ANNUAL REPORT
2015 - 2016

Scientific Research Organisation of Samoa

THE SCIENTIFIC RESEARCH ORGANISATION OF SAMOA

SROS

(Please address all correspondences to:
Hon. Minister of Agriculture & Fisheries).

Government of Samoa

OFFICE OF THE MINISTER

MINISTRY OF AGRICULTURE & FISHERIES
(and SCIENTIFIC RESEARCH ORGANISATION OF SAMOA)

Ref.: MinMAF(2017/41)

03 November 2017

Honorable Leaupepe Taimaaiono Toleafoa Faafisi,
Speaker of the House
Legislative Assembly
TUANA'IMATO.

Your Honorable,

In accordance with the Scientific Research Organisation of Samoa's Acts 2006 (RDIS Act 2006) and 2008 (SROS Act 2008), I am pleased to submit herein the 10th Annual Report of the Scientific Research Organisation of Samoa (SROS) for the year ended 30th June 2016.

The Report is the record of the Organisation's performance during this financial year, in accordance with its mandate and output structure, and to be laid before the Legislative Assembly of Samoa.

Ma le fa'aaloalo lava.

Hon. Lopao'o Natanielu Mu'a
MINISTER
SCIENTIFIC RESEARCH ORGANISATION OF SAMOA

TABLE OF CONTENTS

1. Statement to Parliament

1.1 Introduction

This is the 10th Annual Report for the Scientific Research Organisation of Samoa (SROS) since its inception in 2006. Previously known as the Research Development Institute of Samoa (RDIS), SROS is a public beneficiary body constituted and operating under the provisions of the Research and Development Institute of Samoa Act 2006, the Scientific Research Organisation of Samoa Act 2008, the Labour and Employment Relations Act 2013, the Public Finance Management Act 2001 and the Public Bodies (Performance and Accountability) Act 2001. SROS also adheres to specific reporting requirements to Government as laid out by the Ministry of Finance and Ministry for Public Enterprises.

This Annual Report covers the Financial Year (FY) July 2015 – June 2016 in which its operational activities were financed under an approved budget of SAT$3,483,482 comprising of SAT$3,334,494 grant from Government and SAT$148,988 expected to be collected by the Organization largely from its technical and consultancy services. The accounts for this financial year have been audited by the Samoa Audit Office, so as to be in line with the requirements of the Public Finance Management Act 2001.

1.2 SROS Vision and Mission Statement

SROS Vision

"Through research and development of value adding to goods and services, a significant improvement in the national GDP and social benefits to Samoa is achieved".

SROS Mission Statement

"SROS aims to conduct scientific research and develop technologies which outcomes are of great value in the development and sustainability of value added goods and services for export and to achieve reduction on fuel imports and greenhouse gas emissions"

1.3 Objectives and Priorities

Supporting its vision and mission statement, SROS is committed to delivering on the following key objectives:

a) To promote the national economy of Samoa based on research and development;
b) To undertake scientific and technical research with the primary aim of adding value to local resources and services;
c) To develop functional prototypes of products and processes based on scientific and technical research for the local or overseas markets;

d) To establish partnership with the private sector and commercial interests to support the Organisation's activities;
e) To ensure effective training for researchers and professionals engaged in scientific and technical research work;
f) To conduct analysis of narcotics or precursors for the purposes of investigations and prosecution of offences; and,
g) To undertake environment impact assessments.

Additionally, SROS also performs various functions:

1) The Organisation also performs various functions such as:
    a) To carry out scientific research and develop technologies for any of the following purposes:
        (i) contributing to the achievement of national goals in the Strategy for the Development of Samoa and any other national plan of Samoa;
        (ii) assisting local industries, Government Ministries, corporations and agencies;
        (iii) furthering the interests of the community;
        (iv) any other purpose determined by the Board; and,
        (v) conducting analysis of narcotics or precursors for the purposes of investigations and prosecution of offences.
    b) To encourage and facilitate the application of the results of any other scientific research;
    c) To act as a means of liaison between Samoa and other countries in matters related with scientific research and development;
    d) To train and to assist in the training of researchers and workers in the field of science and to cooperate with tertiary education institutions, both local and overseas, in relation to education in any field of science;
    e) To establish and award fellowships for students to do research, and to make grants in aid of research, for a purpose referred to in paragraph (a);
    f) To collect, interpret and disseminate information relating to scientific and technical matters;
    g) To publish scientific and technical reports, periodicals and papers; and,
    h) To carry out environment impact assessments.
2) The Organisation may:
    a) Carry out food analysis and testing required under any food legislation or other enactment; and,
    b) Issue reports or certificates regarding food analysis and testing under a).

