



# Annual report

*project*

## **Strengthening the Fiji Papaya Industry through applied research and information dissemination**

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*project number* PC/2008/003

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*period of report* June 31st 2010 - May 31st 2011

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After two years in operation the Fiji Papaya Project (PC/2008/003) leads the Fiji papaya industry in applied research and industry development activities. Extensive networks established through the project's Technical Advisory Board (TAB), a functioning network has been established that has enabled the leveraging of inputs from other private and public sector partners to address industry needs. The FPP, based at the Natures Way Cooperative (NWC) quarantine treatment facility in Nadi, is now recognised as a coordinated initiative for which the industry has assumed ownership. As such it has gained wide support and enthusiasm from farmers, exporters and public sector players and is starting to yield tangible results.

Due to papaya's relatively short production cycle a number of field trials have already yielded significant data. This data is now being used by the industry or used in the trial scaling up and replication. These field trials have included:

- Seed block trial to reintroduce the package of best practices to collect seed from inbred papaya lines and initiate a programme for selection of a locally adapted solo sunrise variety. This has led to the launching of a certified seed producers scheme using best practice seed production techniques.
- Production trial using conventional and organic treatments to determine the economics of organic papaya production under Fiji's conditions. From this a paper has been submitted for publication on the economics of organic papaya production in Fiji. Fiji's largest grower/exporter is using this information to formulate a commercial organic investment project.

In addition to the field trials there have also been a number of off-farm research activities within the last reporting year which are starting to have commercial impacts. These trials include:

- Harvest and postharvest assessments to identify the critical areas physical damage is occurring on the product.
- Trial shipment of sea freight Fiji papaya into New Zealand.

Positive outcomes as a result of these off-farm trials include:

- Training and awareness among growers and exporters as to best practice harvest and postharvest practices in order to minimize physical damage.
- Introduction, awareness and training on using low cost newspaper as a liner for harvesting bins and as an alternative packing material for export cartons.
- A strategy for the progression of sea freight Fiji Papaya that includes actions that must be taken by NWC, exporters, Biosecurity, carton manufacturers and farmers.

Year two of the Fiji Papaya Project saw four technical exchanges between collaborating scientists. These were:

- Fiji Papaya Project staff Kyle Stice and Livai Tora travelled to Hawaii on a technical exchange visit over the period 14/11/11 - 26/11/11. A report entitled "Snapshot of the Hawaiian papaya" was produced as an outcome of this trip and is provided appendix 1 of this report.
- Tropical fruit consultant Roger Goebel of North Queensland provided technical support to the Fiji papaya project during the period September 16th to 24th 2010.

...a Industry through applied research and information dissemination

...balis and Terry Campbell from DEEDI travelled to Fiji to  
...it a series of harvest and post-harvest assessments over  
...0.

- Australian partner Terry Campbell from DEEDI travelled to Fiji in March 2011 to assist in the loading and assessment of sea freight trial to NZ.

These technical exchanges have resulted in positive outcomes for the research activities of the project. The technical exchange has also helped build capacity within the Fiji Papaya Project team to carry out and write up sound scientific research.

At the conclusion of the second year of operations the Fiji Papaya Project has pioneered institutional arrangements for stakeholder collaboration and information dissemination. These have been able to bring together a previously fragmented industry into a cohesive body that is able to respond to the needs of its members. At the centre of the institutional arrangements is the Technical Advisory Board (TAB). The TAB made up of all industry stakeholders meets quarterly to discuss the progress of research activities as well as prioritise new activities. A major achievement of the TAB has been the leveraging of funds and technical inputs from other stakeholders such as MPI research, SPC and the Taiwan Technical Mission.

The Fiji Papaya Project website and quarterly newsletter are now operational and are being well utilised by industry and other stakeholders. These are being highlighted by regional information hubs such as the Pacific Island Trade and Investment Commission (PITIC) and the SPC Pacific Agricultural and Forestry Policy Network (PAPFNET).

