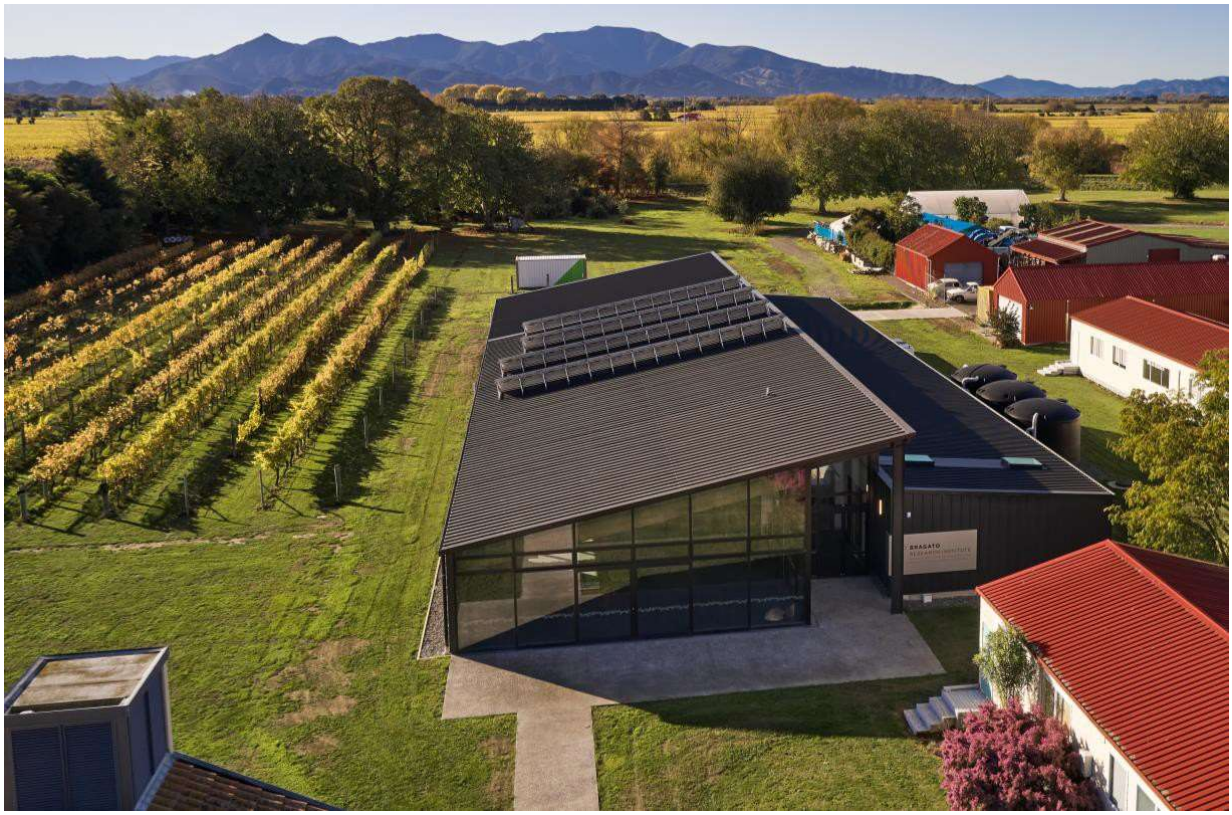
Bragato Research Institute

Submission on

Te Ara Paerangi – Future Pathways Green Paper Consultation

16 March 2022



BRAGATO
RESEARCH INSTITUTE
RANGAHAU KAREPE, WĀINA O AOTEAROA

BRI SUBMISSION ON *TE ARA PAERANGI – FUTURE PATHWAYS*

Bragato Research Institute (**BRI**) is the research, innovation and knowledge translation organisation of the NZ wine industry. BRI welcomes the opportunity to provide feedback on the *Te Ara Paerangi – Future Pathways* Green Paper 2021. This submission was prepared by the BRI Executive team and endorsed by the Science Advisory Committee and the Board.

This submission:

- outlines the NZ wine sector's vision for the NZ research, science and innovation system,
- explores this consultation's themes in the context of that vision, and
- details how BRI offers a unique, and clear value proposition within the RS&I system.