In performing its functions, the Organisation shall take into account relevant Government policies as communicated to the Organisation by the Minister or the Board of Directors.

The Organisation shall also:

i treat the functions referred to in 1) a) and b) above as its primary functions; and,
ii treat the other functions referred to in 1) c) to h) and 2) as its secondary functions.

2. Chairperson's Report

On behalf of the Minister responsible for SROS, the SROS Board of Directors, Management and Staff, I wish to present SROS's 10th Annual Report for the financial year July 2015 – June 2016. The Output 1 under the authority of the Chief Executive Officer is responsible for providing advice to the Minister responsible for SROS and the Board of Directors, relating to the SROS's mandated objectives and desired outcomes over the longer term. Under the guidance of the Board of Directors, Output 1 is also responsible for the implementation of approved recommendations associated with the development of new or the review of existing strategic policies relating to scientific research and development.

2.1 Activities and Performance of the Entity

SROS continues to progress with scientific research developments, and technical and consultancy services that will have widespread economic benefits for the Samoan community, and build on its momentum to position itself to be an internationally recognized research organization. Much has happened during this financial year in terms of research progressions and technical developments, and they are highlighted in the Chief Executive Officer's report that follows.

In terms of financial performance, SROS has again surpassed its Cost Recoveries target of SAT$148,988 by SAT$145,958 or nearly two-fold, which is an 88% improvement compared to collections of SAT$211,200 from the previous financial year. Also, SROS has managed to generate a surplus of SAT$327,775 for this financial year which is nearly a two-fold increase compared to the previous financial year's surplus of SAT$170,236.

2.2 Capital and Dividend Information

The major capital investment made by SROS in this financial year is the new double cab truck to assist with the increased research related transport demand and activities, buildings and roads, and other Office and other equipment as listed in section 3.5 of the Chief Executive Officer's report.

The annual payment of dividend to Government does not apply to SROS in its legal status as a public beneficiary body under the Public Bodies (Performance and Accountability) Act 2001.

2.3 Director Information

As stipulated in the amended SROS Act 2008, the Board of Directors for SROS consists of seven Directors and the CEO of SROS who is an ex-officio member, with the Chairman appointed by the Head of State from the seven Directors on the recommendation of Cabinet. In view of the three year term of directorship, this is the last financial year for some of the current Board of Directors and the start of new Board Directors who are as listed (photos 1 & 2):

- Fonoti Perelini Perelini — Chairman (up to 8th June 2016)
- Sulamanaia Montini Ott — Chairman (from June 8th 2016 onwards)
- Dr. Satupa'itea Viali — Director
- Dr. Taema Imo-Seuoti — Director (up to 8th June 2016)
- Dr. Sonny Lameta — Director

- Lalauena Palagi Taulealo — Director (up to 8th June 2016)
- Suluimalo Amataga Penaia — Director
- Fonoiava Seali'itu Sesega — (from 8th June 2016 onwards)
- Tusani Iosefatu Reti — (from 8th June 2016 onwards)
- Jewel Monica Adeline Cook — (from 8th June 2016 onwards)
- Tilafono David Hunter — Ex-Officio/CEO

During this financial year, the Board of Directors performed various functions to ensure proper and efficient performance of SROS, determine policy and provide directions to the CEO relating to the overall operations of SROS. Key decisions made and approved by the Board of Directors include the following:

- review and endorsement of research and technical project proposals;
- review and approval of SROS quarterly and annual report submissions including audited financial statements to MPE and Cabinet, and research project completion reports;
- participation in stakeholders consultation, review and approval of the new SROS Corporate Plan 2017-2020 and allied Statement of Corporate Objectives 2017-2020;
- approval of key development activities such as the road resealing work, new 15-seater van and staff official travel; and,
- providing expert advice to the CEO and Management with respect to the smooth progress of SROS's mandated functions and activities.

The Board of Directors held a total of only five monthly meetings this financial year and all Directors attended these meetings. The low number of Board meetings was due to a misunderstanding and misinterpretation by the CEO of the timeframe communicated by MPE on the ending date for Board Directors in photo 1 and the starting date of new Board Directors in photo 2. Although the Board of Directors held only five monthly meetings, they still provided approval considerations via email communications with the CEO for other pressing matters that included quarterly reports, new research proposals, end-of-project reports, and staff official travel overseas for work related meetings, workshops and training. These approvals via email were then included in meeting Agendas for Board information so that they are officially recorded in the meeting minutes.

The sitting allowances to the value of SAT$638 and Directors' fees to the value of SAT$65,063 were paid to the four eligible Directors (Dr. Satupa'itea Viali, Dr. Sonny Lameta, Sulamanaia Montini Ott and Lalauena Palagi Taulealo), while the other three Directors who are public servants weren't remunerated. A total of SAT$775 was expended to support the functions and activities of the Board of Directors throughout the financial year.