The Fiji papaya industry is now poised to become a significant export industry at a time when other agricultural export industries are in decline. The FPP has contributed in no small measure to this development. However, much more is needed to consolidate and to build on these gains.



*SPC Plant Pathologist and commissioned organisation Project Leader Tony Gunua presents to the Technical Advisory Board results of papaya disease samples received from CABI.*

## against activities and outputs/milestones

### **Objective 1: Strengthen the capacity of the Fiji papaya industry to plan, conduct and adopt the products of problem-solving research**

Activity 1.1 Establish a standing technical advisory board (TAB) and processes for prioritising and managing research.

*Status/achievements*

Technical advisory board established with eight meetings completed. TAB has grown into an industry body for Papaya and all meetings are well attended and productive.

Activity 1.2 Establish quality monitoring, traceability and feed-back system to farmers

*Status/achievements*

Monitoring and feedback system is in place and operational.

Activity 1.3 Establish infrastructures for identifying producers' problems and conducting on-farm research

*Status/achievements*

Monitoring system is in place to identify producers' problems and the standing technical advisory board is actively reviewing issues and making appropriate decisions for action.

Activity 1.4 Establish mechanisms for effective feedback, adaptation and adoption of innovations

*Status/achievements*

The Fiji Papaya Project website and quarterly newsletter are fully operational and have been well received both locally and regionally. On and off farm research activities have all been grower/exporter participatory to ensure that the results are quickly absorbed. A number of cluster workshops have taken place for farmers and exporters as well as a large industry meeting that was completed on May 24th 2011.

Activity 1.5 Provide targeted technical support in key areas

*Status/achievements*

- Tropical fruit consultant Roger Goebel of North Queensland provided technical support to the Fiji papaya project during the period September 16th to 24th 2010.
- Australian partners Yan Diczbalis and Terry Campbell from DEEDI travelled to Fiji to assist the FPP team to carry out a series of harvest and post-harvest assessments over the period October 18-25th 2010.
- Australian partner Terry Campbell from DEEDI travelled to Fiji in March 2011 to assist in the loading and assessment of sea freight trial to NZ.

### **Objective 2: To expand and increase the resilience of the Fiji papaya industry**

Activity 2.1 Identify and evaluate local and export markets and strategies to enhance or sustain the value chain for Fijian papaya to these markets.

*Status/achievements*

...of the Fiji papaya supply chain was undertaken by project  
...n recent market surveys to NZ, Australia, USA and Japan.  
...ach was very successful in identifying the key inefficiencies  
...along the value chain and the improvements that need to be made in order  
...address these issues. The Fiji Papaya project has used the results of this market  
...research to design the targeted research interventions. The Fiji Papaya Project is  
...also working with other support agencies to meet identified market requirements;  
...including the HACCP certification of NWC which is a joint initiative with the EU  
...funded SPC FACT project.

#### Activity 2.2 Identify and evaluate new genetic resources to underpin sustainability

##### *Status/achievements*

Seed block trial to reintroduce the package of best practices to collect seed from inbred papaya lines and initiate a programme for selection of a locally adapted solo sunrise variety is underway with a package of best practices for seed selection currently being developed using information from this trial.

At the discretion of the Technical Advisory Board a hold has been put on importation of papaya seed from sources other than the University of Hawaii. This is in light of a potential disease introduction and the possibility of GMO contamination. On this basis varietal evaluations have also been placed on hold.

#### Activity 2.3 Strengthen the seed system to disseminate high quality planting materials

##### *Status/achievements*

Seed block trial to reintroduce the package of best practices to collect seed from inbred papaya lines and initiate a programme for selection of a locally adapted solo sunrise variety has completed its first phase with phase 2 currently underway.

As a result of these research findings the Fiji Papaya Project has been in industry consultation on the launch of a certified seed producer's scheme using best practice seed production techniques. The proposed scheme will draw on systems designed for both the Hawaii and Australia papaya industries.