Realising Wine Industry Aspirations

Building a wine innovation system

The NZ wine sector contributes more than $2 billion per annum in exports and a further $500 million in domestic sales. But the value story is much broader than this. There are 11 major wine regions from Otago to Northland, and within these regions vineyards and wineries catalyse and sustain a myriad of small businesses as parts of their supply chains and related services, as well as broader tourism and hospitality activity. The cumulative economic footprint is significant, and in some areas, central to regional economic wellbeing.[1]

The economic argument is only one element of the value story, with clear evidence of a broader halo effect internationally as our wine projects and affirms our national brand for quality, sustainability, distinctiveness, and hospitality. Domestically, our wines enhance peoples' daily lives and contribute to our own sense of identity and connection to place. No other NZ primary product connects domestic and international consumers so strongly to place.

NZ wine's success has emerged and accelerated through the coupling of innovation and entrepreneurship. Much of that innovation has come from deliberate and sustained research programmes. The wine sector's Bragato Research Institute is now well established and is forging ahead with a series of mission-critical research programmes such as the recently funded Sauvignon Blanc Grapevine Improvement Programme. This will equip producers of NZ's flagship variety, Sauvignon Blanc, with globally unparalled resilience to face the challenges and realise the opportunities presented by an uncertain, rapidly changing world. Our research portfolio deals with diversification, sustainability challenges (such as climate change, pests and disease, water, soil health etc) as well as productivity and value-add. We are working to develop the most knowledge intensive and smart wine innovation system in the world.

We have a dedicated state of the art research winery, and we have hundreds of members' vineyards that together add up to a world-class research hub and a distributed "living laboratory". We have only just begun to realise the power of rapidly advancing and increasingly available technologies and techniques in areas such as sensing, bioinformatics, and big data.

BRI is at the heart of an evolving sophisticated wine innovation system with our research programmes and leading-edge capabilities sitting at the core, connected both to the broader research community, and through our members to a powerful adaptive learning system across the regions of New Zealand.

The **Annex** to this submission provides further details of some of BRI's capabilities, research programmes and their impact.

[1] Economic contribution of the New Zealand wine sector, NZIER (2020)

We want a national research and innovation system that supports our sectoral aspirations, but it is a two-way street and we want to contribute to broader challenges

Unsurprisingly, we would like to see *Te Ara Paerangi – Future Pathways* lead to a national research system that enables and supports us to achieve these aspirations. We have created science leadership, focussed on sector priorities, that will deliver very significant impact within a system that enables us to draw on the broader and diverse capabilities of NZ's science ecosystem as required, but which also allows us to deepen our capabilities within an industry-owned model that drives increased private investment and solves industry challenges while also generating public benefit across New Zealand.

We are fully committed to working equally alongside the rest of the system to address cross-cutting issues such as supporting EDI goals, living up to the Treaty of Waitangi, supporting career development, sharing broader infrastructures, and increasingly hosting others in our wine research hub.

A national research and innovation system should recognise diversity of institutions, roles and sectoral relationships

Successful innovation systems are diverse, and innovation comes in great part from connectedness and combining complementary elements. This process is dynamic: to succeed, BRI needs to be able to develop its research and innovation core – where we drive our programmes and hold dedicated capability, but where we can also plug and play as needed in a supportive and efficient way without some of the competitive dynamics that we see today.

This flexible model should accommodate different institutional models and avoid the danger of bundling disparate elements, in search of efficiencies, to the point where rigidities crowd out innovation.

We agree that modern research and innovation systems should focus increasingly on investment levers to achieve national priorities. The systems should be increasingly agnostic on institutional form provided their outcomes are frontier knowledge creation, better integration between education and research, resilience, international connections, and breakthrough knowledge translation with industry and communities.

BRI already focuses on achieving all these outcomes. We want to ensure the national research, science and innovation (**RS&I**) system enables and supports us to further develop our ability to do so.

We generate private value for our sector and significant public value

Like any national research and innovation system, our institutions are a product of history and often reflect investment in past areas of need or economic structure. The wine sector has scaled massively over the past few decades and the creation of BRI as a dedicated grape and wine research institute reflects this. The economic benefit driven by the NZ wine industry is particularly important in regional economies such as Gisborne, Hawkes Bay, Wairarapa, Marlborough, and Central Otago.

