pacific farmer organisations

Farmer-led, Participatory Action Research

A new paradigm for agricultural research in the Pacific

About Pacific Farmer Organisations

Pacific Farmers Organisation (PFO) is the umbrella body for national farmer organisations in the Pacific Island Countries and Territories (PICT's). Agriculture is the main livelihood of the majority (typically 70%+) of the Pacific Islands population. Farmer organisations play a critical role in supporting small farmers to connect, influence, and access information and technologies to improve livelihoods. PFO is a key partner in supporting farmers and rural communities to respond to the challenges of climate change.

PFO is a vibrant and growing network of national farmer organisations that are supporting improved livelihoods for their members and rural communities generally. PFO began operating in 2008 comprising a small group of Farmer organisations (FO) in five countries, and following its legal establishment in 2013, it has grown to embrace 30 member organisations] and over 95,000 farming households (55% are women farmers) in 12 PICT's (Cook Islands, Federated States of Micronesia, Fiji, Kiribati, Marshall Islands, New Caledonia, Papua New Guinea, Samoa, Solomon Islands, Timor Leste, Tonga, and Vanuatu) and has member FOs in Hawaii (United States). PFO's Secretariat is based in Fiji with a satellite office in Hawaii.

About Farmers Organisations for Africa, Caribbean and the Pacific (FO4ACP)

With an implementation period of 54 months, the Farmers Organisations for Africa, Caribbean and the Pacific (FO4ACP) is expected to directly benefit 150,000 farmers in the (Pacific) region.
The Program is a joint partnership between the European Union, the African, Caribbean and Pacific Group of States, the International Fund for Agricultural Development and the Pacific Island Farmers Organisations Network.

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Cover picture caption: *Low cost vegetable nursery designed by the Vanuatu Farm Support Association to help mitigate against the changing weather patterns by giving the farmer more control of the growing cycle as compared to the traditional methods of direct sowing or bareroot transplanting. Produced for publication by Pacific Farmer Organisations with funding assistance provided by the Farmer-led Research and Innovation (FORI) project.*

What is Farmer-led, Participatory Action Research?

Farmer-led, participatory action research is an approach that places farmers at the center of an innovation process. It ensures the integration and collaboration of all stakeholders throughout the research cycle, with a special emphasis on encouraging the active and effective leadership of farmers. Farmer-led participatory action research values the knowledge of all stakeholders, building and strengthening the capacity of all participants, thereby maximizing the impact generated by the research. The research community, development partners and farmer organisations collaborate in the analysis/diagnosis of the baseline situation, agenda setting and programming, identification of solutions, development, implementation and extension, monitoring and evaluation.

Farmer-led participatory action research puts a strong emphasis on continuous collaboration throughout the research, ensuring the mutual sharing and exchange of the parties involved - especially that of the research community and farmer organisations; and recognizing the important role of both these parties, , looks for complementarity between traditional knowledge and technical research for the benefit of improving the livelihoods of smallholder farmers.

Farmer-led participatory action research acknowledges the benefit of the participation of farmer organisations in the governance of research, in the establishment of long term partnerships and in the co-construction of traditional or innovative solutions, with an emphasis on local context and needs. In farmer-centered agricultural research partnerships:

1. Farmers' knowledge and experience are valued.
2. Farmers actively participate in decision-making and research activities, including data collection.
3. Knowledge exchange between farmers and researchers is encouraged.
4. Sustainable practices are promoted.
5. Farmers benefit from research outcomes.
6. Policies are evidence-based and inclusive.
7. Long-term commitment and scaling up are emphasized.

Farmer-led research can improve rural livelihoods. Impact assessments indicate enhanced food and nutrition security through increased crop diversity and improved production. Farmer-led research often led to higher yields and household incomes compared to previous farming techniques, and allowed farmers to accumulate savings and to invest in assets. Most of the research involved the reduced use of chemical inputs and had a positive environmental impact (Bayer et al. 2015)

1 *A fruit and vegetable seedling nursery was designed by Bula Agro Enterprises in Fiji to be 'cyclone mitigated' within 2 hours for an impending cyclone.*
2 *Seedlings are moved into modified shipping containers to be held during the cyclone.*

A move away from traditional agricultural research

Traditional agricultural research is becoming less relevant for several reasons:

- Lack of Farmer Involvement: Traditional research often lacks meaningful engagement with farmers, who are the primary stakeholders and end-users of agricultural innovations. Without their active involvement, research outcomes may not align with farmers' needs, making them less likely to adopt the proposed solutions. Research that lacks farmers' perspectives and practical input may not resonate with them, resulting in slow adoption of recommended practices. If farmers do not see the relevance or benefits of new technologies or methods, they may be hesitant to implement them.

- Limited Consideration of Local Context: Traditional research may focus on generalized solutions without adequately considering the diverse local contexts in which agriculture operates. Agricultural practices that work well in one region may not be suitable for another region due to variations in climate, soil, culture, and other factors.

- Sustainability Concerns: Traditional research may not prioritize sustainable agricultural practices, leading to potential environmental degradation, depletion of natural resources, and negative impacts on ecosystems. Environmental challenges can be location-specific.

- Ignoring Traditional Knowledge: Traditional research may overlook the valuable traditional knowledge that farmers have accumulated over generations. Disregarding this knowledge can lead to missed opportunities for leveraging existing practices and innovations.