#### Activity 2.4 Improve production systems through participatory, on-farm research

##### *Status/achievements*

Due to the short life cycle of the papaya crop a number of field trials have been completed and yielded significant data that is being used by the industry or used for an up scaling/replication of the trial. Successful field trials have included:

- Seed block trial to reintroduce the package of best practices to collect seed from inbred papaya lines and initiate a programme for selection of a locally adapted solo sunrise variety.
- Production trial using conventional and organic treatments to determine the economics of organic papaya production under Fiji's conditions.

Completion of these field trials has resulted in a number of positive outcomes including:

- Launching of a certified seed producers scheme using best practice seed production techniques.
- A publication on the economics of organic papaya production in Fiji and a proposed commercial planting of organic papaya by Fiji's largest grower/exporter.

#### Activity 2.5 Improve post-harvest handling

##### *Status/achievements*

the industry's post-harvest handling systems have been undertaken by scientists as well as commercial farmer/exporter Grant. On this basis a number of research activities have been

implemented including:

- Harvest and postharvest assessments to identify the critical areas physical damage is occurring on the product.
- Trial shipment of sea freight Fiji papaya into New Zealand.

Positive outcomes as a result of these off-farm trials include:

- Training and awareness among growers and exporters as to best practice harvest and postharvest practices in order to minimize physical damage.
- Introduction, awareness and training on using low cost newspaper as a liner for harvesting bins and as an alternative packing material for export cartons.

### **Objective 3: To enhance the profitability and competitiveness of the Australian papaya industry by improving the supply chain**

Activity 3.1: Identify and mobilise commercial partners who can champion improvements in papaya chains and where benefits and cost savings are shared by all members of the chain.

Activity 3.2: Identify strategies to improve product flows/handling, information systems, supply chain relationships and value adding to all participants in the supply chain.

Activity 3.3: Identify post harvest disease issues and implement possible remedial strategies.

Activity 3.4: Trial supply chain interventions with commercial partners to improve product flows/handling, information systems, supply chain relationships and value adding to all participants in the supply chain.

### **Objective 4: To promote the adoption of project outputs in the Fiji papaya industry and elsewhere**

Activity 4.1 Identify potential beneficiaries within papaya industry and beyond (e.g. nascent papaya industries in others PICs, other existing or potential fruit industries in Fiji) and define strategy for reaching them.

#### *Status/achievements*

At the conclusion of the second year of operations the Fiji Papaya Project has developed a unique system of stakeholder collaboration and information dissemination which has been able to bring together a previous fragmented industry into a more cohesive body, well positioned to respond to the needs of its members. Among the hallmarks of this system is the Technical Advisory Board (TAB); with its 13 members this board meets quarterly to discuss the progress of research activities as well as prioritise new activities. With its strategic membership the TAB has been able to respond to many issues that are outside of the ACIAR realm of activities by leveraging funds and man power from other stakeholders such as MPI research, SPC and the Taiwan Technical Mission.

The Fiji Papaya Project website and quarterly newsletter are fully operational and have been highlighted by many regional information hubs such as the Pacific Island Trade and Investment Commission (PITIC) and the SPC Pacific Agricultural and Forestry Policy Network (PAPFNET).

Activity 4.2 Compile, review and analyse results from field trials and all other research activities.

#### *Status/achievements*

...h activities have produced useful results over the last  
... Fiji Papaya Project staffs collate data on a quarterly basis  
for presentation to the TAB. Several research activities have been completed and  
the results analysed by the project staff and collaborating scientists from DEEDI.  
In the case of two off-farm experiments, technical support was sought from a  
DEEDI statistician in the analysis of the data.

Activity 4.3 Prepare information dissemination materials and processes to bring  
research outputs to priority beneficiaries (as identified above). .

