, as opposed to directly to consumers, tended to align themselves with the perception of being part of a broader industry.

In contrast, those who employed diverse sales approaches chose to classify themselves as boutique growers. These individuals engaged in direct sales to consumers in various forms and, in some cases, extended their reach by supplying hospitality establishments or food manufacturers.

The significance of these distinctions becomes evident when considering the dynamics of fresh produce distribution and accessibility within local communities. Additionally, it plays a crucial role in the assessment of the logistical and financial implications related to the various routes to market adopted by these growers.

Growing is the main source of income
Among the small growers, a significant 60% depend on their cultivation efforts as their primary source of income. Within this group, it's interesting to note that an equal split emerges: half of these growers classify themselves as boutique, while the other half identify with the larger industry. Furthermore, among those who rely on growing as their primary income source, there's a notable 50/50 division when it comes to cultivating diverse crops versus monocrops. Surprisingly, no dominant common characteristics surface within this particular subgroup.

Conversely, when we turn our attention to the remaining 40% of small growers, it becomes evident that their financial situation is different. This segment typically falls into one of two categories: they are either in the early developmental phase of their produce business or, at the opposite spectrum, have accumulated alternative income sources over several decades. For the

latter group, this strategy has been employed to reduce their physical involvement in growing activities over time.

Secondary and multiple crops

A significant portion of growers, precisely 60%, incorporate secondary crops into their farming operations. These secondary crops encompass both food-related items such as chillies, chestnuts, figs, macadamias, summer vegetables, summer fruits, microgreens, and tamarillos. Additionally, some growers diversify their portfolios with non-food secondary crops, which encompass trial orchards (featuring the same species but different varieties), tree nurseries (focusing on the same species), seedlings, and maize leases.

The integration of secondary crops introduces a range of advantages to these growers. It not only enhances diversity within their workflows and extends their presence across various growing seasons but also serves as a valuable risk management strategy. By spreading financial risks and minimising pest and disease susceptibility, the incorporation of secondary, or multiple crops, contributes to a more resilient and biodiverse agricultural ecosystem.

Volume of produce

While the interview questions refrained from delving into the sensitive territory of yield and produce volumes, some growers voluntarily offered insights into these aspects. What emerges from this supplementary information is a remarkable demonstration of how small land areas can yield substantial volumes of food. For instance, one grower managed to produce an impressive 20 tonnes of nuts from just 6 hectares, while another produced 10 tonnes of passionfruit from a mere 0.5 hectares. In the realm of vegetables, the interviewed grower is able to harvest tens of thousands of individual items (where an item might be a bunch of vegetables) from a scant 0.1 hectares, with each item weighing in at a modest 125-250 grams.

This revelation underscores the importance of understanding the volumes of fresh produce generated per hectare by small-scale growers. Such knowledge serves as a critical foundation for future planning, particularly in the realms of land allocation, food production, consumer engagement, and community interactions within New Zealand.

Intriguingly, it's worth noting that one hazelnut grower, despite successfully producing nuts, believes that a doubling of the current yield is necessary for their growing business to attain profitability. This insight highlights the intricate relationship between yield and financial sustainability in the context of fresh food production.

Ultimately, comprehending the intricacies of fresh food cultivation and its associated financial returns plays a pivotal role in safeguarding the livelihoods of those responsible for our local fresh food supplies, ensuring that they can maintain sustainable and prosperous businesses.

Types of markets

Every small-scale grower interviewed in our study is focused on supplying the New Zealand domestic market. Notably, half of these growers actively engage in direct sales to local consumers through various channels, reflecting a diverse range of marketing strategies. Additionally, two growers stand out by directly catering to the hospitality industry, providing fresh truffles and vegetables with short shelf lives.

Specialisation in high-end or specialty markets was primarily observed among the hazelnut (2) and macadamia growers. They recognize the unique value of their produce and have identified niche markets for their goods. Conversely, the hazelnut (1), macadamia, and truffle growers expressed their intention to significantly increase their production volume before considering the prospect of entering the export market.

Meanwhile, two growers, specialising in feijoas and tomatoes, have chosen to distribute their produce through a produce wholesaler.

Understanding these marketing strategies and the fresh food distribution methods employed by small-scale growers is paramount when assessing the accessibility of food to the New Zealand populace. This knowledge becomes particularly relevant when planning for future urban and food growing spaces, including their proximity to potential consumer markets.

Large Growers

The two large-scale growers we interviewed stand out due to their land holdings exceeding ten hectares, and both have a strong presence in export markets. Additionally, the kiwifruit grower has one route to market through the single-desk marketing structure of that particular industry sector, and the avocado grower engages in domestic market supply during the shoulder seasons, enabling some level of diversification in their distribution strategy.

It is crucial to acknowledge that large growers and their smaller counterparts primarily cater to distinctly different market segments. Consequently, their motivations for growing differ significantly, emphasising the need to recognize their unique roles and contributions within the broader fresh produce sector.

7.1.2 Ambition to scale up

In addition to the insights shared in Table 1, growers were also posed a fundamental question: Do you have any aspirations to scale up your operations?

The response from small-scale growers was unequivocal, with every single one expressing no intention to pursue scaling up. Furthermore, one grower revealed a shift from their initial goal of scaling up to a new aspiration centred around increasing scope rather than sheer scale. Two

other growers articulated their desire to enhance efficiency and yield within their existing operations, negating the idea of scaling up.

This unanimous stance among small-scale food growers carries significant implications, offering critical insights into how best to support and foster the growth of this sector. It underlines the importance of tailored assistance and development strategies to align with the unique ambitions of small-scale growers, ultimately benefiting the sector as a whole.