- Ineffective Policy Impact: Traditional research, when not adequately linked with policymakers and farmers, may have limited influence on policy formulation. Policies may not address the real challenges faced by farmers or may not be feasible to implement on the ground.

- Increasing Complexity of Agricultural Issues: Modern agricultural challenges, such as climate change, food security, and sustainability, require a multidisciplinary and holistic approach. Traditional research, which often focuses on single aspects, may struggle to address these complex issues effectively.

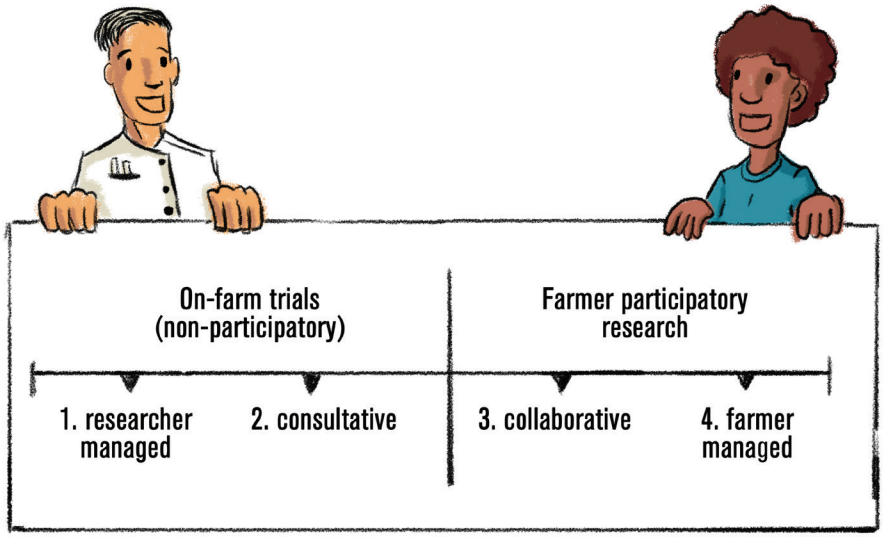
- Emphasis on Short-term Results: Traditional research may prioritize short-term outcomes, often driven by donor funding cycles and publication pressures. Long-term sustainable solutions may require more time and investment, which might not align with traditional research priorities.

- Increasing Demand for Participatory Approaches: As farmers gain more recognition as knowledge holders and key decision-makers in agriculture, there is a growing demand for participatory approaches like Farmer-led, Participatory Action Research, which prioritize inclusivity, relevance, and sustainability.

In response to these challenges, there is a growing shift towards more farmer-centered, participatory, and interdisciplinary approaches to agricultural research, which aim to address the needs and complexities of modern agriculture effectively.

Table 1: Comparing Agricultural Research Approaches: Traditional vs. Farmer-led, Participatory Action Research		
Aspect	Traditional Agricultural Research	Farmer-led, Participatory Action Research
Research Approach	Researcher-driven and controlled	Farmer-driven and participatory
Decision-making	Researchers and policymakers decide	Collaboration among farmers and researchers
Farmers' Involvement	Passive subjects of study	Active co-researchers and participants and disseminators of knowledge and innovation
Knowledge Contribution	Farmers' knowledge often overlooked	Farmers' traditional knowledge valued
Research Priorities	Set by researchers and institutions	Identified based on local needs and issues
Data Collection and Analysis	Researchers collect and analyze data	Farmers involved in data collection
Research Outcomes	May not align with local realities	Context-specific and relevant outcomes
Sustainable Practices	May not prioritize sustainable methods	Emphasizes sustainable farming practices
Capacity Building	Limited focus on farmers' skills	Farmers empowered through training. Farmers' capacity (confidence, knowledge and skills) strengthened to address challenges and manage experimentation and innovation.
Policy Influence	Limited farmer involvement in policymaking	Farmers actively contribute to policies ensuring policies address actual needs and issues
Impact and Adoption	Adoption rates can be low	High potential for widespread adoption
Long-Term Engagement	Limited ongoing engagement with farmers	Encourages long-term collaborations between farmers and other collaborators.
Equity and Inclusivity	May not address local disparities	Focuses on fair and equitable partnerships

In summary, traditional agricultural research tends to be researcher-driven, with limited farmer involvement and may not always consider local knowledge and needs. In contrast, Farmer-led, Participatory Action Research is a collaborative approach that empowers farmers as co-researchers, emphasizes their knowledge, and promotes sustainable and context-specific outcomes. It also fosters inclusive decision-making and has higher potential for widespread adoption and a positive impact on farming communities.



Farmer-led Participatory Research

Perspectives on Cause and Effect: Western Scientific vs. Traditional/Indigenous Views

In Western scientific views, cause and effect are understood through a linear, reductionist approach. This approach seeks to identify specific causal relationships between variables by conducting controlled experiments and analyzing data. It relies on the principles of objectivity, repeatability, and predictability. In this view, cause and effect are seen as directly linked, with one event or action leading to a specific outcome in a predictable manner. This approach is prevalent in disciplines such as physics, chemistry, biology, and economics.

For example, in Western science, if we conduct an experiment where we provide a specific type of fertilizer to a crop and observe a significant increase in crop yield, we conclude that the fertilizer application caused the yield increase. The relationship is considered linear and direct, with the fertilizer acting as the cause and the increased yield as the effect.