*Status/achievements*

The Fiji Papaya Project staffs have released a number of publications on research  
findings which are available on the project website including:

- Report on Supply Chain Assessments measuring physical damage. Released in  
October 2010.
- Natural Disaster Mitigation Strategies for the Fiji Papaya Industry+a paper  
presented to the International Horticulture Congress in Lisbon in August 2010.
- Snapshot of the Hawaiian papaya industry - Considerations for Fiji. Released in  
December 2010.
- Optimising Sea Freight Fiji Papaya. Released in April 2011.

Activity 4.4 Conduct Papaya Industry Stakeholder Workshops (to share outputs from  
the Project and develop consensus on 'next steps' for further development of the industry)

*Status/achievements*

A major Papaya Industry Stakeholder Workshop was held in the Sigatoka Valley  
on May 24th 2011. This workshop was also attended by ACIAR Research  
Program Manager, Dr Richard Markham.

Activity 4.6 Conduct briefings and informal workshops to transfer conclusions of project  
to other potential beneficiaries (Fiji Ministry of Agriculture, Koronivia Research Station, Fiji  
College of Agriculture etc.)

*Status/achievements*

Beneficiaries as described above are all represented on the Technical Advisory  
Board and therefore they receive reports from the project on a quarterly basis. In  
addition, the FPP has presented its findings to the Fiji Produce Exporters  
association and several key cluster farmer groups.



### 3.1 Scientific impacts

A number of scientific impacts can be attributed to research findings from the Fiji Papaya Project including:

- Fiji's largest grower/exporter is investing in a commercial organic production block as a result of the positive outcomes of the production trial using conventional and organic treatments to determine the economics of organic papaya production. Similarly a large papaya farmer/exporter from Hawaii is investing in organic production as a joint venture with a local farmer here in Fiji.
- Findings from the field trials on inbred seed production are now forming the practical basis for a production manual in support of the newly launched Certified Seed Producers Scheme.
- A sea freight trial tested a number of innovations in carton design, pre cooling and palletizing against the conventional methods of sea freight which have been tried in the past. As a result of the positive findings of these new innovations exporters have developed a new strategy for sea freight which involves a complete transition away from the traditional methods which were often characterised by in transit ripening and poor temperature control.
- Findings from a series of supply chain assessments of physical damage have revealed that the majority of damage occurs during transportation in the field bins. Supporting research on the benefits of newspaper liners in harvesting bins has revealed that there is a significant reduction in postharvest physical damage from bins lined with newspaper when compared to unlined bins. Presentation of this research finding has led several exporters to include newspaper liners in their harvesting bins. Similarly extension partners MPI and TTM have released the benefits and are investigating practical, low cost methods of disseminating these newspaper liners to farmers.



*Fiji Papaya Project staff together with Terry Campbell of DEEDI carry out supply chain assessments in the Sigatoka Valley.*

... year of operations the Fiji Papaya Project has developed a unique system of stakeholder collaboration and information dissemination which has been able to bring together a previous fragmented industry into a more cohesive body, well positioned to respond to the needs of its members. Among the hallmarks of this system is the Technical Advisory Board (TAB); with its 13 members this board meets quarterly to discuss the progress of research activities as well as prioritise new activities. With its strategic membership the TAB has been able to respond to many issues that are outside of the ACIAR realm of activities by leveraging funds and man power from other stakeholders such as MPI research, SPC and the Taiwan Technical Mission. It is expected that the TAB will become institutionalised into an industry association which will exist beyond the life of the Project. It is also expected that this model will be applied to other crops such as breadfruit in the very near future.