7.2 Analysis from the Discussion Questions - Grower Interviews

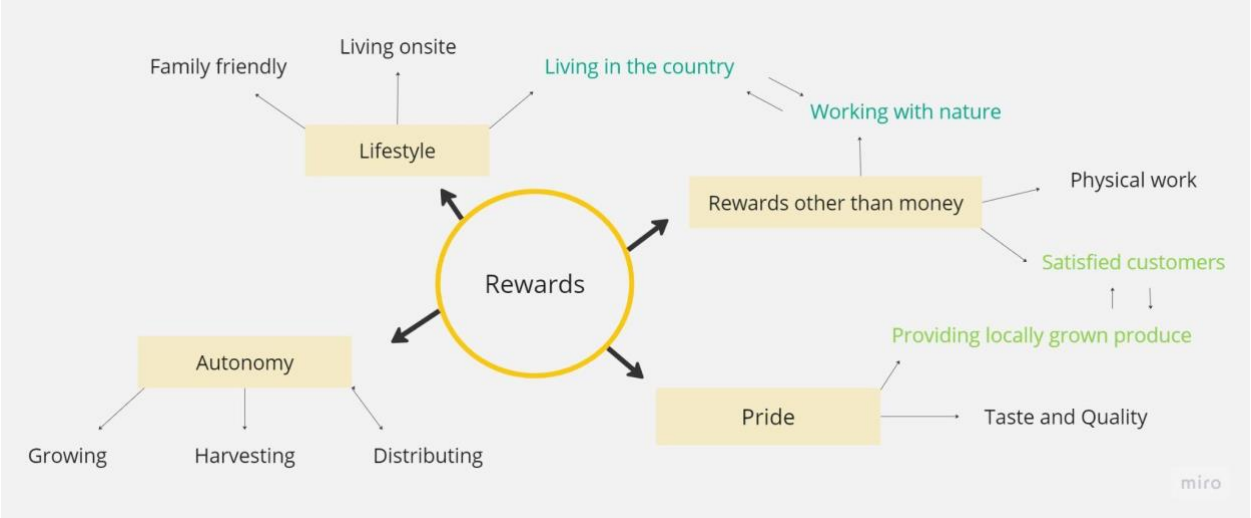
During the interviews, growers responded to a set of six discussion questions, each strategically crafted to uncover various themes. The first three questions aimed to elicit what these growers find most rewarding in their endeavours, the challenges they encounter, and the kind of assistance they desire. The thematic analysis of these questions is visually represented in Figures 7 and 8, providing valuable insights into their motivations and struggles.

Subsequently, two more questions delved into how small-scale food growing businesses positively impact their local communities and the surrounding natural environment. Understanding these contributions is pivotal for the future planning of urban, rural, and peri-urban spaces, as it can inform the development of more sustainable and harmonious coexistence. The thematic analysis of these questions can be found in Figure 9 in section 7.2.4.

Lastly, one question was specifically crafted to explore the growers' perspectives, experiences, and opinions on economies of scope and economies of scale. This subject is analysed in section #, alongside the responses provided by the Thought Leaders, offering a comprehensive perspective on the matter.

7.2.1 Growers' rewards

Figure 7. The rewards experienced by small-scale food growers, each of them resonating with



equal significance, give insight into dynamics that are crucial for recognizing the themes of food security, environmental and community resilience.

Lifestyle: The "Lifestyle" aspect captures the growers' genuine appreciation of the holistic experience that comes with living, working, and raising a family in a small-scale rural setting, closely connected with nature. This connects the grower with their environment on an intimate level, enabling greater connection to the theme of environmental resilience. This section also highlights the rewards of health and well-being achieved through physical labour, outdoor work, alignment with nature, and embracing the seasonal rhythms, an aspect solely attributed to small-scale growers.

Rewards Other Than Money: This section delves into the non-financial motivations of small-scale food growers, emphasising their values that extend beyond monetary gains. Notably, small scale growers can directly appreciate the positive impact they have in supporting resilient communities. They find immense joy in cultivating fresh and delicious produce to offer their local communities, relishing the personal interactions with their customers. As small growers/consumer relationships build this creates a positive loop fuelling local food security.

Pride: The sense of "Pride" is a common thread shared by both large and small growers. They take great satisfaction in cultivating high-quality, fresh, and tasty produce, which is a source of immense pride and contentment. Regardless of domestic or global distribution, having high quality produce ensures continual demand linking to the theme of community resilience through employment.

Autonomy: Within this segment, some small-scale growers express the importance of "Autonomy" throughout all aspects of their produce business. They take pride in their self-

sufficiency, enjoying independence in the development, cultivation, and sale of fresh produce. This autonomy is highly valued by small-scale growers, emphasising their preference for self-reliance over dependence on external structures or entities. The grower has ownership of the environmental footprint from growing to distribution. Having this level of control supports environmental resilience.

7.2.2 Challenges

Growers encountered a multitude of challenges. Weather was universally problematic, while pest and disease pressures were commonly reported, with large growers facing significant challenges and some small-scale growers dealing with moderate issues. Financial challenges were a shared burden, with each grower experiencing them for various reasons. A sense of isolation was most acutely felt by those with diversified crops and those who directly served consumers. For one grower, Māori land presented a unique challenge that deeply concerned them.

Given the complexities of small-scale food growing businesses, the process of growing fresh produce for local communities is largely under supported, creating potential stress across all themes. Community resilience is largely supported by food security. When growers are under supported, their ability to consistently supply produce is reduced, weakening local food security and community resilience. As an unintended consequence environmental care reduces in priority.

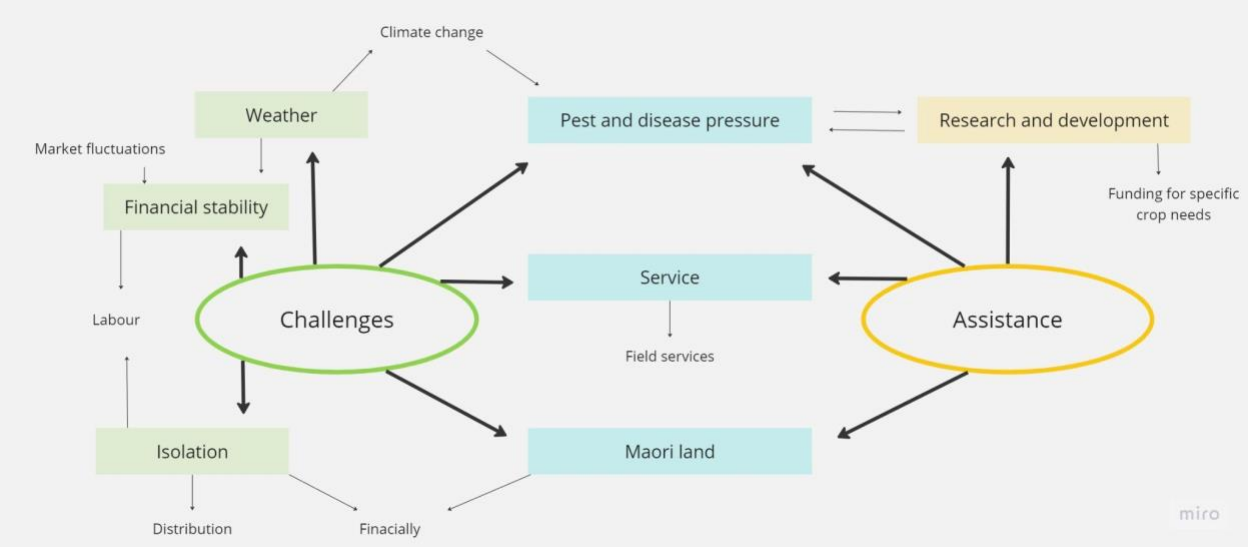


Figure 8. Thematic diagram showing grower challenges and how assistance can reduce environmental impacts while strengthening community resilience and food security.