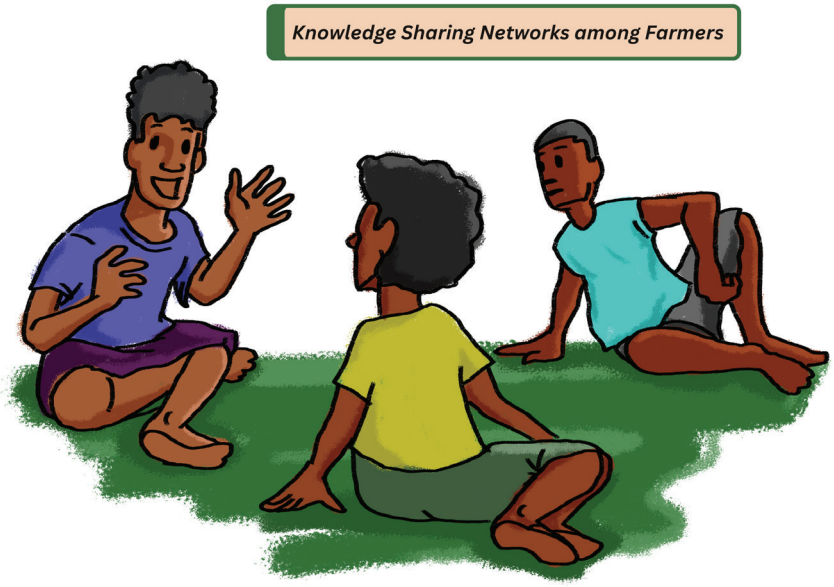
On the other hand, from a more traditional or indigenous view, cause and effect are perceived through a holistic and interconnected lens. Instead of looking for isolated, direct causal relationships, this view considers the intricate relationships between all elements of a system, including spiritual, ecological, and societal aspects. This perspective often integrates knowledge from mythology, spirituality, and ancestral wisdom.

In this view, cause and effect are seen as multifaceted and interconnected, where actions can have far-reaching consequences that may not always be immediately apparent. Events and outcomes are understood as part of a complex web of relationships, where everything is connected and interdependent.

For example, in a traditional or indigenous context, the increase in crop yield might be attributed to the harmonious relationship between the farmer, the land, the spirits, and the ancestral knowledge guiding their practices. The cause of the successful crop yield could be seen as a combination of respecting

rituals, maintaining ecological balance, and following traditional farming practices. The effect is not limited to just an increased crop yield but also includes the well-being of the community and the environment.

In summary, the Western scientific view emphasizes linear, direct causal relationships based on empirical evidence and controlled experiments, while the traditional or indigenous view considers cause and effect within a broader, interconnected context that includes spiritual, ecological, and societal dimensions. Both perspectives offer valuable insights and approaches to understanding the world, and they reflect different cultural world views and epistemologies.



Farmer-led Participatory Research

Table 2: Comparing Perspectives: Western Scientific vs. Traditional/ Indigenous Views on Cause and Effect

Aspect	Western Scientific View	Traditional/Indigenous View
Perspective	Linear and reductionist	Holistic and interconnected
Causality	Identifies specific causal relationships	Considers multifaceted connections
Methodology	Controlled experiments, data analysis	Integrates mythology, spirituality, and ancestral wisdom
Relationships	Direct cause and effect Complex web of interdependence	Context
Focuses on empirical evidence	Incorporates spiritual, ecological, and societal aspects	Interpretation of Events
Objective and repeatable observations	Sees events as part of a broader context	Consequences
Specific and predictable outcomes	Far-reaching consequences, not always immediately apparent	Cultural Worldview
Aligned with Western scientific principles	Reflects traditional cultural epistemologies	

Fair and equitable partnership

Fair and equitable partnership in agricultural research that puts farmers in the center is an approach that recognizes the invaluable knowledge and expertise that farmers possess as custodians of traditional and local agricultural practices. It involves active collaboration between farmers, researchers, policymakers, and other stakeholders to collectively address agricultural challenges and co-create sustainable solutions. Here are some key elements of such a partnership:

1. Recognition of Farmer Knowledge: The partnership starts with acknowledging the depth of knowledge that farmers have accumulated over generations. Their experience and understanding of local ecosystems, weather patterns, soil health, and crop performance are essential in designing effective and context-specific research and development projects.
2. Farmer Empowerment: The approach empowers farmers to actively participate in the research process. Farmers are encouraged to identify research priorities, participate in experimental design, data collection, and analysis. This involvement leads to more relevant research outcomes and increased adoption of research findings.
3. Inclusive Decision-Making: Policymakers, researchers, and farmers jointly make decisions throughout the research process. This participatory decision-making ensures that different perspectives are considered, and the chosen approaches are fair, sustainable, and equitable.
4. Knowledge Exchange: The partnership facilitates knowledge exchange between farmers and researchers. Farmers share their practical knowledge, and researchers contribute scientific expertise. This collaborative learning environment enables the integration of traditional wisdom with modern scientific methods, resulting in innovative solutions.
5. Capacity Building: The partnership invests in building the capacity of farmers to actively engage in research activities. This includes providing training, access to relevant information, and resources to enhance their skills in experimentation, data management, and analysis. This capacity building provides farmers with the confidence, knowledge and skills to engage in experimentation and innovation beyond a specific 'research project'.
6. Intellectual Property Rights (IPRs): The approach addresses intellectual property rights and ownership of research outcomes. Farmers should be recognized for their contributions and share in the benefits resulting from their participation. Studies suggest that small-scale farmer-innovators prefer their innovations to be open access rather than protected by IPRs, and this is largely driven by altruistic motives (Tambo et al. 2020)
7. Sustainable Farming Practices: The partnership promotes sustainable and environmentally friendly farming practices. Farmers' active involvement ensures that the research outcomes align with local ecological conditions and contribute to the preservation of natural resources.
8. Policy Influence: Policymakers should actively involve farmers and researchers in the development of agricultural policies. The partnership encourages evidence-based policy formulation that considers the needs and realities of farmers on the ground.
9. Long-Term Commitment: Successful farmer-centered partnerships require long-term commitments from all involved parties. Continuity in engagement allows for building trust, fostering meaningful relationships, and generating more significant impacts over time.
10. Scaling up and Replication: Successful research outcomes can be scaled up and replicated in other regions with similar conditions. The partnership should explore mechanisms to disseminate successful practices and innovations widely. The involvement of farmers can improve the rate of scaling-up and replication through farmers-to-farmers exchange of knowledge and skills.
11. In conclusion, a fair and equitable partnership in agricultural research that puts farmers at the center is a collaborative and empowering approach. It values farmers' traditional knowledge, engages them as co-researchers, and aims to create sustainable and context-specific solutions for the benefit of farming communities and the agricultural sector as a whole.

Key policy messages on Farmer-led, Participatory Action Research

Farmer-led, Participatory Action Research (PAR) is an approach that involves farmers as active participants and co-researchers in the development and implementation of agricultural practices and policies. Here are five policy messages that emphasize the importance of this approach:

1. Embrace Farmer-Centric Approaches: Policymakers should prioritize and support farmer-led initiatives and PAR projects. Acknowledging farmers as valuable knowledge holders and key stakeholders in the agricultural sector fosters more sustainable and context-specific solutions.
2. Strengthen Agricultural Extension Services: Governments should invest in strengthening agricultural extension services to facilitate farmer-to-farmer knowledge exchange and encourage participatory research. These services can help disseminate valuable information and expertise across farming communities. Involving farmers in research and the generation of knowledge and innovation is a win-win situation, supporting Governments' extension services, which are often constrained by funding and the challenges posed by the topography of many island countries. .
3. Allocate Research Funding for PAR: Policymakers should allocate some agricultural research funding specifically to support farmer-led, participatory action research projects. The availability of specific funding ensures that research efforts are driven by local needs and actively involve farmers in the decision-making process.
4. Foster Collaborative Partnerships: Encourage collaborations between farmers, research institutions, NGOs, and other relevant stakeholders to promote participatory research. Policymakers should facilitate platforms that encourage dialogue, knowledge sharing, and cooperation to enhance the impact of PAR initiatives.
5. Promote Policy Co-creation with Farmers: Policymakers must actively involve farmers in the formulation and evaluation of agricultural policies. Engaging farmers in policy co-creation ensures that policies are grounded in practical realities, are relevant to the local context, and contribute to the sustainable development of the agricultural sector.

Overall, these policy messages emphasize the need for a more inclusive and participatory approach in agricultural research and policy-making, where farmers' perspectives and experiences are valued, and they are active agents of change in shaping the future of agriculture.

Farmer-led Participatory Research

Contrasting Approaches in Agricultural Research: Centralised vs. Decentralised Research Models

A farmer-led participatory action research necessitates a decentralised approach to agricultural research. How well crops and livestock perform depends on soil, microclimate, topology, genetic diversity etc. As weather patterns change and become less predictable, ‘gains’ in production will rely increasingly on innovating in context.

In recent years contrasting approaches have emerged in agricultural research, each with its advantages and challenges: the Centralised Research Model and the Decentralised Research Model. The former revolves around conducting research on government-run research stations, providing resources, and expertise but potentially overlooking diverse environmental conditions and farmer needs. On the other hand, the Decentralised Research Model employs a farmer participatory approach, with trials replicated on farmers’ sites across various agro-ecological conditions. While this model enhances the likelihood of meeting farmers’ needs and fostering direct relevance, it may face limitations in terms of scientific rigor and funding for technical equipment. These divergent paradigms have significant implications for agricultural development and innovation, shaping the ways in which research is conducted and translated into practical outcomes for farming communities.