To date, we have received start-up support and greatly appreciate the public co-investment that supports many of our strategic research programmes. Our sector is a progressive one, and increasingly sees research and innovation as core to the sector's sustainability and competitiveness; increases in industry investment (including a 19% lift in annual industry levy funding from 2021) reflect this. We do, however, think there is a strong argument for stable, or base funding, as enjoyed by others. That type of support has enabled other organisations to develop capabilities that serve the research ecosystem, their workforce, and their stakeholders well. This support would assure our ability to invest in research that looks "over the horizon" and better allow us to develop people and capability that can also be available for the broader RS&I system.

Partnerships and engagement with others

Partnership is central to successful innovation: developing shared understanding, generating trust, looking ahead, and combining different perspectives for the addressing of issues and the creation of new opportunities. We have always sought to broaden our engagement with government, university, public and independent research organisations in a way that is less about institutional form, and more focused on collective endeavour and cross-cutting challenges. We see this as the best path to generating the new knowledge that will underpin our sector's future success.

International connections are vital to innovation

The seeds of NZ's winegrowing innovation system came from overseas, but over time NZ has generated its own capability and knowledge to support the sector's development, addressing its own specific needs. In turn, innovation from NZ has fed back into the international body of knowledge, beginning with screw caps and virus management, but now particularly in areas of vineyard canopy management, knowledge relating to Sauvignon Blanc, and the challenges of producing fine wine in a "cool climate".

International connections remain a vital part of the NZ winegrowing innovation system. NZ's wine innovation system is small by international standards; a core part of BRI's role is to translate overseas knowledge into the NZ context, and to determine where new knowledge specific to NZ is needed. NZ's winegrowers place a high value on the specific role BRI takes in connecting its network of growers and winemakers with the international wine science scene, using a knowledge translation approach.

The Themes of *Te Ara Paerangi – Future Pathways* address the key opportunities for sustainable growth of the NZ winegrowing sector

Priorities

NZ winegrowing faces a set of issues and opportunities that are highly aligned with the Government's key research priorities. As an exporter of a high-value, distinctive export product, the industry is a significant contributor to economic growth and development. However, as a primary producer, the industry faces the big external challenges of continuing input cost inflation, climate change, water availability and use, and land use change. These external challenges combine to make productivity and sustainability our key research targets, as addressing those challenges is central to our continued value growth.

As a major regional employer, the industry is deeply immersed in the issues of labour supply, and the opportunities for technology to increase productivity and enhance the opportunities available for our valued workforce.

We share these issues and opportunities with all NZ's primary sectors. To support NZ's primary sectors to collectively address these long-term priorities, the RS&I policy framework must drive the right behaviours across the RS&I system.

When allocating finite Government resources for RS&I, a clear focus on priorities should help guide investment, infrastructure, and institutional behaviour for the delivery of greatest benefit.[2] The Government needs to focus on actions that recognise and encourage collaboration and cooperation

[2] NZIER calculates that, each year, current wine sector R&D leads to: an increase in exports by $41 million; an increase in the size of the national economy by $64.5 million; a boost in household consumption by $37.2 million; and 258 new jobs for the economy. Source: *Economic impact of research and development in the wine industry*, NZIER, 2020

around national and sectoral priorities, as well as creating new opportunities and knowledge from blue-skies opportunities.

Aligning research with priorities is critical, but so is the pathway for knowledge created by research to be driven to outcomes and impacts for New Zealand. Too much Crown-funded research conducted in New Zealand has simply "remained on the shelf", never generating value. All research contracts should explicitly address extension, knowledge translation and other pathways to impact, even if the next logical step is further research.

MBIE should maintain a pragmatic view of what constitutes "Science excellence". A definition based on the academic quality of research is one useful definition to drive part of the Crown's RS&I investment portfolio. However, the working definition of excellence should also accommodate the idea of "fit-for-purpose". Good science is sometimes not going to deliver publications in the best journals, but that same science may be "excellent" for NZ in the sense that it makes a tangible and significant contribution to NZ's economic, environmental, or social well-being. We strongly urge adoption of a definition that recognises the impact of such contributions.