Weather: Weather, the most prominent and uncontrollable challenge, was unanimously acknowledged as a hurdle that could not be surmounted. Even though growers recognized that the challenging weather events stemmed from climate change, they feel they can't do much in the face of it. Conversely, larger growers explored the option of mitigating weather challenges

by implementing protective measures like shelter. However, such safeguards came at the cost of production trees and financial resources.

Pest and Disease Pressure: The challenge of pest and disease pressure was most pronounced among larger, mono-crop growers and somewhat among those cultivating perishable fruits and vegetables. Large growers relied on chemicals for control but emphasised their reduced usage of milder chemicals compared to previous decades. Diversified growers, on the other hand, adopted biological controls, integrated pest management, and diversification to minimise the risk of pest and disease outbreaks.

Isolation: Isolation primarily pertained to the lack of service support and technical assistance. Small-scale growers believed that the support services designed for the majority of the horticulture industry, consisting of large growers, were out of reach, being unprofitable for the suppliers. Technical guidance and crop production techniques are tailored to suit large growers, leaving small-scale growers feeling unsupported and misunderstood. The infrastructure was not user-friendly for them. These challenges often forced small-scale growers to work solo for long hours, leaving them with limited social and recreational time, exacerbating their sense of isolation.

Māori Land: For the single grower on Māori land, this presented the most significant challenge. Their experience is that banks will not lend to businesses on Māori land, resulting in the need for the entire enterprise to be self-funding. This placed added pressure and time constraints on the business, hindering its development and causing delays.

The challenges for small scale growers are disproportionately greater than those of large-scale growers, which make them more vulnerable and less able to make a positive impact across the themes of food security and resilience of environment and community.

7.2.3 Assistance

When growers were asked about their "no-strings-attached" wish list for assistance to enhance their horticultural business outcomes, the question caught them by surprise. It appeared as if they had never been consulted on this matter before. Interestingly, there were certain commonalities between the types of assistance needed and the challenges they faced, as shown in Figure 8 above.

Research and Development
Fifty percent of small growers, and all large growers, expressed a desire for research and development. While there were commonalities in terms of pest and disease control, growers also identified specific needs related to their crops or growing systems. Additionally, one of the hazelnut growers emphasised the importance of funding for research and development. They highlighted two key areas where research is needed but challenges to secure funding are

frustrating. They see the potential for growth but can't make progress due to their small association and restricted yield.

Many growers expressed the need for support tailored to small, diverse growers, which was the second most common request. They sought an "extension agent" service, which would provide practical support and informed advice based on proven field trials of diverse soil, plant, and community integration systems, often referred to as agroecology. This type of support is distinct from the advice, support and product sales services typically offer.

The Māori landowner/grower called for government intervention and assistance to ensure that businesses on Māori land have equal access to lending and funding opportunities compared to other landowners.

7.2.4 Community and environmental contribution

Figure 9 below provides insight into the theme of community and environmental resilience made by growers. As the interviews delved into how their horticultural businesses impact local communities and natural environments, it became evident that this was an emotionally charged topic for the growers, particularly in the environmental context. They expressed a strong sense of pride when discussing how their permanent trees contribute to carbon sequestration, a noteworthy endeavour for which they receive no recognition or credits.
However, one grower raised a recent concern about a negative consequence that has emerged—an increased population of rats, which now requires more intensive baiting efforts for control. Another grower reported a dual-edged consequence related to increased bird populations. On one hand, increased bird life is beneficial to biodiversity and ecosystems, while on the other hand growing numbers of birds can become problematic as they interfere with fruit ripening and, in some cases, bud formation.

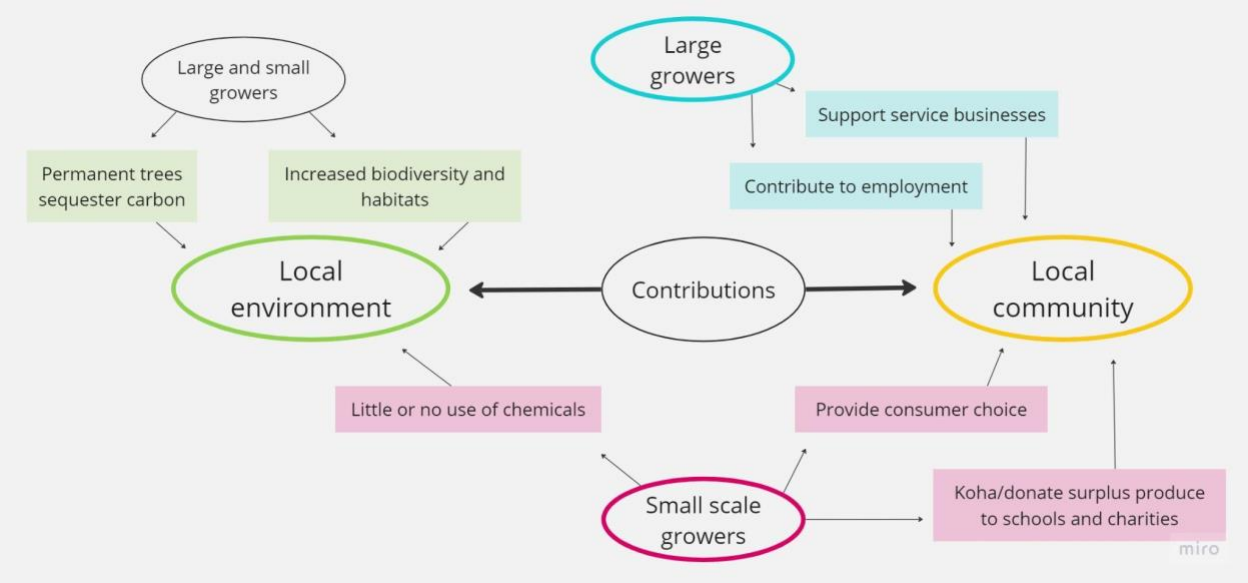


Figure 9. Thematic diagram showing contributions of different scale growers to the local environment and communities, which are seen to have positive impacts on food security, environmental and community resilience, which are the key themes.

Local Community

The small-scale growers expressed their strongest support within their local communities by providing quality fresh fruit and vegetables. They take pride in offering produce that is exceptionally fresh, with little to no shelf-life, and they often donate excess goods to local charities through koha arrangements. In contrast, the large growers support local service businesses and provide employment opportunities within their communities. It is evident that both small and large growers contribute to their communities in different yet meaningful ways.

Natural Environment

In addition to permanent tree presence, all growers actively participate in planting native trees, leading to increased biodiversity across their properties. Ecological enrichment by small-scale diverse growers extends to entire ecosystems, including habitats, plant life, bird populations, insects, and soil microbiology. Notably, the practice enhances soil stability and porosity, improving the overall soil quality. Despite a few exceptions where land use varied, such as the tomato grower in an urban setting with greenhouses, it is clear that horticultural food growing has numerous positive contributions to the local natural environment.