Photo 1: SROS Board of Directors up to 8th June 2016 for financial year 2015/2016 [Sitting (L to R) Dr. Taema Imo, Fonoti Perelini Perelini (Chairman), Lalauena Palagi Taulealo; Standing (L to R) Tilafono

David Hunter, Suluimalo Amataga Penaia (insert), Dr. Sonny Lameta, Dr. Satupa'itea Viali, Sulamanaia Nu'uetolu Montini Ott].

Photo 2: SROS Board of Directors from 8th June 2016 onwards for financial year 2015/2016 [Sitting (L to R) Jewell Monica Adeline Cook, Sulamanaia Nu'uetolu Montini Ott (Chairman), Tusani Iosefatu Reti, Fonoiava Seali'itu Sesega; Standing (L to R) Tilafono David Hunter, Dr. Satupa'itea Viali, Dr. Sonny Lameta, Suluimalo Amataga Penaia (insert)].

2.4 CSO Obligations

The SROS did not implement any CSO obligations during this financial year.

2.5 Other Information

All other relevant information are highlighted in the CEO's report that follows.

In closing, I would like to specially acknowledge with much gratitude the former Minister responsible for SROS, Honourable Fa'amoetauloa Lealaiauloto Taito Nanai Dr. Fa'ale Tumaali'i, for his regular wise counsels rendered to the Board to ensure proper management of SROS to achieve its desired research and technical outcomes. I would also like to welcome the new Minister responsible for SROS, Honourable La'aulialemalietoa Asiata Leuatea P.F. von Schmidt, and we look forward to working for and with him to progress our research and technical activities as per our vision and mandate.

I would also like to extend my appreciation to the Government of Samoa and our Development Partners for their financial support via on-going investments in SROS. The Management and staff of SROS have been highly dependable in terms of commitment throughout this financial year, and making positive progress to our research and development efforts towards achieving desired outcomes for the betterment of our national economy and the welfare of our people. To my fellow Board colleagues, thank you very much for your unrelenting support in assisting our CEO and Management with the running of our Organisation to realize its innovative research and development initiatives for the betterment of our people.

Soifua & God bless!

Sulamanaia Nu'uetolu Montini Ott
Chairman
Board of Directors
Scientific Research Organisation of Samoa (SROS)

3. Chief Executive Officer's Report

This annual report covers the financial year July 2015 – June 2016. Our Government's continued commitment to realize SROS's mission was evident in the approval of the requested budget of SAT$3,483,482, which is composed of SAT$3,334,494 as Government Grant and SAT$148,988 as Cost Recoveries, to support and enable SROS to undertake scientific research and product development activities for value adding to goods and services. There has been considerable progress made in the areas of prototype product development, strengthened technical service capabilities and collaborative partnerships as detailed in the sections to follow.

The staff strength of SROS during this financial year is 44 (28 men and 16 women; photo 3) and the Management team is as follow:

- Tilafono David Hunter — Chief Executive Officer
- Tuimaseve Kuinimeri Asora-Finau — Manager, Plant & Food Technology Division
- *Vacant* — Manager, Industrial Research Division
- Mamea Samuel Ieremia — Manager, Administration & Finance Division
- Pousui Dr. Fiame Leo — Manager, Technical Services Division
- Lilo Samani Tupufia — Manager, Environment & Renewable Energy Division
- Fauono Sina Mualia — Business Development Specialist

In addition to the abovementioned Management team, SROS had one overseas volunteer assisting with its research, technical and commercial development activities as follow:

- Dr. Kenji Sakamoto (February 2014 – January 2016) – Senior JICA Volunteer assigned to SROS to assist with research related to functional ingredients from various natural resources, including medicinal plants for health care applications, and orchid and fragrant plants for cosmetic applications.
- Mr. Sililo Iuli (January – May 2016) – Senior VSA Volunteer assigned to SROS to assist with the establishment of mutually beneficial partnership links with the private sector and commercial interests to support SROS activities and mandate through research and development.

Photo 3: SROS Management & Staff for the financial year 2015/2016.