### 3.3 Community impacts

#### 3.3.1 Economic impacts

A hallmark of the last 12 months of the Fiji Papaya Project is increasing costs. Exporters in particular have had to deal with increasing freight costs, increasing electricity costs, an almost 30% increase in quarantine treatment and packing rates, a further 25% increase in proposed biosecurity charges. For several exporters these increases are perceived to be unworkable. The Fiji Papaya Project is therefore working with exporters at the marketing end of the supply chain to see where costs can be driven out. Areas that are being critically assessed to help alleviate the economic pressures of rising costs include:

- Use of sea freight which reduces transportation costs by nearly 60%.
- Use of newspaper as a packing material instead of the current foam, this represents a potential packaging cost savings of up 80%.

Fiji Papaya Project staffs have formulated this hypothetical cost savings into exporter's gross margins and can demonstrate that these measures almost completely offset the recent price increases.

Papaya exports from Fiji totalled approximately 450 tonnes in 2010 making this the third highest year of papaya exports since the inception of NWC in 1996. The major markets for Fiji papaya were New Zealand (314 tonnes) and Australia (135 tonnes). In total 10 exporters shipped papaya through NWC in 2010, up from 5 in 2009, indicating an increased interest from new exporters.



*FPP sea freight trial consignment loaded and ready for sailing. The use of this sea freight system provides a possible freight savings of 60% for papaya exporters.*

...livelihoods has emerged for decades as major intractable  
...lands countries. For Fiji, more than 10,000 new jobs  
annually need to be created in the private sector if all new job seekers are to find  
employment. Only about half that number is being absorbed by the private sector.  
Rural areas, despite outmigration, continue to be the home for about half of Fiji's  
population, though declining. Fiji's key exports are rural based, providing the greatest  
potential for future development and prosperity, particularly in the agriculture, forestry,  
fisheries and tourism sectors. Against this background the FPP has shown that small  
holders can earn a worthwhile income from a horticulture export crop if they have the  
required expertise and meet the necessary standards. It is particularly gratifying to see  
the significant involvement of youth in project activities and becoming involved in papaya  
farming. In so doing the FPP has made a worthwhile contribution to addressing the major  
problem of urban drift.

### 3.3.3 Environmental impacts

The intensity and frequencies of both cyclones and flooding in recent years has caused  
the Fiji papaya industry to reflect deeply on strategies that can be implored to mitigate the  
risk of natural disasters on the Fiji Papaya industry. While disaster mitigation was not  
previously an activity addressed by the ACIAR Fiji Papaya Project it is becoming ever  
more evident that this is a priority issue and therefore an opportunity exists for the Project  
to integrate a disaster mitigation component. The focus will likely lay in developing  
practical adaptation strategies that small scale farmers can implement on their farms in  
order to minimise the risk of being completely destroyed by a natural disaster. The area  
of disaster and climate mitigation is seen to offer potential for the development of a  
significant future follow up project for the present FFP.

Smallholder farmers are being encouraged to adopt production techniques that encourage  
the preservation of soil structure, decrease erosion and reduce fossil fuel emissions; such  
techniques include the use of horses and bullocks during land preparation.

The field trial on organic production is aimed at determining the viability of this package of  
practices. If the economic analysis is favourable it is likely that many farms will adopt this  
much more environmentally friendly package of practices in order to capture the available  
market.

The introduction of newspaper as an alternative packing material to foam is anticipated to  
have a positive environmental impact through the recycling of a potential waste product  
(the unsold newspapers) and through the abandoning of the very slow degrading foam  
that is now the industry standard packing material.



*This open topped seafreight sample carton was designed by the Fiji Papaya Project staff  
in collaboration with a leading exporter and carton manufacturer. Together with the  
newspaper packing material this represents a complete transition in packing materials.*

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## and dissemination activities

our quarterly newsletters have been released in an effort to keep stakeholders updated on the activities of the Fiji Papaya Project. The primary means of disseminating newsletters is through email however hard copy newsletters are also circulated to farmer group representatives and NWC members on request.