7.2.5 Anomaly - Marketing

Marketing poses an interesting conundrum within the context of small-scale food growing. It was expressed in various facets—as both a reward and a challenge, and it even found its place on

the growers' assistance wish-list. On one hand, marketing was viewed as a reward when seen in the light of autonomy, providing the growers with control over the entire process. However, the challenge emerged when recognizing that marketing demands an entirely different skill set from growing. While the growers' passion resides in cultivation, they often harbour a strong aversion to marketing activities. As a possible solution, the truffle grower joined a truffle co-op to address this challenge. Nevertheless, there is still a desire for further assistance, particularly in the realm of value-adding—transforming the produce into higher-value products.

7.3 Lifestyle Block Owner

The lifestyle block owner initiated the conversation with a disdain for the term "lifestyle block," contending that it conjures images of large, unproductive spaces with high-end homes, typically located in areas of elevated land value near urban environments. The only commonality between this landowner and the traditional concept of a lifestyle block is the high land value, which led the landowner to prefer the title "small-block" landowner.

For this landowner, the substantial capital investment in the property has limited the financial capacity to pursue agricultural activities beyond those with established supply chains. Consequently, the primary business on this property revolves around beef production. Nevertheless, there remains a strong aspiration to delve into fresh produce horticulture.

To assess the feasibility of transitioning into plant-based produce as a business venture, the landowner conducted thorough due diligence. The challenges unearthed during this research echoed the experiences of the ten small-scale growers interviewed. These common challenges encompassed an unsupportive environment for small producers and the recognition that marketing requires a distinct skill set from cultivation, adding complexity to the concept. Financial viability posed a significant hurdle, particularly due to the costs of land and compliance.

The landowner faced another challenge in the form of time constraints. Balancing off-farm work for financial stability with the demands of growing fresh produce left limited time for the latter. Location and the volume of produce presented yet another unresolved equation. The remote location lacked passing consumers, making gate sales impractical. This would necessitate box deliveries, potentially requiring a continuous supply of produce. The final unresolved option was mono-crop or a diversity of crops - the former might be simpler, but the latter would provide better financial diversity and risk buffer against pest and disease incursion.

The culmination of these uncertainties, resulting from the due diligence process, led the small block landowner to refrain from further engagement with fresh produce farming, despite the strong desire to do so.

7.4 Business Matters of Small-Scale Food Crop Growing

During the interviews with growers, business-related questions were intentionally limited due to the personal and sensitive nature of financial matters. To provide a more comprehensive

perspective, two individuals experienced in the banking and business development/coaching sectors were included in the interview phase.

The discussion with the Agriculture Economist from the banking sector lacked a structured set of questions but revolved around how banks evaluate lending to different sectors, especially focusing on lifestyle blocks and small primary industry businesses. Banks primarily base their assessment of loan applications on risk and the ability to repay the loan. Higher-risk applications typically entail higher fees. Self-employment is generally perceived as high risk, as is involvement in farming or the primary industry. Combining self-employment with the primary industry is regarded as the highest risk category due to the uncertainty of regular income, with exceptions being dairy farming and dairy grazing, which have more predictable monthly income. For enterprises such as small-scale growing or other primary sector endeavours with limited proven track records, obtaining financing through a conventional bank can be extremely challenging. The recommendation here is to thoroughly research and present the business case with all contingencies covered comprehensively, potentially requiring a regular alternative source of income to secure lending.

The co-founder / chief coach of a regional business development centre provides valuable insights for small-scale growers. The foremost strategy recommended is to prioritise sourcing and securing finance, making it the primary tactical action. Frequent cash flow forecasts, consistently updated with actual data, are crucial to maintaining financial stability. The coach underscores that although organisations can achieve exceptional results with minimal resources, this is not a sustainable approach in the long term. They emphasise the expanded sources of capital and finance available today, such as crowdfunding and crowdlending. Additionally, during the initial business start-up phase, connecting with others in a similar business phase is advised, as it can be an arduous and potentially isolating journey. Learning online marketing is particularly valuable, given that many growers expressed a need for assistance in marketing, and over 50% of them sell directly to consumers or the hospitality sector.

The business coach also offers advice on scaling up, but since none of the interviewed growers in this set have ambitions of scaling up, this aspect is considered irrelevant.

Some growers contributed their thoughts and experiences on business matters:

Export:

- The passion fruit grower initially supplied an export market but encountered serious risks due to the COVID-19 pandemic, prompting the exploration of alternative local markets.
- The truffle grower aspires to establish an export market but recognizes the need to build up the volume of truffles. To facilitate this goal, a co-op has been formed to pave the way for exports, with the expectation of higher financial returns compared to the local market.

- The two large growers, kiwifruit and avocados, both engage in exports. Kiwifruit has a distinct marketing route through the single desk marketer, Zespri. The avocado grower exports the main season fruit while selling shoulder season fruit in the New Zealand domestic market, with sub-grade fruit directed to an oil processor.

Finance:

- Among the large growers, the kiwifruit grower was the only one to rate finance as rewarding, consistently sustaining positive financial income year after year.
- The avocado grower manages business finances based on a five-year average due to ongoing market and production fluctuations, which can be a challenge to maintain financial solvency.
- Common themes emerged from the small-scale growers, highlighting the imbalance between the costs of production, land, and living, compared to the financial returns from growing food crops. Furthermore, employing labour is a financial stressor, with 40% of interviewed growers not employing labour due to financial constraints.

7.5 Sustainable Agronomist Consultant

The interview with the Sustainable Agronomist consultant aimed to explore the advice and services available, or the lack thereof, that are suitable for small-scale food growers in New Zealand. A single question initiated the discussion: "What help is out there for small diverse growers in New Zealand?" The concise response revealed a stark reality - there is virtually no support available for small-scale growers, although there are some emerging initiatives addressing environmentally friendly produce growing for New Zealand's larger growers. However, the conversation that followed was characterised by vibrancy and a sense of purpose.

In New Zealand, there is an absence of mechanisms to support small-scale diverse food growers. Unlike countries like the United States and Ireland, which have maintained long-standing extension programs, New Zealand privatised its former extension programs, significantly altering the dynamics.

According to the consultant, for produce growers to achieve financial viability, the only viable option is to find a niche and have the ability to set prices. Operating as price-takers in the mainstream market is not conducive to financial security. As per this consultant's perspective, the solution for small-scale food growers lies in embracing diversity in both thought and crops. They must challenge the existing status quo and question the capitalist system if they wish to contribute to New Zealand's quest for a sustainable, fair, and equitable food system.