Institutions

Building a world-class wine innovation system required BRI to build on existing institutional relationships, and foster new ones. The existing NZ wine innovation system brings together institutions such as BRI, Plant & Food Research, University of Auckland, Lincoln University, Nelson Marlborough Institute of Technology and the Eastern Institute of Technology.

The opportunity now is to leverage BRI's unique position and technological advances to bring a new "institution" into the system: a distributed network of grape growers and viticulturalists. We are actively developing new approaches and investments that could integrate these winegrowers more directly and completely into the innovation system. We believe this distributed network would greatly enrich relationships between established research organisations and industry. Any redesign of NZ's RS&I system needs to facilitate new collaborative relationships such as these.

Co-location decisions are complex and will usually be specific to the characteristics of the parties involved. The driver for decision-making should, in each instance, be a consideration of where the most valuable collaborations and relationships can be developed. Relationships between research organisations are important, but so too are relationships between research organisations and the sectors with which they work.

We note that factors influencing co-location decisions can change rapidly. The use and sophistication of digital communication tools has exploded over the past two years and will only continue to grow in effectiveness. This is increasingly a factor in location decisions, particularly for the nimbler, less infrastructure-intensive research organisations.

These co-location considerations are of particular interest to BRI as we grow our research centre for the NZ wine industry. Not only are we unique in our trusted access to NZ's 1,400 winegrowers, but we have more experience than many with co-location: we are co-located with both Plant & Food and Nelson Marlborough Institute of Technology in Blenheim, with Lincoln University in Christchurch, and have agreements for staff to teach in NMIT and Lincoln University, and expect to have further teaching relationships in place this year.

Infrastructure

As a sectoral organisation, BRI views infrastructure capability as a collective issue. With a diverse range of needs and opportunities, the winegrowing sector will never own all the infrastructure necessary to support the sector's research needs, and neither will any other research organisation.

The key issues are whether infrastructure exists, whether infrastructure is accessible, and whether it is engaged in research and development of benefit to our, or any other sector.

Infrastructure developed with Crown investment must be treated as an enabler of collaboration and a driver of outputs, outcomes and impact, not an asset to be managed to develop a competitive position for the asset owner (to the detriment of NZ's overall science output and the benefits RS&I can create). While ownership of infrastructure inevitably becomes an institutional matter, use and access must be treated in a constructive manner. A key example is the area of databases and collections, which can be operated to build a competitive position for their owners, despite the common-good intent of the original policy.

For any infrastructure developed using institutional (as opposed to public) funds, the Crown should use levers such as funding and RS&I policy to incentivise its use in a collaborative rather than competitive manner.

The nature of critical infrastructure varies with the sector or science discipline. It also varies with the size, nature, and age of research organisations. Larger organisations may have critical mass and assets that mean their key infrastructure opportunities are capital-intensive assets and specialised equipment. Smaller and newer companies' greatest needs may be some level of base funding to ensure long-term viability and allow staff to focus on proposals for research support, collaboration and delivery.

Infrastructure is also a strong driver of workforce recruitment, development and retention. RS&I is a global industry, and science staff want to see a career pathway supported and enabled by accessible infrastructure – in the right place.

For BRI, these matters are very topical as we develop a centre of winegrowing research. On our Blenheim campus we have a key infrastructural asset – our research winery. This is critical infrastructure, used by many research organisations and commercial companies. We have just established a genomics laboratory (within Lincoln University), which will be the cornerstone of the industry's largest ever research investment – a $18.7 million grapevine improvement programme. We anticipate developing other strategic infrastructure assets as winegrowing science, and our own capability develops in NZ.

Workforce

Developing and maintaining a workforce able to adapt to and deliver in a changing world is critical to the ongoing effectiveness of the RS&I system. Stability of institutions and infrastructure is an essential part of ensuring that early-stage researchers are reassured about the viability of a career in science. Of particular concern to many early career researchers is the perception of employment being totally dependent on applications for funding. RS&I companies must balance the need to remain solvent and effective against the need to give staff confidence that employment is not threatened by any single funding application. One means of achieving this balance is for research organisations to have a component of base or fixed funding. This is particularly important for new organisations and small organisations, for whom securing any single funding contract will often represent a material change in their financial position.