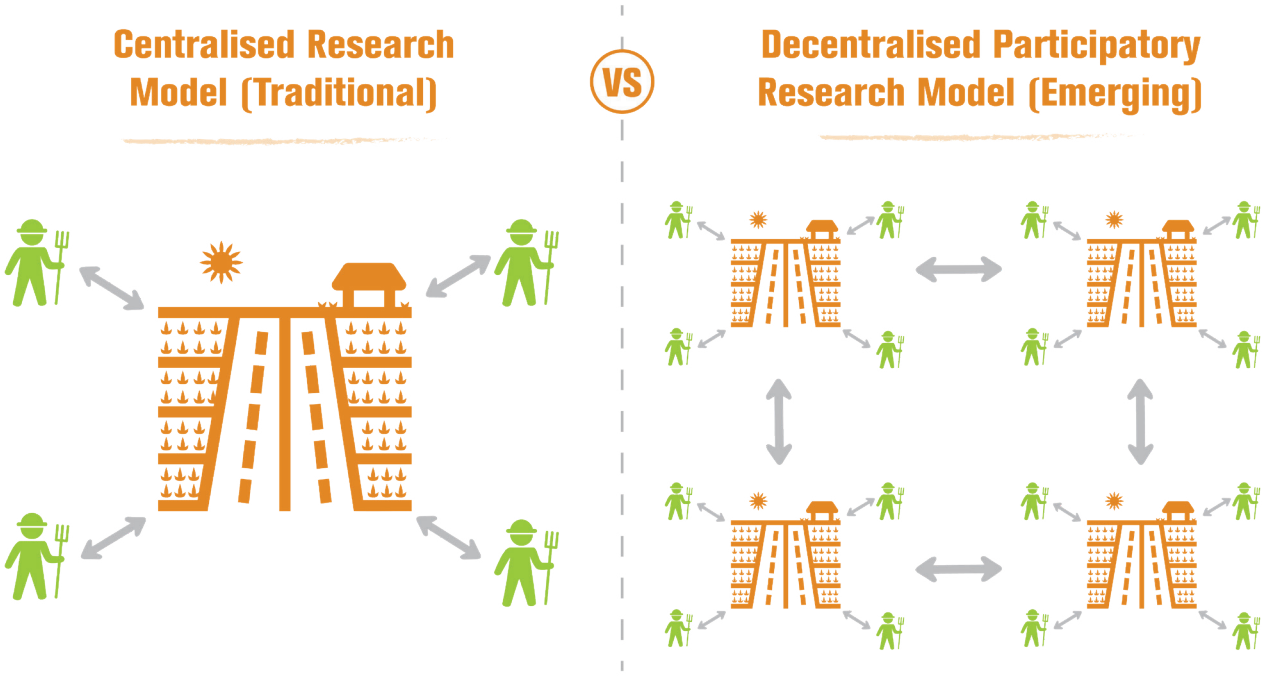


Table 3: Comparing Agricultural Research Models in the Pacific: Centralised vs. Decentralised Approaches

Centralised research model		Decentralised research model	
Traditional model in the Pacific where agricultural research all takes place on 1 or 2 main government run research stations.		**Decentralised research utilizes a farmer participatory model where trials are replicated on farmer sites across a wider range of agro-ecological conditions.**	
Advantages	**Disadvantages**	**Advantages**	**Disadvantages**
In the past had the resources including funding and planting material. Appropriate for breeding for resistance to a serious disease (Centralised research is required before local evaluation can be undertaken) Appropriate for facilitating the importation of improved germplasm for subsequent evaluation by farmers. Made up of academically qualified personnel who have access to the latest research technology.	Does not take into account the different climate and environmental conditions especially in large archipelago countries where climate and environmental conditions vary over relatively short distances. [1] Focus changes as per changes in government policies. Has the potential to be disconnected to the needs of farmers. In the past sufficient budget available. However, no longer assured with increasing pressure on government resources and changes in policy and focus.	Relies on extension service which is often constrained by funding and topography. Much is demanded of agricultural extension, including agricultural and marketing skills, organizing farmers and other stakeholders, developing social capital, sustainable natural resource management and food and livelihood security Increased likelihood of meeting direct needs of farmers. Increased probability of farmer uptake as they are directly involved in the research. Research outcomes cover a wider geographic area and therefore are directly relevant to more farmers. Can be especially relevant in evaluating climate smart practices, including climate smart germplasm. Farmer participatory research can be more economical as it utilizes existing infrastructure and farmer inputs. It benefits from farmers practical experience and local context. Farmers are directly engaging in research, taking their ideas, combining it with good science accessible through partnerships, and are tailor-suiting technologies and methods to their own needs. As a result, some very good local sustainable solutions have been developed — allowing farmers to address problems as well as forge a way forward (example)	Can be highly demanding in terms of management and supervision Can lack scientific rigour if not properly planned and managed. Can be disconnected from international research knowledge. Lack of funding (in particular for capital/ technical equipment)

[1] Climate Book (page 284) In Vanuatu for example climate ranges from hot tropical in the north to almost subtropical conditions in the south. Average seasonal temperatures range between 21 and 27. Therefore, a crop that grows well in one place does not grow well in another.

Example of the ineffectiveness of the high cost centralised research model

The Climate Change and Agriculture (Taylor et al., 2015) book, highlights an example from Vanuatu where selected cultivators of different crops developed at the Tagabe Research Station on Etafe performed poorly when taken north to Santo. Similarly, the performance of high- yielding cocoa developed at the Vanuatu Agricultural Research and Training Centre (VARTC) at Saraoutou in southeast Santo has been disappointing when planted in the main cocoa growing area on the island of Malekula less than 100km South. Malekula farmers are now selecting their own seed despite the substantial resources devoted to cocoa selection over the years. As a result, the industry is now experiencing significant inbreeding yield depression.

There are other examples — sweet potato germplasm imported from CIP, Peru, because of improved performance and tolerance to drought was found to be susceptible to scab, a common problem in the Pacific, but not in Peru.