7.6 Facilitator / Author - Food and Fibre Sector

The facilitator was interviewed to extract insights from their experience in running farmer field days and other learning programs, shedding light on the most effective learning methods for farmers and growers. Their initial response was straightforward: farmers learn best from observing what their peers are doing, often through visual observation and dialogue. It involves discussing both successful and unsuccessful approaches.

The conversation then delved into learning frameworks and agricultural extension (Ag-extension). Education and learning can take various forms: formal, informal, and non-formal. Farmers tend to gravitate toward informal and non-formal learning settings. Informal learning has no predefined structure and often occurs in casual settings, such as over a fence, at a local pub or sports setting. Non-formal learning, on the other hand, follows a structured format, is facilitated, and encourages active participation. In such environments, consultants are generally absent, allowing participants to build confidence, share failures, and test new ideas. This approach helps maintain a balanced power dynamic and prevents one entity from exerting excessive influence, which can lead to counterproductive outcomes.

Although farmers primarily learn through observation and discussion, it was also emphasised that taking a break from the farm and participating in group activities with like-minded individuals can have a positive impact on mental health.

The facilitator pointed out that New Zealand lacks true agricultural extension programs. Instead, information is often disseminated by business representatives, and scientific research is typically funded by corporations. An effective Ag-extension program should involve collaboration between researchers and farmers to address specific problems, thus nurturing independent learning among farmers and growers.

Regarding small-scale growers, the facilitator noted that they often find themselves in a challenging cycle of insufficient finances and the need for support and assistance to drive improvement and development.

7.7 Economies of Scope and Economies of scale

Economies of scope and economies of scale were explored in interviews with growers and three thought leaders to investigate their perceptions, experiences, and opinions on these concepts. In the interviews, the description provided for these terms was as follows: "Economies of scope differ from economies of scale, with scope meaning the production of a variety of different products together to reduce costs, while scale means producing more of the same product to reduce costs by increasing efficiency. For growers, scope can also be described as multi-crop/production, and scale as monocrop/production."

It's noteworthy that while the description emphasises cost reduction and efficiency, the responses from the interviewees were more multifaceted. Figure 10 below presents the interviewee responses regarding economies of scope and scale.

Large growers operate at scale by specialising in a specific produce crop.

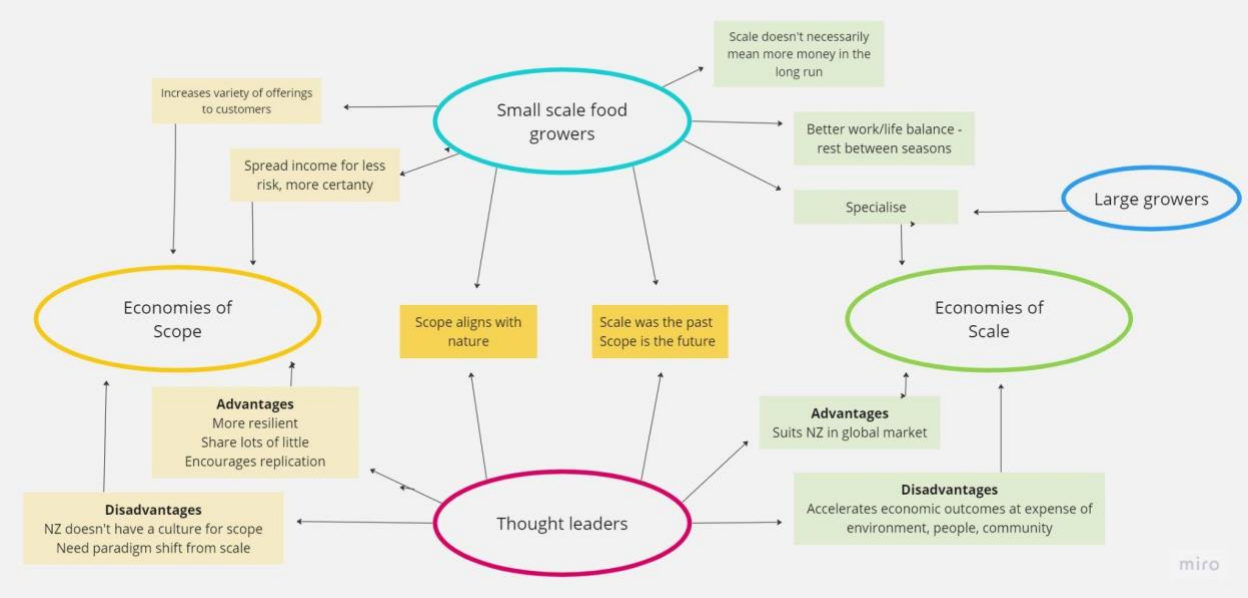


Figure 11. Thematic diagram highlighting key ideas and connections between economies of scope and economies of scale from small scale growers, large scale growers and thought leaders. The ideas shown directly link to the themes of food security, environmental and community resilience.

7.7.1 Small scale food growers on economies of scope / scale

Scale:

Small-scale food growers generally favour economies of scope, but there were interesting comments regarding scale. For instance, the tamarillo grower transitioned from scope (with two crop types) to scale (with one crop type) to achieve a better work-life balance. Handling two crop types offered no break in the 12-month cycle, making it challenging to take a breather. The truffle grower specialises in a single crop type since no other crops are compatible with truffles, and they aim to become experts in this niche. The macadamia grower initially pursued economies of scale to reduce costs, such as packaging, but now encourages growers who buy their trees to consider inter-cropping and complementary crops to mitigate risks like finances, pests, and diseases. They emphasised that the risk of scale is putting "all eggs in one basket," while the risk of scope is spreading resources too thin. Hazelnut grower (2) mentioned that scale doesn't necessarily translate to more long-term profits, as it requires capital and ongoing maintenance expenses, as well as increased labour demands. In partial contrast, hazelnut grower (1) invested in mechanical equipment to reduce labour costs but still struggles to keep up with the workload due to the larger orchard size.

Scope:
Small-scale food growers who operate within economies of scope highlight how it spreads various risks, particularly financial risk. While income might be slightly lower, it's more stable over the seasons. Scope also helps diversify the risk of pest and disease incursions or disasters, leading to increased production certainty. Having a variety of crops enables these growers to offer a wider range of produce to their customers, which is considered a positive marketing and financial strategy.

Central to these responses are two key themes:

1. Alignment with Nature: Economies of scope align with the principles of nature, which is biodiverse and forms a complex ecosystem. When in good health, nature is stable and life-giving. Growers and thought leaders emphasise that nature serves as the foundation upon which our food systems and communities rely.

2. Future Prospects: Growers operating within economies of scope express strong belief that it's the superior of the two options. Some go as far as suggesting that economies of scale served the past, but economies of scope are the future, owing to the costs associated with scaling up, expenses related to freight, and the need to mitigate risks. These two factors align significantly with the perspectives of thought leaders.