3.1 Highlights for the year

Highlights noted for this financial year include the following activities:

a) In August 2015, SROS co-hosted with MAF the SPC-funded Regional Consultation Workshop on 'Strengthening Agriculture and Forestry Research and Extension Linkages for Sustainable Food Security and Trade'. About 80 participants from Research, Extension and Advisory Services (REAS) in 13 Pacific Island Countries and Territories (PICTs) and key stakeholders congregated in Apia to explore ways of strengthening REAS capacity in order to effectively support farmers to better markets access and income diversification which can ultimately benefit food security and better nutrition. The participants included Heads of Research and Extension from the selected countries in the region, and representatives from major partner agencies including regional and international organizations who were invited to speak on selected topics related to strengthening research and extension services (photo 4). The expected outcomes from the workshop are as follow:
   - Synthesized priority challenges and opportunities related to capacity development, advocacy and networking between REAS at both national and regional levels;
   - Compendium of research and extension best practices;
   - List of priority research areas; and,
   - Regional Extension Strategy developed.

Photo 4: Participants at the Regional Consultation Workshop held in Apia Samoa in August 2015.

b) SROS is a research partner in a regional project on 'Enhanced Fruit Production and Postharvest handling systems for Fiji, Samoa and Tonga'. This four-year multi-partner project is funded by the Australian Centre for International Agricultural Research (ACIAR) and involves collaboration between research partners from Fiji, Tonga and Samoa. For Samoa, SROS and MAF will be collaborating with the University of the Sunshine Coast. SROS will receive AUD$311,000 to support its activities during the four years' life of the project, which is to develop postharvest handling systems and export pathways for fresh pineapple and breadfruit. The official launching of the project was hosted by SROS in Samoa in June 2016. The launching workshop was attended by senior representatives from the Ministry of Agriculture, Food, Forests and Fisheries of Tonga, Fiji Ministry of Agriculture, SPC, UN-FAO, Universities of the Sunshine Coast and Queensland and SROS. The workshop attendees were briefed on proposed research to increase production and postharvest efficiency of pineapple in Samoa, Fiji and Tonga, research to improve domestic mango production in Fiji, and efforts to re-build the Tonga domestic citrus industry. The workshop attendees were also advised on potentially groundbreaking research that seeks to develop low-growing (dwarf-like) breadfruit trees that could be more cyclone tolerant and easier to harvest.

c) SROS secured another two consultancy contracts; FAO to the value of USD$76,720 and MNRE to the value of SAT$48,000. The FAO consultancy work is on 'Scientific Research for Food safety risk and postharvest analysis of fresh produce in Samoa', which includes the development of pesticide residue testing which is a critical testing service that has been constantly requested by SROS stakeholders including MNRE and MAF. The MNRE consultancy work includes the provision of water quality analysis to monitor the water quality environment of the Apia Waterfront. The baseline data that will be generated from this monitoring activity will enable MNRE to make informed decisions about certain activities that could be implemented at the Apia Waterfront. Consultancy activities by

SROS scientists is another revenue earning stream for SROS to increase its revenue earning capacity and thereby relying less on Government grants in the long term for its ongoing operations.

d) SROS essential oil prototypes was showcased at Japan's largest exhibition specializing in cosmetics (COSME EXPO) that was held in Tokyo in January 2016, and were very popular with the visitors at the event. The most popular essential oil was *Mosooi* which was to be expected, given its already popular status in stores in Japan and with large cosmeceuticals as a core ingredient for perfume and scented lotions manufacturing. *Mosooi* oil that is available in Japan is imported from Africa and other Asian countries, and many visitors favoured the stronger scent of the Samoan *Mosooi* oil because it meant a lesser quantity is used during production. The second most popular oil was *Moegalo* given its stronger solid 'lemon' flavor in comparison to other companies' Lemongrass oil that had a more stronger 'grass' flavor.

e) In April 2016, SROS held its first stakeholders' consultation as part of our planning process towards the development of the SROS Corporate Plan 2017-2020 (photo 5). A cross section of government ministries, NGO and private sector representatives were invited which reflected on the diverse range of users of SROS services, and an opportunity for them to provide their feedback and ideas, specifically, ideas for new projects and partnership options with SROS to commercialise our developed prototypes and processes. The participation and contributions from our stakeholders' consultation ensured that the strategies and allied activities in the SROS Corporate Plan 2017-2020, will be relevant and responsive to their technical and research development interests and needs. The SROS Corporate Plan 2017-2020 and allied Statement of Corporate Objectives 2017-2020 will be submitted to Cabinet and Legislative Assembly in the beginning of the next financial year for their respective endorsement considerations.

Photo 5: Participants at the first SROS Stakeholders' Consultation held on 26th April 2016 to develop the SROS Corporate Plan 2017-2020.

3.2 Overview of operating performance and results for the year

Collaboration amongst stakeholders including our development partners, international and regional organizations, Government agencies, and the private sector, have contributed significantly in driving the Organisation's research and development activities via financial support of various projects in renewable energy, product development, plant and food technologies, and technical services.