Government investments in science should encourage mentoring and tangible career development initiatives, facilitate career portability between research bodies, and place an emphasis on developing excellent researchers able to lead medium to long term research efforts.

Funding

Funding is the driver of the RS&I system, and the key lever with which private and public investors give effect to priorities and policies. BRI's submission is that funding should be based on clear signals, consistently applied, with extended continuity that gives effect to the strategic investment intent. Funding mechanisms should be open access, and designed to reward targeted behaviours, not institutional types.

BRI sees a distinction between the funding frameworks that should drive applied research versus more basic investigation. For basic research, research organisations are well-placed to interpret the state of global science against the context of their own capabilities and the context of the needs of NZ stakeholder communities. We should trust research organisations to make the connections between the possibilities that new science offers, and the potential of that science to benefit NZ, through various pathways and routes to application.

On the other hand, sector priorities should be the drivers for investments in RS&I that are closer to application and to market. Crown RS&I investment policies and decisions should recognise that while research organisations have flexibility in the areas in which they wish to work, sectoral priorities reflect the enduring needs and opportunities that businesses face. The appeal of new science and new technologies must be balanced against those enduring needs. An effective RS&I funding policy will bring new science and approaches to bear on the outcomes and opportunities of greatest need as identified by the relevant sector, and maintain that focus until the outcome is delivered or until a deliberate and soundly-based change of direction is indicated.

ANNEX - What makes BRI unique?

Clear value proposition

Bragato Research Institute was created in June 2017 with $12.5 million establishment funding from MBIE, and began operations in 2018. It builds on a solid base of decades of industry funding and Crown support for grape and wine research.

BRI is unlike any other New Zealand research organisation. It both is a dedicated research, innovation and knowledge translation organisation, while at the same time being an integral part of the NZ wine industry, who are its owners. This gives BRI unparalled access to both the science and industry communities, and places it in a unique position to deliver transformative value to NZ.

MBIE's November 2020 review of BRI assessed the value of wine industry research to New Zealand, including BRI's ability to realise this. The review found:

> "There is a clear value proposition for BRI, centred on the provision of specialist viticultural research, combined with a state-of-the-art Research Winery. Bragato fills a gap not supplied by other research organisations, providing immediate technical support for the industry to grow and thrive."

Our impact is delivered through our science staff, our research winery, our research programmes, and our dedicated knowledge translation staff.

1. Science leaders, and growing early career researchers
Since its formation, BRI has focussed on attracting and investing in top researchers and programme managers, to support our goal of growing exceptional science leaders for the benefit of our sector.

Key numbers:

- Permanent Staff:.....14
- Estimated 80 -100 researchers involved in the NZ wine innovation system, coordinated by BRI
- PhDs on Permanent Staff:.....7 (+1 PhD student)
    - Early career PhDs:.....5
    - Currently recruiting:.....1-2 PhDs
- Currently supporting at universities: 3 PhD students

2. BRI Research Winery
BRI's national Research Winery in Blenheim (a facility unique in the Southern Hemisphere) provides new capability to deliver impact and science excellence to winegrowers. In addition to conducting our own wine research, we conduct research for wine companies that is of a kind, quality and scale not previously possible.

Key numbers

- Vintage 2020:
    - Opened. First research wines produced
- Vintage 2021:
    - Our research produced a massive **186 different wine ferments**; no other winery in New Zealand comes close to producing this many wines.
    - One innovative research wine developed during this vintage has already led to a new product being launched in the Australian market; more are under development.

3. BRI's Major Research Programmes

The current, recently completed, and under-development major research programmes that BRI leads include the following. These programmes include research collaborations with University of Auckland, Lincoln University, Plant & Food Research, Lincoln Agritech, University of Canterbury, Nelson Marlborough Institute of Technology, and Eastern Institute of Technology.