7.7.2 Thought leaders

The thought leaders had a resounding alignment with small scale food growers on economies of scope and economies of scale, even though their questions were slightly different.
Thought leaders were asked to discuss advantages and disadvantages of economies of scope and scale, and what roles they believe large export and small scale food crops have in New Zealand's future.

Advantages and Disadvantages of Scope and Scale:
Upon analysing the thought leaders' responses, it becomes evident that economies of scale and scope can’t easily be separated; they need each other for comparison.
One thought leader points out that while scale was effective in the 1970s, 80s, and 90s during relatively stable times, the world no longer enjoys such stability. Climate change brings extreme weather events, increased pest and disease incursions, and geopolitical uncertainties. The advantage of scope-focused food growing operations lies in their diversity and flexibility, offering resilience to adapt when stressors challenge the existing scale-based system.

New Zealand is a tiny nation that exports approximately 90% of its produce, scale has been the solution for entry into global markets. Supplying into global commodity markets means small margins which need large volumes to make a profit.

The disadvantage of economies of scale is that this system accelerates financial outcomes at the expense of nature, people and communities.

Remaining small offers real advantages compared to investing in scale, which can lock a business into more of the same and increase risks. Staying small doesn't preclude development and expansion. Another thought leader emphasises the opportunities that come with being small, including the potential to replicate successful small-scale growing models across communities. Sharing resources like packaging, processing spaces, or human resources presents another way for small-scale growers to grow and expand while operating within economies of scope.

Operating within scope, however, comes with the disadvantage of not aligning with New Zealand's prevailing culture. The existing structures and regulations are heavily skewed toward large-scale growers and supermarket dominance, making it difficult for scope-based operations to flourish within the current system.

In contrast, Thought Leaders interviewed emphasise the significant role small-scale food growers play in ensuring New Zealand's survival and fostering community cohesion, ultimately enhancing food security.

Both thought leaders concur on the need for a paradigm shift and recognize that shifting from the dominance of scale to embracing scope-based approaches will indeed pose a formidable challenge.

Future Roles of Export (Large Growers) and Small-Scale Food Growers:
Regarding the future roles of export (large growers) and small-scale food growers, the responses were clear:

Export:
There aren't many benefits of scale foreseen for the food and fibre sector in the future due to the uncertainty of the physical world, expresses one Thought Leader.
However, another Thought Leader conveys that although the current economic system relies on exports for income, it's expected that lightweight components of food, such as calcium, enzymes, and new food technology research results, will be New Zealand's exports in the future due to the cost of freighting to global markets. This shift means it won't be traditional products like milk powder, meat, or fruit but rather value-added components. The risk lies in farmers remaining locked into producing different products within the same system.

Small-Scale Food Growers:
Small-scale food growers are expected to play a massive role in ensuring stability in New Zealand’s’ domestic food system and resilient communities, especially as the global economy undergoes transformations. There is pessimism about the future continuing with "business as usual" given the shifting global economy. Small-scale food growers will contribute to bringing communities together, providing food sovereignty and security in an uncertain future.

Two quotes of firm expression are:

"Small scale growers will give us opportunity to adapt in the disruption of supply chains caused by climate change".

"The inevitability of the changing world will force the hand of change from scale to scope
Those in scope already have a head start".

7.7.3 Future productive landscapes

The senior lecturer in future landscapes points out that lifestyle blocks often receive negative perceptions and discussions, primarily from conventional farmers who view them as a wasteful use of productive land, a perspective that is understandable. Urban planners, on the other hand, often consider these areas as vacant lands awaiting urban development, with the primary focus on meeting urban needs, which are typically associated with housing, infrastructure, and amenities. Unfortunately, food production is frequently overlooked in the context of "urban needs." Historically, cities have actively excluded food production from their planning. The integration of food and housing as equally important and interconnected elements is still in its infancy, at best.

The term "peri-urban" designates the transitional zone between rural and urban areas, serving as a buffer between industrial farming and urban living, as explained by the senior lecturer. People residing in these peri-urban areas have voiced concerns about having food production in proximity to their homes, citing environmental issues like water contamination, concerns about human health due to pesticide spray drift, and worries about animal welfare. Other aspects of food cultivation in close proximity to residential zones, such as odours, noise, and increased road use, have been deemed tolerable trade-offs to ensure accessibility to locally produced food.

The potential of peri-urban zones lies in their spatial proximity to urban areas, enabling the production of food at an appropriate scale. This approach reduces the need for extensive transportation and enhances community resilience by ensuring a local supply of fresh food.

8. Discussion

8.1 Terminology

The term "lifestyle block" is commonly used in New Zealand to describe non-urban residential land blocks, which can vary significantly in size. Auckland Council defines them as land larger than residential lots, usually in rural settings (*Expansion of Lifestyle Blocks and Urban Areas onto High-Class Land*, 2011), and Fairweather & Robertson (2022) extend the description to include land blocks up to 20 hectares in size. They also distinguish between the landowners of these properties, categorising them as "lifestylers" and "small farmers." They define "lifestylers" as individuals who prioritise the rural lifestyle experience over the productive potential of the land, and “small farmers: as those who value the production abilities of the land. However, planners perceive these land lots differently; they view them as land waiting for urban development, which includes housing, infrastructure, and amenities but excludes food production (Goodall, 2003). Conventional farmers often consider them as wasted productive land (as noted by a senior lecturer in productive landscapes in 2023). Therefore, the small scale grower has no defining term to unify them as a group to be seen and heard in pan-sector efforts to create food security and community resilience through positive environmental change.

In light of the diverse findings from this research, which emphasise the importance of diversity among small productive land blocks and their owners, it raises the question of appropriate terminology for this group of food producers. Perhaps "Small Diverse Growers" or simply "Diverse Growers" might be a more suitable title, as size has not been a significant factor in the data related to fresh food production and community resilience. It's worth noting that the term "small farms" has been identified in peri-urban work (Goodall, 2023), a visionary solution for food security and community resilience and in the urban environmental planning sector. Finding the correct term for the small-scale grower, enables urban development to use the small growers' use of landscape to enhance ecosystems in the transition between rural and urban spaces for environmental resilience.

8.2 Diversity in Fresh Produce Growing and Market Channels

Diversity is the main commonality throughout the literature review and interviews, including sources such as small growers, thought leaders, and academic references including MacFall et al, Liebig et al, Reidsma, P., & Ewert, F.

A significant finding from the interviews is that a majority of small-scale growers emphasise the importance of diversity in both crops and market channels, primarily as a means to mitigate environmental and financial risks. This viewpoint is corroborated by the insights of a sustainable agronomist (October 2023), who likewise underscores the critical role of diversity for small-scale growers.