3.2.1 Environment and Renewable Energy Division (ERED)

The ERED is responsible for Output 2 – Sustainable Management of Renewable Energy Resources and Environment – and undertakes research on the scientific development and sustainable management of renewable energy resources, and the evaluation of the environmental stability of agricultural practices and other related activities.

The following sections highlight work in progress of ERED during this financial year.

a) Jatropha as an Alternative Source of Biodiesel

Funded to the value of USD$150,000 received from the International Union for Conservation of Nature (IUCN) in financial year 2012/2013, laboratory extraction trials of *Jatropha* oil from seeds using both solvents and mechanical means are now completed. The results from these trials showed the laboratory extraction using petroleum ether produced an average yield of 45% v/w oil from dried *Jatropha* seeds in comparison with the KK40 extraction equipment which gave lower yields of less than 30%v/w. A final report is now being compiled for the IUCN first phase project which will also include biodiesel research from both coconut and Jatropha oils.

A meeting with the IUCN regional coordinator and donor partners from Italy was held in Auckland New Zealand in June 2016, whereby they showed much appreciation of the research work done in Samoa. In connection with this, another grant of up to €600,000 is being allocated for three countries – Samoa, Vanuatu and Marshal Islands – to submit activities to continue from those completed in the first phase. In connection with this funding opportunity, SROS in collaboration with MNRE and LTA will be submitting a joint proposal which will include agronomic studies for *Jatropha* and coconut oil production, enzymatic biodiesel reaction at the pilot scale and value adding or purification of byproducts.

b) Fruit Spirits Project

Funded to the value of USD$140,000 received from South Korean Government in the financial year 2013/2014, various locally available and abundant fruits are being evaluated as feedstocks for fruit spirit production.

Pilot scale studies are ongoing to investigate the shelf life of the various fruit spirit prototypes that were found popular from the sensory evaluation undertaken in collaboration with STA and SAME in the last financial year, using the following two methodologies:

1. An accelerated test using extreme temperature of 50^{o}C; and,
2. Normal room temperature test procedure.

The results from the accelerated test method showed unusual fluctuations of alcohol content in the prototypes during the 12 months monitoring post production, in which the levels increased in the first three months and thereafter decreased. It is suspected that the bottling of the fruit spirits in clear and dark bottles may have caused the fluctuations. Also, the fruit spirits bottled in dark bottles were found to have a pleasant smell from the third month onwards.

A few modifications such as the use of Ava Samoa as an additive to the fruit spirits and dried Oak wood chips to create a bourbon whiskey flavor for each fruit spirit were also tested. Ava is sourced locally while Oak was bought from New Zealand, and various weight levels (by volume of spirit) of Ava and Oak were evaluated with the final level of alcohol maintained at 40%v/v using water. Results showed that 10 days after production, the Oak flavored starfruit spirit samples gave very strong bourbon smell and reddish whiskey looks. On the other hand, the Ava infused starfruit spirit samples showed strong Ava smell and yellowish bright color (photo 6). Moreover, it was observed that standardizing the alcohol content to 40%v/v cannot be achieved during distillation but only after distillation, by diluting with distilled water using the chemical formula $C_1V_1=C_2V_2$. The addition of Ava and Oak also removed the watery smell of the water in the final starfruit spirit prototypes.

Photo 6: Ava and Oak blended fruit spirits with new labeling and bottling.

Pilot scale production of fruit spirit prototypes are still ongoing with the use of Ava Samoa as an additive or dried Oak wood chips to create a bourbon whiskey flavor for each fruit spirit prototype (photo 7).

Photo 7: Ava and Oak blended fruit spirit prototypes.

c) Photosynthesis Bacteria Evaluation Research

With funding to the value of SAT$20,000 received from MNRE in the last financial year via a consultancy contract, research is ongoing to evaluate the ability of the photosynthesis bacteria to consume and neutralise hydrogen sulphide in reduced water conditions. The outputs from this research will have relevant application to solving the foul smell from the Afulilo hydro dam and other water bodies suspected to be due to the presence of high levels of hydrogen sulphide. The results for measured water parameters based on weather conditions and water levels at Afulilo hydro dam during December 2015 are given in table 1. The results show that in this particular month, there was high organic activity which resulted in low oxygen levels and high demand in water.

Table 1: December 2015 sampling results (weather was overcast, rainy and high water levels).