Project website: The Fiji Papaya Project website has been active for nearly 8 months. This professionally designed site is intended to provide up to date information about the activities of the project as well as a library of the work that has been completed. Visitors to the website can have access to all project publications as well contact details for members of the project. The site is located at [www.fijipapayaproject.com](http://www.fijipapayaproject.com)

2010 Agricultural Show - The Fiji Papaya Project hosted a booth at the 2010 Agricultural Show which took place at the Vodafone Arena July 20th . 24th. The theme of the show was %eed Fiji First: Go Local+. The Fiji Papaya Project displayed papaya seedlings; fruit packed for export and provided information sheets to interested people.

Project related publications produced in the current reporting period include:

- Post-harvest assessment report. Released in October 2010.
- %Natural Disaster Mitigation Strategies for the Fiji Papaya Industry+presented to the International Horticulture Congress in Lisbon in August 2010.
- Snapshot of the Hawaiian papaya industry - Considerations for Fiji. Released in December 2010.
- Optimising Sea Freight Fiji Papaya. Released in April 2011.



*Fiji Papaya Project banner with all collaborating organisations features prominently on all communication materials including the project website and newsletters.*



*FPP Activity Leader Kyle Stice presented his research poster to the International Horticulture Congress in Lisbon in August 2010*

A papaya industry meeting was held on May 24th 2011 at the Sigatoka Research Station. Items on the agenda included:

- Exporters briefing . Sea Freight Fiji Papaya
- Papaya seed producer's certification scheme . Industry consultation
- Post harvest handling training using newspaper



*Papaya industry meeting which was attended by over 60 stakeholders*



*NWC General Manager and exporters discuss design of sea freight cartons with FPP project staff.*

The Fiji Papaya Project has also been working with the AusAID funded Small and Micro Nursery Enterprise Development Project for Sustainable Seedling Supply in the delivery of training on papaya seedling production.

The Fiji Papaya Project field trial sites in Nadi and Sigatoka receive frequent visits from industry stakeholders as well as regional and international groups.



*FPP Officer Livai Tora hosts a group of local agriculture students at the Sigatoka trial site.*



*Papaya farmer Danny Mataroa of the Cook Islands visits the Nadi trial site as part a regional agribusiness tour to Fiji.*



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## Property

There are no significant intellectual property issues that have arisen in the reporting period.



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## ture activities

There are no major variations proposed for the remainder of the project. The Fiji Papaya Project has imbedded in its design a structure that allows primary research activities to evolve and new activities to be considered at the discretion of the TAB. This structure has proven to be an effective tool for the project and it is envisioned that priorities will continue to evolve and change through the remainder of project however because this adaptable system is in place it is unlikely to cause any major disruptions.



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## Personnel

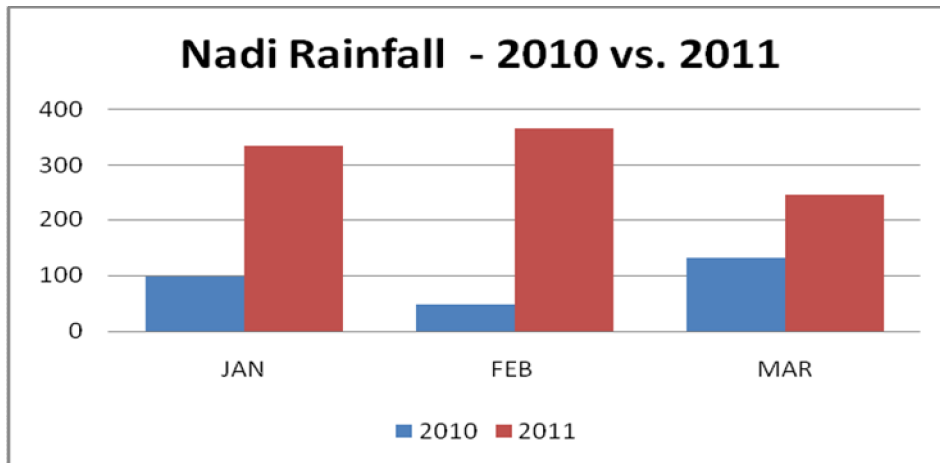
At the beginning of the project the commissioned organisation Project Leader was Dr. John Konom, Dr. Konom resigned from his post at the Secretariat for the Pacific Community in October 2009, and the position was passed onto Dr. Warea Orapa of the Plant Health Division of the Secretariat for the Pacific Community. In the early part of 2011 Dr. Orapa completed his contract with SPC and the role of commissioned organisation Project Leader was passed onto Dr. Tony Gunua, also of the Plant Health Division of the Secretariat for the Pacific Community. The transition between project leaders has been smooth and the day-to-day operations of the project have not been affected.