Diversity, in this context, encompasses a wide array of aspects, including genetic diversity within food species, varied production techniques, both within individual farms and across different farms. This approach not only enhances on-farm biodiversity but also contributes to a more

extensive regional biodiversity, and in turn, food security. The positive effects of diversity in production extend to the distribution process, creating a network of resilience capable of swiftly responding to disruptions from any direction within the complex system (MacFall et al., 2015). Additionally, the implementation of diversity in crop management has the potential to reduce pest incursions and simultaneously increase crop yields, as supported by Parker et al., (2019), increasing environmental resilience.

From the interviews, it is clear that economies of scope, particularly those associated with diversity, hold a dominant position when discussing the future of sustainable food production, and resilient communities in New Zealand. While acknowledging the historical significance of economies of scale in New Zealand's food production systems, the thought leaders interviewed express uncertainty about the continued dominance in the future. Furthermore, the international literature review consistently highlights the positive outcomes of diversity in growing and food distribution systems, notably devoid of any negative aspects related to diversity. This contrasts the literature from thought leaders in New Zealand (Proudfoot, 2022) and (Ministry for Primary Industries, 2023), which largely neglects the topic of diversity. The discrepancy clearly emphasises the compatibility between research interviews and international literature in advocating for diversity, while New Zealand-specific literature remains noticeably silent on the matter.

8.3 Small Scale Food Growers in Peri-urban Spaces

The conflict over the use of high-class land for housing, at the expense of horticultural food production, is a contentious issue, as outlined in the "Peri-urban potential" (Goodall, 2023). Findings from interviews reveal that people are less concerned about food being grown in proximity to their residential areas if it is done on a small scale and in a manner that prioritises the environment, human health, and animal welfare. This suggests that small-scale growers can design growing systems for community resilience. In Figure 11 below, a comparison is provided between large-scale growers, commonly found in New Zealand's produce industry, and small-scale growers, based on interview insights.

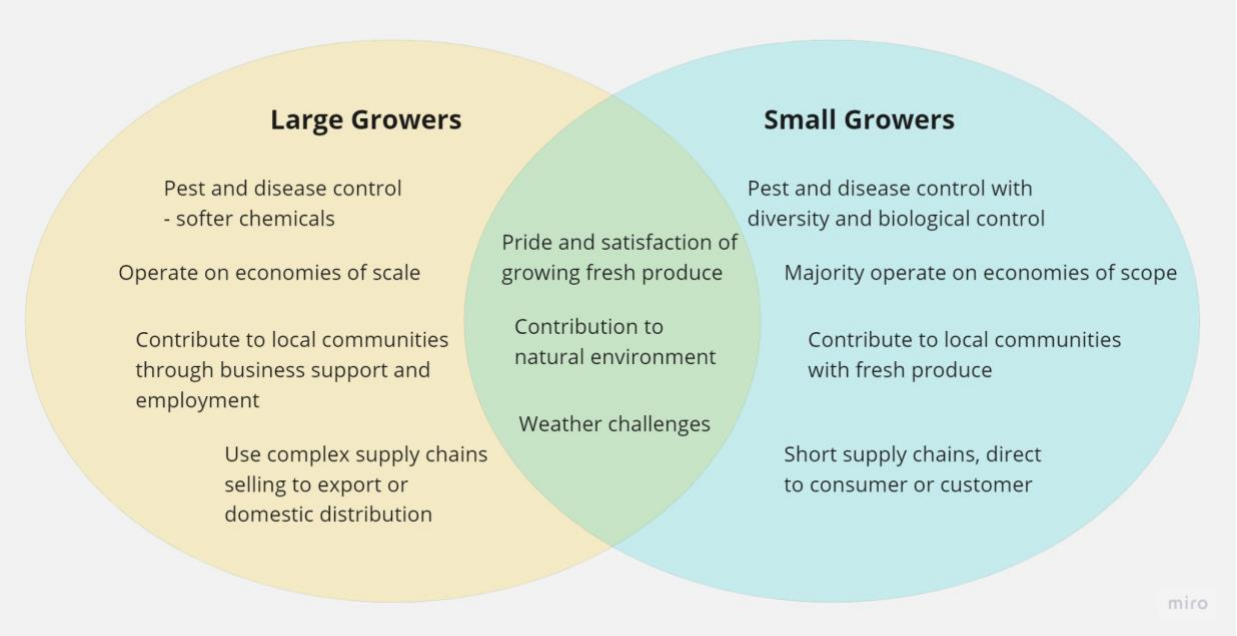


Figure 11. Venn diagram comparing main practices of large growers and small growers relating to the themes of food security, environmental and community resilience.

Shared aspects, such as the pride and satisfaction derived from growing fresh produce, contributing to the enhancement of the natural environment, and coping with weather challenges, as reported by interviewees, are factors that do not adversely impact peri-urban zones (Goodall, 2023). However, the characteristics of large-scale growers, as revealed in interviews, including the scale of their operations, use of chemicals, and extensive supply chains, render them incompatible with domestic food systems in peri-urban spaces. Therefore, small-scale growers, with their models of small-scale production, avoidance of chemicals, shorter supply chains, and existing contributions to communities through the provision of fresh produce, appear to be the most compatible with peri-urban zones (as reported in the interviews).

Furthermore, interviews uncovered that the small-scale growers do not aspire to scale up their operations, indicating their comfort within the parameters required in peri-urban spaces. This underscores the compatibility between small-scale food growers and peri-urban zones, which contributes to domestic food security and resilient communities. Notably, one of the thought leaders interviewed specifically highlighted the increased resilience that can be achieved through small-scale diverse growing systems.

8.4 The Future, and Change

The literature review sheds light on New Zealand's export food system, highlighting its focus on science, innovation, and technology to ensure sustainable food production and maintain a strong global presence, which significantly contributes to the country's economy. KPMG Emerging Leaders have prioritised addressing food insecurity in New Zealand and express enthusiasm for

the future of "lab food" over traditional farming (Agribusiness Agenda 2023, 2023). However, the Plant and Food Research centre highlights barriers such as time and cost in producing fruit flesh safely in a laboratory setting (In the Face of Climate Change and Food Insecurity, New Zealand Considers Lab-Grown Fruit, 2023). Meanwhile, existing small-scale growers in New Zealand are actively engaged in producing fresh, delicious food for their customers while simultaneously supporting biodiversity and other ecosystem services within their natural surroundings (combined interviews). International literature reviewed during this research underscores the importance of land use that promotes biodiversity and diverse food production systems, especially as a response to climate change (MacFall et al., 2015; Liebig et al., 2019; Food and Land Use - NCE 2018, 2018).

Therefore, the most effective approach in terms of time, money, and climate action would be to turn the focus to diverse, small-scale growers for assistance in addressing New Zealand's domestic food systems and insecurities, which form the foundation of the country's ability to export food and food technology. These small growers are already in action, but they require the necessary resources to provide the needed impact for food security, and environmental and community resilience. Existing growers can serve as the champions to replicate their successful practices, suggests the researcher of this report. Due to the scarcity of New Zealand academic literature addressing the future of sustainable fresh food production for the domestic food system and the positive impact of diverse growing systems on the environment and communities (Liebig et al., 2019, MacFall et al., 2015) further New Zealand specific research is needed in this space.