Parameters	**Sample 1**	**Sample 2**	**Sample 3**	**Sample 4**
TDS (mg/L)	14.5	14.3	42.3	42.0
Salinity (ppt)	0.02	0.02	0.05	0.05
Resistance	3.45	3.50	1.19	1.19
conductivity (µS/cm)	28.9	28.6	84.6	84.0
temperature (^{o}C)	28.0	28.7	27.9	27.9
pH	6	5	5	5
H_2S (mg/L)	0	0.1	0.1	0.1
turbidity (NTU)	4.03	9.25	13.70	6.10
dissolved oxygen (mg/L)	6.2	6.2	6.13	5.8
BOD (mg/L)	9.3	9.4	9.6	11.2

Furthermore, photosynthesis bacteria isolated from soil and submerged mangrove swamps of Saleimoa was DNA sequenced and identified as "*Pantoea sp; Pantoea dispersa*" by the University of New South Wales (UNSW) in Australia (table 2 & Sequencing Raw Data).

Table 2: Nanodrop Results.

Sample	Conc, ng/uL	260/280	260/230
S9: PSB A1 ("PSB I")	5.2	1.36	0.25
S10; PSB x ("PSB iii")	6.7	0.92	0.49
S11: PSB A2 ("PSB ii")	4.9	1.65	0.46

"**Sequencing Raw Data**
>S11 Primer 519r

TACACATCAGCTTGCCCGCTCTCTGCGGTACTTCATCGGCGAGGTTATTAACCTCACCGCCTTCCTCCCCGCTGAAA
GTACTTTACAACCCGAAGGCCTTCTTCATACACGCGGCATGGCTGCATCAGGCTTGCGCCCATTGTGCAATATTCC
CCACTGCTGCCTCCCGTAGGAGTCTGGACCGTGTCTCAGTTCCAGTGTGGCTGGTCATCCTCTCAGACCAGCTAGG
GATCGTCGCCTAGGTGAGCCATTACCCCACCTACTAGCTAATCCCATCTGGGCACATCCGATGGTGTGAGGCCCG
AAGGTCCCCCACTTTGGTCTTGCGACGTTATGCGGTATTAGCTACCGTTTCCAGTAGTTATCCCCCTCCATCGGGC
AGTTTCCCAGACATTACTCACCCGTCCGCCACTCGCCACCCAAAGAGCAAGCTCTTCTGTGCTGCCGTTCGACTTG
CATGTGTTAGGCCTGCCGCCAGCGTTCAATCTGAGCCATGATCAAACTCTCTA

Enterobactericae : Pantoea spp ***" Pantoea dispersa"***

The evaluation of the bacteria efficacy in consuming the smelly hydrogen sulphide in water samples from the Afulilo hydro dam is ongoing and is focusing on the abovementioned strain that was isolated and identified by UNSW.

d) Biomedical Screening Research

Further plant and marine sample collection and screening were carried out in collaboration with MNRE. SROS in collaboration with MCIL also focused on patent application to patent the six species (four terrestrial plant and two marine species) which showed promising efficacy in inhibiting the activity of α-glucosidase enzyme responsible for high blood sugar levels causing diabetes, as part of the biomedical research in order to protect the identified species under international patent laws, as reported in the last financial year. Screening using the same extracts from the marine and terrestrial plant samples is also being used to evaluate their efficacy to inhibit the lipase enzyme responsible for obesity.

EMBASSY OF THE UNITED STATES OF AMERICA

With additional funding support from the US Embassy Samoa Office to the value of USD$5,000 received in this financial year, extracts from the pre-selected 40 marine and 60 terrestrial plant samples were also evaluated for their respective efficacies in inhibiting the lipase enzyme responsible for obesity, via enzymatic reactions using α-amylase, tyrosinase and lipase. These screening and evaluation activities are ongoing.

d) Japanese Embassy-funded Sustainable Growth of Fragrant plants for Poverty Reduction Project – Essential oil extraction component

Funded to the value of USD$94,912 received from the Embassy of Japan (Samoa Office) in financial year 2014/2015, and in collaboration with STA, MNRE and MWCSD, this project is designed to directly benefit the grassroots level as well as contribute to the

socio-economic development of Samoa by using cost effective biotechnologies on plants which are abundant, well grown and economically viable.

One of the two activities of the project is to produce essential fragrant oils from popular fragrant plants locally grown, using distillation equipment that were officially handed over by the Ambassador of Japan to Samoa, to the Chairman of the SROS Board of Directors (photo 8). Sufficient quantities of essential oils of expected quality from the three plant sources presently researched [lemongrass (*Moegalo*), eucalyptus (*Eukalipi*) and ylang ylang (*Mosooi*)], were produced and showcased at the internationally renowned Tokyo COSME EXPO in January 2016 (photos 9 & 10).

Photo 8: Official handing over of tissue culturing and essential oil production equipment.

Photo 9: Samoa display booth at the COSME EXPO, Tokyo, Japan.