Challenges facing Pacific Island Farmers that need research solutions

The agriculture sector in the Pacific has a number of major challenges that affect the productivity and profitability of farming. These challenges, which are often inter-related, include:

- Adapting to climate extremes and climate change
- Declining soil fertility
- Narrow genetic base of most traditional staple crops
- Increasing incidence of pests and diseases
- Quarantine and other market access requirements of importing countries
- Increasing dependency on imported food

Applied research solutions can make a significant contribution to meeting many of these challenges.

Research to provide farmers with appropriate crop varieties to address climate change and climate extremes

Most of the root crops grown across the Pacific originated in Melanesia and to this today, Melanesian countries such as PNG and the Solomon Islands have maintained a significant level of genetic diversity. However as crops moved from West to East by early voyagers, the genetic diversity narrowed through farmer selection and preferences. This process has resulted in a relatively narrow genetic diversity for groups like taro, yam and banana in many Polynesian countries such as Samoa and Tonga. This narrow genetic base has increased the susceptibility of these staple foods to diseases that could become more widespread and vigorous with climate change. This vulnerability to disease became starkly evident with the taro leaf blight (TLB) outbreak in Samoa in 1993. Food security and livelihoods were threatened and Samoa's main export industry came to a halt. Prior to the disease arriving in American Samoa and Samoa, taro was the main agricultural export, but the disease saw production fall from 0.4 million tonnes per year before the epidemic to less than 5 tonnes by the end of 1995 (Singh et al., 2012). Economic loss from the export market and the increased purchase of grain as a replacement starch was estimated to be around US$22 million from 1994 to 2010 (McGregor et al., 2011).

The projected increase in climate change and extreme weather events is likely to adversely affect food production and food systems in the region. As pest and disease incidence and distribution are influenced by temperature and precipitation patterns, projected changes in climate are likely to have an impact, with the potential for new threats from pathogens or pests considered unimportant today, and the possibility of current problems being reduced or eliminated (Taylor et al. 2016). Therefore,

research to broaden the diversity of crops and the subsequent cultivation of these varieties will enrich farmers' crop and varietal portfolios and in doing so provide protection against future pest and disease epidemics and biological disasters.

Increasing the diversity of varieties grown is a 'no regrets' strategy for strengthening the resilience of and reducing risk to food production and food systems.

Decentralised research is vital in supporting farmers to adapt to climate change. There is always uncertainty in predicting how particular crops and cropping systems will respond to different climate variables, not helped by the challenge of projecting future climate for specific locations on individual islands.

Decentralised research can help to fast-track the evaluation of different varieties and cropping systems across different locations.

Empowering Farmer-Led Agricultural Research: The Vital Role of Farmer Organisations

In the Pacific region, Farmer Organisations (FOs) have undergone a significant transformation, evolving from being rare entities to becoming crucial players in the agricultural sector. These FOs play a vital role in empowering smallholder farmers through their active involvement in various aspects of agriculture. They contribute significantly to agricultural extension services, providing farmers with valuable knowledge, training, and support to improve their farming practices. Additionally, FOs facilitate access to essential agricultural inputs such as seeds, fertilizers, and equipment, enabling farmers to enhance their productivity and profitability. Moreover, these organisations play a crucial role in linking farmers to markets, helping them reach a broader customer base and obtain fair prices for their produce. Furthermore, FOs have recognized the importance of research in addressing the mounting challenges posed by climate change, population growth, and the non-communicable disease (NCD) epidemic.

In response to the pressing needs of farmers in the region, FOs have embraced the decentralised research model, which has gained recognition worldwide for its efficiency and effectiveness. Unlike the traditional centralised research approach prevalent in the Pacific, decentralised research actively involves farmers themselves in the research process. By collaborating directly with farmers, FOs ensure that the research is guided by the practical knowledge and experiences of those who will ultimately implement the solutions. This farmer-centric approach leads to the development of contextually appropriate agricultural practices that can be adapted to the diverse ecological conditions present in various island nations. Given the geographical proximity of islands, soils, and climatic conditions can vary significantly within short distances. Decentralised research helps tailor solutions to address specific challenges faced by individual farmers in their particular locations, increasing the likelihood of successful outcomes and sustainable agricultural practices.

In contrast, the centralised research model has faced obstacles due to fluctuating funding allocations to agriculture ministries and related public sector institutions, and staff shortages and changes. This inconsistency has hindered the ability to respond effectively to the evolving challenges in the agricultural sector. By fostering partnerships between FOs, agricultural ministries, and relevant public sector institutions, the Pacific Island countries can establish a more resilient and sustainable agricultural sector. The collaboration between these entities enhances data collection, facilitates the creation of tailored solutions to overcome production constraints and promotes farmer uptake of innovative practices.. Ultimately, these efforts not only improve the livelihoods of smallholder farmers but also contribute to the broader economies of the Pacific Island countries, ensuring a prosperous and sustainable future for the region.

Case studies:
Farmer Organistions' Involvement In Successful Agricultural Research

Vanuatu Farm Support Association

The Vanuatu Farm Support Association (FSA) grew out of an earlier group, the Plantation Support Association (PSA) which was set up in 1983 to assist ni-Vanuatu landowners to run the plantations returned to them when independence was declared. By 1992, circumstances changed and the PSA became the FSA and its emphasis shifted to addressing the needs of commercially orientated small-scale farmers.