Efforts to preserve ecosystem services crucial for human health and community stability call for changes in land use and food production systems, as highlighted in the "Food and Land Use" literature (Food and Land Use - NCE 2018, 2018). However, farmers and growers need support to navigate these transformations successfully. In New Zealand, the existing support system has been fragmented over the past decades, as reported by "Kirk et al." Fortunately, the reviewed literature aligns with the perspectives of the sustainable agronomist and facilitator interviewed, emphasising the need to revise the current model to provide effective support to growers on their journey toward sustainable food production (Kirk et al., 2022).

Two thought leaders interviewed stress the necessity for a paradigm shift across New Zealand's food systems, encompassing both export and domestic systems. To bring about change within New Zealand's domestic food system, small-scale growers must challenge the existing status quo, as recommended by the sustainable agronomist. Furthermore, established leaders and growers need to broaden their perspectives to recognize the positive contributions of small diverse growers to both the domestic and export sectors, as suggested by the researcher of this report.

9. Conclusions

Overall, small scale food growers in New Zealand have the potential to help domestic food security while simultaneously benefiting the environment and community resilience. However, they require assistance and support to ensure their potential can be realised. The development of small-scale diverse food-growing systems in New Zealand necessitates robust, locally based research. These growers will play a pivotal role in shaping the future of New Zealand's domestic food system. While their system doesn't require scaling up, it offers an ideal format for replication throughout the nation, especially in visionary peri-urban spaces.

New Zealand is a nation heavily reliant on food exports as a major contributor to its economy. However, the environmental impacts stemming from food production play a significant role in climate change, making it imperative that changes occur. While efforts and initiatives are underway to mitigate these impacts, they are primarily through the lens of technology and innovation, often within the framework of industrial agriculture and horticulture. By stepping outside the status quo and investing in the development of small-scale growers, domestic food security will be in a better position to underpin the New Zealand export economy. New Zealand's export and domestic food systems should not be viewed as mutually exclusive, but rather as complementary elements that are crucial for a sustainable future in the country. It is imperative that small-scale diverse food growers are actively included in the vision of ensuring food access for everyone indefinitely.

The concepts of food security and community resilience are closely intertwined. In New Zealand, small-scale food growers represent a minority, but their horticultural practices align closely with nature, emphasising biodiversity enhancement, responsible resource management, and minimal chemical use. They embrace diversity in fresh food production and distribution, which can significantly benefit the country in environmental and community resilience.

To achieve the vision of food security and community resilience in an environmentally supportive way, a significant paradigm shift is necessary. Transitioning from the prevailing emphasis on scale-based approaches to embracing scope-based methods will undoubtedly be a formidable undertaking. It is vital for stakeholders to come together, cooperate, and urgently work towards sustainable fresh food production and the development of resilient local communities. These efforts are crucial as New Zealand navigates through a world characterised by uncertainty stemming from both climatic and geopolitical factors.

Small-scale diverse food-growing systems occupy a crucial place in New Zealand's landscapes and human communities, carrying the potential to reshape and enhance the nation's approach to domestic food production and distribution.

10. Recommendations

5. Create a robust identity to unite the small-scale food grower sector

6. Quantify the produce impact of small-scale growers in local communities, through investment in research

7. Sector leadership must participate in conversations for future domestic food security solutions

8. Use this report as a catalyst to initiate the above actions

In order to achieve these recommendations, there needs to be collaboration amongst current small-scale growers, thought leaders, land development bodies and food security agencies. Actions from these conversations will flow into enhanced environmental and community resilience.

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Appendix A

Interview Questions

Small Crop Growers

6 Short Answer Questions:

1. What land size is your horticultural activity?
2. What crops do you grow?
3. Is this horticultural (hort) activity your main source of income?
4. Is your operation a) a boutique enterprise, b) part of a greater industry or c) other
5. Is your hort activity ... a) a hobby b) a retirement plan c) a business d) other ?
6. What types of markets do you supply?

7 Discussion Questions

1. What are the most rewarding aspects of your horticulture activity/business?
2. What are the most challenging aspects of your hort activity/business?
3. What is your opinion on economies of scale vs economies of scope? (Could also be described as single crop/product vs multiple crop/product horticulture) Economies of scope differ from economies of scale, in that the former means producing a variety of different products together to reduce costs while the latter means producing more of the same good in order to reduce costs by increasing efficiency.
4. Do you have any ambition to scale-up your activity/business?
5. If you could have assistance to improve your hort activity/business outcomes, what would your wish-list be?
6. What contribution does your hort activity have to your local community? 13 What contribution does your hort activity have to your local natural environment?

Large Growers

4 Quick Background Questions

1. How many years have you been in horticulture?
2. What land size do you manage in total?
3. How many different crops are you managing? What crops are they?
4. What markets do you sell into?

7 Discussion Questions

1. What are the most rewarding aspects of your horticulture business?
2. What are the most challenging aspects of your horticulture business?
3. If you could have assistance to improve your hort business outcomes, what would your wish list be?
4. What is your opinion on economies of scope vs economies of scale? (Could also be described as single crop vs multiple crop horticulture)
5. What advice can you give to small scale hort crops that want to scale up?

6. What contribution does your hort activity have to your local community?
7. What contribution does your hort activity have to your local natural environment?

Lifestyle Block Owner
Please describe your business and the due diligence process you went through to make decisions regarding your land use

System Diversity in Food Growing - Economies of scope. Economies of scale.
A Generic Overview: Economies of scope differ from economies of scale, in that the former means producing a variety of different products together to reduce costs while the latter means producing more of the same good in order to reduce costs by increasing efficiency.

With a forward focus on improving our Food Growing Outcomes, and from your experiences with economies of scope and economies of scale in the food growing context:

1. What do you think are advantages of economies of scope?
2. What do you think are Dis-advantages of economies of scope?
3. What do you think are advantages of economies of scale?
4. What do you think are Dis-advantages of economies of scale?
5. What role/roles do you see large/export food crops having in New Zealand's future?
6. What role/roles do you see small scale food crops having in New Zealand's future?

Business Development
From your experience, what are the key points of advice for businesses, regardless of sector, that wish to:

1. Start up
2. scale up
3. Source and secure funding

Banking
What is a bank's perspective around lending for small rural enterprises?

Future Productive Landscapes
How can small scale food crops / growers fit (or not fit) into peri-urban zones?

Sustainable Agronomy Consultant
What support services are available in New Zealand for small scale diverse crops / growers?

Facilitator / Author
From your experience please discuss how farmers and growers learn best