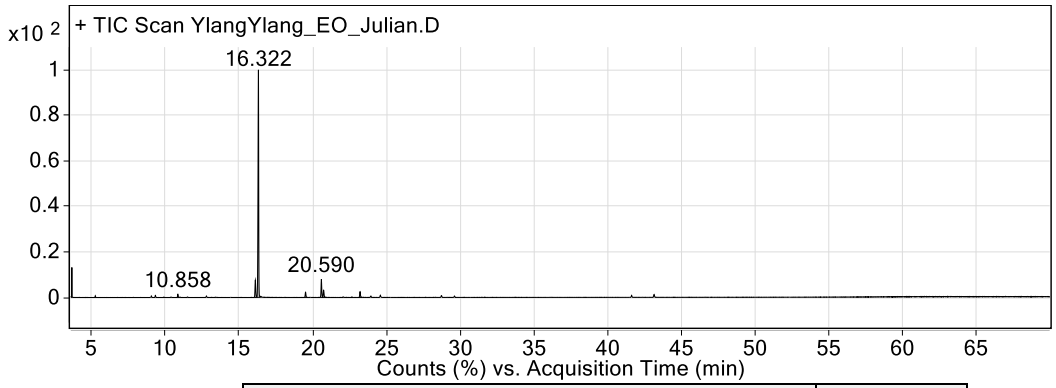
Photo 10: SROS developed essential oil prototypes showcased at the COSME EXPO, Tokyo, Japan.

According to Samoa's Ambassador to Japan, Fa'alavaau Perina Sila-Tualaulelei who manned Samoa's display booth at the event, the most popular essential oil to visitors was *Mosooi* which was to be expected, given its already popular status in stores in Japan and with large cosmeceuticals as a core ingredient for perfume and scented lotions manufacturing. *Mosooi* oil that is available in Japan is imported from Africa and other Asian countries, and many visitors favoured the stronger scent of the Samoan *Mosooi* oil because it meant a lesser quantity is used during production. The second most popular oil was *Moegalo* given its stronger solid 'lemon' flavor in comparison to other companies' *Moegalo* oil that had a more stronger 'grass' flavor. After the Tokyo COSME EXPO, two Japanese companies have shown much interest in the Mosooi essential oil and now in dialogue with SROS regarding future progress in commercial essential oil production and export from Samoa.

These essential oils were extracted using 65-L pot distillers from Japan (photo 11). Results thus far from these extraction trials have produced low essential oil yields: 0.2 ± 0.06%v/w of oil from *Mosooi*; 0.5 ± 0.07%v/w of oil from *Moegalo*, and; 0.2 ± 0.07%v/w of oil from *Eukalipi*. Extraction trials are ongoing to optimize the extraction process to achieve oil yields that will make essential oil extraction an economically viable and commercially attractive activity for interested uptakers post project life.

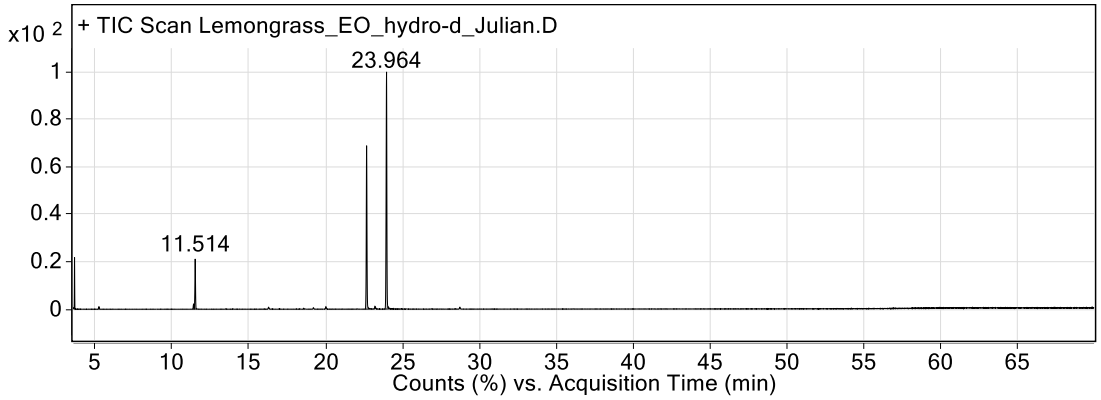
Photo 11: 65-L pot distiller for essential oil extraction.

Chemical compositions of essential oils from *Mosooi*, *Moegalo* and *Eukalipi* were tested by the University of Mendel in Czech Republic as a part of collaborative research efforts with SROS, with the results given in figures 1 to 3.