The FSA and the VARTC collaborated in a pilot project aimed at broadening the genetic diversity of taro, yams, sweet potato, and cassava in village farmers' fields and evaluating the extent of on-farm conservation in Vanuatu's traditional cropping systems.

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Two years after the new varieties were distributed to 10 villages, monitoring of farmers' fields showed an 86 per cent net gain in diversity for yam villages and 61 per cent gain for taro villages and importantly none of the traditional varieties were lost. The farmers explained that their decision was in keeping with their traditional system of introducing and adopting new varieties without discarding old ones.

Screening the germplasm material for distribution and establishing new varieties required significant upfront costs. However, once the 'new' germplasm was embedded in the local farming systems, which was facilitated by the FSA, and maintained by the farmers themselves, it came at no additional cost to government or donors.

By enriching farmers' varietal portfolios, the resilience of their food systems was enhanced thereby providing some protection against future pest and disease epidemics and biological disasters which are expected to increase with climate change (McGregor et al. 2011; Camus and Lebot, 2010).

Teitei Taveuni (Fiji)

Located on the island of Taveuni, Teitei Taveuni (TTT) was formed in 2009 in response to challenges that threatened the livelihood of Taveuni farmers including deforestation, unsustainable land use, decline in soil fertility, high use of chemical sprays and conventional fertilizers, and water catchment problems.

TTT was a key partner in the successful ACIAR/SPC (Australian Centre for International Agricultural Research/Pacific Community) Soil Health Project. TTT worked with the Fiji Ministry of Agriculture and other partners to establish and monitor field trials on member farms around the island. When research results indicated that a particular treatment increased yields or improved quality, the farmers were quick to adopt the technology because they had been involved in the research from the beginning and therefore understood and had ownership over the research.

Research findings revealed that a number of new inputs were required to restore balance to the highly degraded Taveuni soils. These inputs included: mucuna bean as a cover crop, ag lime, fish bone meal and rock phosphate. Because these inputs were not readily available, TTT established a farmer resource centre where they began selling these inputs to members who were interested.

Nature's Way Cooperative (Fiji)

Nature's Way Cooperative (NWC) was formed in 1996 to undertake mandatory quarantine treatment on behalf of the fresh fruit and vegetable industry. NWC currently has 290 farmer and exporter members.

Following a number of low output years, NWC realized that their farmer/exporter members required assistance in addressing a number of the bottlenecks which were affecting the supply of produce for export. NWC concluded that if they did not help address these issues the quarantine treatment business would be at serious risk.

In July 2009, the NWC Field Service was revamped to become the NWC Research and Extension Service and began implementation of the ACIAR — funded Fiji Papaya Project and later the ACIAR-funded Pacific Breadfruit Project. Through a partnership approach NWC has fostered research relationships with the Ministry of Agriculture, Biosecurity Authority of Fiji and the SPC.
NWC works directly with its member farmers and exporters for all applied research work and has achieved a number of major successes using this model including:

i) Papaya:

- Establishment of a certified seed producer's scheme for Fiji Red Papaya based on research findings which is now run as a commercial scheme managed by NWC with oversight from the Ministry of Agriculture.
- Investment in a commercial hot water dipping treatment available to Fiji papaya exporters through NWC. This treatment was developed through four years of post-harvest research led by NWC. The treatment is expected to overcome a major source of post- harvest loss currently being suffered by the industry. It has the potential to save the industry approximately FJD $2 million annually.
- Commercial investment at the farm and exporter level in organic papaya production based on research findings and economic analysis.
- Development of technologies supporting sea freight of papaya from Fiji to New Zealand. Research findings indicate a 50% savings in freight with no reduction in fruit quality, compared to air freight.NWC and exporters are making investments based on this research to make regular sea freight a part of the industry.

ii) Breadfruit:

- A package of best practices for mass propagation of breadfruit using various methods including: root suckers, marcotting and tissue culture.
- Long term trials established evaluating performance of trees derived from different propagation types (root suckers, marcotting and tissue culture).
- Investment at the farm level in commercial orchards - as of July 2015, there were 42 participating farmers in the Fiji western division that had planted 2,240 breadfruit trees on eighteen (18) hectares of land.
- Data collection on commercial orchard production - farmer-owned demonstration orchards are now coming into production some 18 months ahead of expectations, greatly improving the feasibility of breadfruit as a commercial crop.
- Data collection on intercropping systems with breadfruit — several trial sites have received a positive cash flow from their orchard sites from year 2 using intercropping of kumala, eggplant, cassava and pineapple.