All other project personnel remain as indicated in the Project Document.

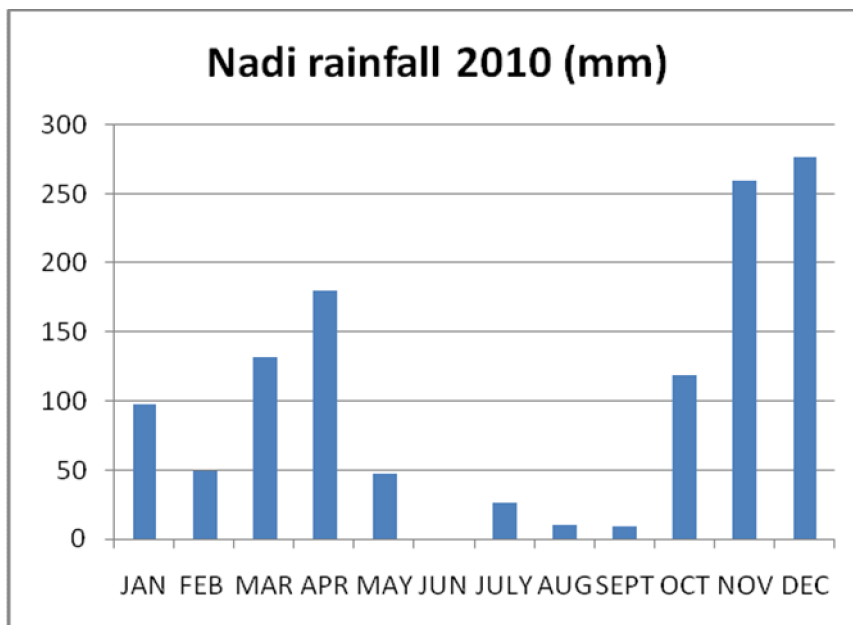


## Opportunities

The Nadi area has been subject to many climatic challenges in 2010. While Fiji farmers have been fortunate to avoid any major cyclones over the past season, they have been subject to extreme wet weather which has caused many problems on papaya farms. From the drought conditions faced in the period June-September, the Nadi area was then hit with an extreme rain event in November that saw nearly 200 mm of rain fall in a single week. This rain saturated the soil and caused standing water on many farms in the Sabeto area including the FPP trial block. As a result of this rain event the Sabeto trials suffered a near 25% loss in its Phase 1 trials. Thankfully these trials were replicated at the Sigatoka trial site which was unaffected.



Nadi rainfall in the period January . March 2011 was recorded at 950 mm, this is stark contrast to the same period in 2010 when only 278 mm were recorded. The insistent rainfall has resulted in water logging in many of the farms in the Western division and the incidence of Phytophthora root rot on these farms continues to rise.



A project that deals specifically with adaptation of climatic extremes is in the initial stage of design and will be finalised in the course of the coming year.



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### **9.1 Snapshot of the Hawaiian papaya industry - Considerations for Fiji. Released in December 2010.**

See attached

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### **9.2 Report on Supply Chain Assessments measuring physical damage. Released in October 2010.**

See attached

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### **9.3 Optimising Sea Freight Fiji Papaya. Released in April 2011.**

See attached