Programme	Research fields	Investment	Outcomes
Sauvignon Blanc Grapevine Improvement	Sustainability / resilience / diversity / genomics	**$18.7 m** over 7 years	Harness natural plant diversity to generate 11,000+ novel Sauvignon Blanc variants, each with characteristics identified and indexed using genomic sequencing. Allow industry to select traits of most commercial value to enhance yield, drought/climate tolerance, disease resistance, pest resistance, etc. Risk mitigation: most NZ Sauvignon Blanc are one clone. Will act as biosecurity threat insurance against novel pest or disease.
Vineyard Ecosystems	Soil health / pest and disease / sustainability	**$7 m** over 6 years	Increase long-term industry resilience and profitability by developing new research-based approaches to pest and disease management that will result in significant increases in vine longevity. Quantify and understand how management choices (weed management, disease management, pruning, etc) affect New Zealand vineyards, to enable more biodiversity and sustainable improvements in grapevine performance.
Lighter Wines	Diversification / new wine styles	**$17 m** over 7 years	Position New Zealand as the world leader for high-quality, naturally grown lower-alcohol wines; substantially achieved. Significant new body of knowledge generated with demand for product outstripping supply. $23.2 m of annual sales of product by 2020.
Pinot Noir	Quality & Productivity / Diversification	**$10.3 m** over 5 years	Growing returns through tools enabling high-quality Pinot Noir production at higher yields.

Programme	Research fields	Investment	Outcomes
Vineyard Systems (under development)	Productivity / Sustainability	To be determined	A first principles examination of vineyard system design, productivity, profitability, and sustainability, driven by outcomes sought by industry. Aims to transform vineyard production in New Zealand.
Soil Health (under development)	Regenerative Agriculture / Sustainability	To be determined	An examination of regenerative practices in winegrowing and their ability to positively impact vineyard productivity and profitability through changes in the management of soil health.
Vineyard lab network (under development)	Big data / decision support systems	To be determined	Proposal to leverage our diverse network of 700 members' vineyards to capture and analyse standardised vineyard data from across the country; use AI and modelling to identify patterns, and generate data to inform vineyard decision-making, and new and existing research.

BRI's current research projects

In addition to BRI's Major Programmes, during the current year we have the following 26 viticulture and oenology research project underway:

Viticulture

Plant health / pests & disease

- Physical means (mechanical shaking) vs chemicals to reduce rot
- Evaluating potential reservoirs of pathogens of grapevines
- Improving outcomes of mealybug insecticide use in vineyards
- Central Otago mealybug and grapevine leafroll virus management
- Weevils in New Zealand vineyards

Climate change / water / soil health

- Water savings and optimising irrigation for yield and quality
- Microbial and vine responses to rising temperatures in NZ
- Managing hail-damaged vineyards (Hawkes Bay and Canterbury)
- Science review of cover-cropping in vineyards

Productivity & Quality

- Viticulture treatments for improving Syrah quality
- Improving grapevine remedial surgery to increase longevity
- Precision grape yield analyser programme
- Automation of grape yield estimation
- Cost-efficient weed management
- Electronic spray deposition sensor for improved spray coverage
- Potential for nanotechnology - wine growing in New Zealand
- Viti-think: a financial calculator for growers
- Long spur pruning as an alternative to cane pruning for Sauvignon Blanc

Oenology

- Prevention of quercetin instability in bottled wine
- Winemaking decisions and polysaccharides in wine
- Understanding green character in Pinot Noir wine
- Effects of freezing Sauvignon Blanc juice - assessing quality
- Chemistry of Vineyard Ecosystems programme samples
- Exploring reductive aromas in Pinot Noir
- Precipitation of calcium tartrate and other compounds in wine
- Effect of bentonite addition prior to cold soaking on Pinot Noir colour, tannin and aroma profile

4. BRI's knowledge translation and extension team

Because we are so close to industry, we are ideally placed to understand the barriers to success within winegrowers' businesses, identify the knowledge gaps, and develop research programmes to fill those gaps.

Our knowledge translation and extension team (permanent staff of 3) then ensures the research findings deliver value to New Zealand, by being converted into practice change in winegrowers' businesses. Our members highly value this activity. Much of this work is done in person, but also generate a significant volume of published material (e.g., in the 12 months to June 2021 our written and digital outputs were the following)