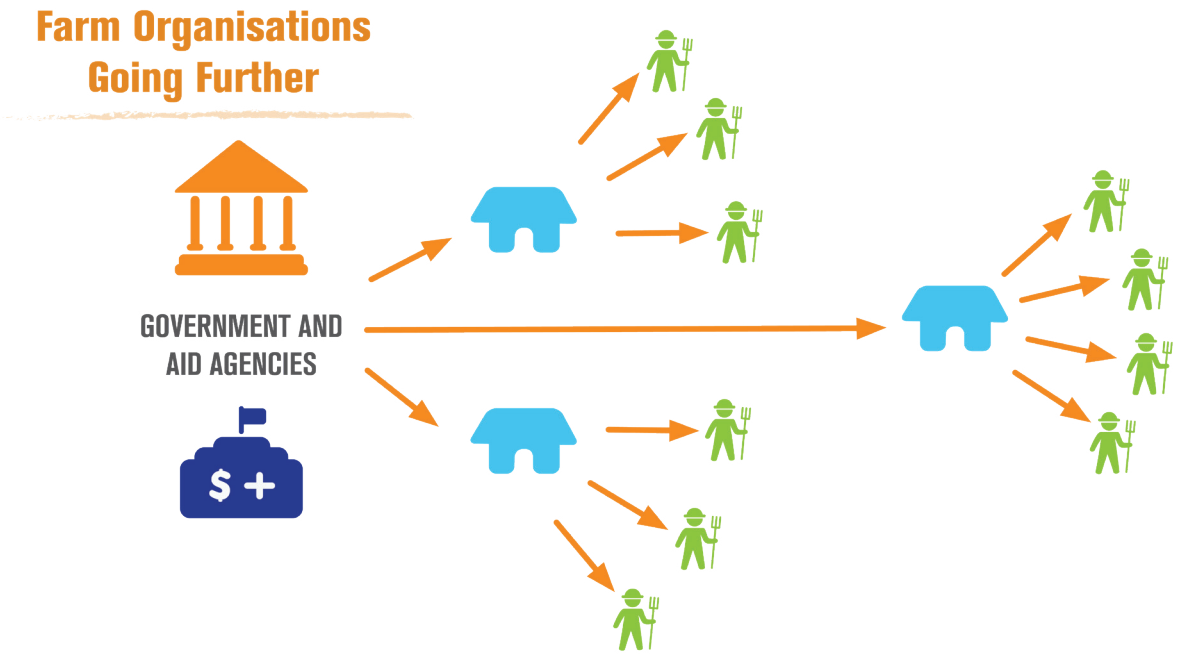
Way Forward

Action for Government and Development Partners

- Review research structure model - introduce a decentralised research model that can work in collaboration with centralised research stations.
- Provide public funding for decentralised research
- Pursue partnerships with FOs as part of the decentralised research approach. Farmer-led research carried out by FOs has made good progress in this regard.
- Governments and development partners should take advantage of positive contributions emerging FOs can play in applied agricultural research. By developing partnership with farmer organisations, the government will be able to get a better value for the public funds use because more farmers benefit as opposed to a centralised model where only a few benefit.
- Research undertaken should focus on the needs of farmers. Involve farmer and FOs in the setting of research priorities to ensure farmer needs are met
- Address knowledge gaps related to the impact of climate change on agriculture: Applied research must be carried out, in collaboration with FOs to address knowledge gaps and improve our understanding of the uncertainties, the constraints and opportunities relating to climate change. This will allow more confident decision-making and a better allocation of resources and importantly foster a more proactive approach to addressing climate change challenges

Action for farmer organisations

- Understand the decentralised model and the role farmers and farmer organisations can play in applied agriculture research
- Make farmer focused research priorities known to governments and private sector
- Seek out partnership with public research organisations and private sector to undertake the necessary research
- Promote the production of traditional crops and farming systems. These crops and cropping systems have proven resilient to climate extremes and climate change over the years. Increasing the productivity of traditional crops is also critical for future food security of PICs in view of the forecasted increase in the real price of imported grain as a result of climate change.



Important references

Kaoh, P, Lebot, V, McGregor, A, Taylor, M, Tuia, V.S, Iato, O, Rogers, C, Bourke, R.M (2014). More Resilient Cropping Systems for Food Security and Livelihoods in the Pacific islands. Paper presented to the International Horticulture Congress, Brisbane, 2014.

Lebot Vincent (2013). Coping with insularity: the need for crop genetic improvement to strengthen adaptation to climatic change. In Environment, Development and Sustainability Vol 15, no 2

Taylor, Mary, McGregor, Andrew and Dawson, Brian, (eds.) (2015). Vulnerability of Pacific Agriculture and Forestry to Climate Change. Secretariat of the Pacific Community, Noumea, New Caledonia.

McGregor, A. with Peter Kaoh, Laisene Tuioti Mariner, Padma Narsey Lal and Mary Taylor 2011. 'Assessing the social and economic value of germplasm and crop improvement as a climate change adaptation strategy: Samoa and Vanuatu case studies'. A background case study prepared for IUCN's report, Lal, P. N. 2011 Climate Change Adaptation in the Pacific: Making Informed Choices, prepared for the Australian Department of Climate Change and Energy Efficiency (DCCEE), IUCN, Suva, Fiji, xvii + 35.

Camus, P. and V. Lebot (2010) On-farm assessment of clonal introduction of root crops diversity in Vanuatu, Melanesia Experimental Agriculture , Volume 46 , Issue 4 , October 2010 , pp. 541 — 559 DOI: https://doi.org/10.1017/S0014479710000591

Singh, D. Jackson, G. Hunter, D. Fullerton, R. Lebot, V. Taylor, M. Iosefa, T. Okpul, T and J. Tyson 2012 Taro Leaf Blight–A Threat to Food Security Agriculture 2012, 2, 182-203; doi:10.3390/agriculture2030182 20123349719

Waters-Bayer, A. Kristjanson, P. Wettasinha, C. van Veldhuizen, L. Quiroga, G. Swaans, K. and B. Douthwaite. Exploring the impact of farmer-led research supported by civil society organisations. Agriculture & Food Security (2015) 4:4 DOI 10.1186/s40066-015-0023-7

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