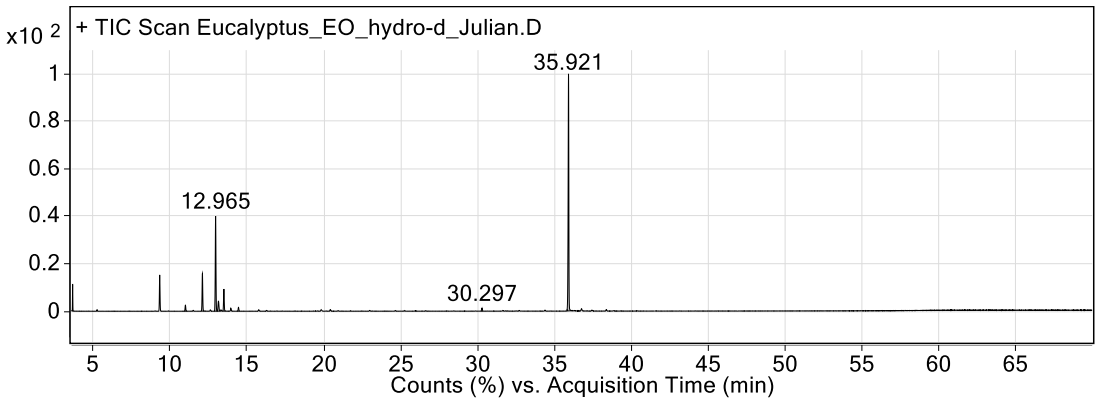
Name	Formula
Bicyclo[3.1.0]hex-2-ene, 4-methyl-1-(1-methylethyl)-	C10H16
Benzoic acid, methyl ester	C8H8O2
Linalool	C10H18O
Benzeneacetic acid, α-oxo-, ethyl ester	C10H10O3
Methyl salicylate	C8H8O3
Estragole	C10H12O
2,6-Octadien-1-ol, 3,7-dimethyl-, (Z)-	C10H18O

Figure 1: Analysis results for *Mosooi*/ylang ylang.



Name	Formula
5-Hepten-2-one, 6-methyl-	C8H14O
β-Myrcene	C10H16
2,6-Octadienal, 3,7-dimethyl-, (Z)-	C10H16O
2,6-Octadienal, 3,7-dimethyl-, (E)-	C10H16O

Figure 2: Analysis results for *Moegalo*/lemongrass.



Name	Formula
α-Pinene	C10H16
β-Pinene	C10H16
α-Phellandrene	C10H16
Benzene, 1-methyl-3-(1-methylethyl)-	C10H14
Limonene	C10H16
trans-β-Ocimene	C10H16
1,3,6-Octatriene, 3,7-dimethyl-, (Z)-	C10H16
γ-Terpinene	C10H16
1,6,10-Dodecatrien-3-ol, 3,7,11-trimethyl-, (E)-	C15H26O

Figure 3: Analysis results for Eukalipi/Eucalyptus.

The results above show that Samoan *Moegalo* and *Mosooi* oils have similar compositions with *Moegalo* and *Mosooi* oils from other places around the world. The oil from *Eukalipi* grown in Samoa was cross referenced against other *Eukalipi* oils and it was found to be uniquely Samoan. Further investigations are being conducted to further understand the factors that make this *Eukalipi* oil unique to Samoa.

Furthermore, collaboration was established with Dr. Pavel Novy of the Faculty of Agrobiology, Food and Natural Resources of the Czech University of Life Sciences, to investigate essential oils extracted from *Mosooi* and *Moegalo* to determine their efficacy as substrate inhibitors for food pathogens such as E. coli. During his one month assignment with SROS during this financial year, he co-developed with the SROS scientists and SROS JICA Senior Volunteer, a new methodology to screen antibiotic inhibitors using the essential oil from *Mosooi*.

It is expected that at the end of the project life, the equipment will be transferred to selected project stakeholders via a competitive EOI process to commercialise fragrant oil extraction, in order to realise potential income generation and employment creation opportunities associated with such commercial activities, as per one of the desired outcomes of the project.

3.2.2 Plant and Food Technology Division (PFTD)

The PFTD is responsible for Output 3 – Plant and Food Research and Development – and undertakes research and development on plant and food resources and their derived products of commercial interest and export potential, and enhancement of food quality and security to improve prospects of the national economy.

The following sections highlight work in progress of PFTD during this financial year.

a) Turkey-Funded Breadfruit Pathogen Phylogenetics Project

Funded to the value USD$50,000 received from the Government of Turkey in the financial year 2013/2014, the PFTD have completed the training activities and have developed the two methods (chemical and boiling) of DNA extraction using microbes isolated from rotten breadfruits. The project funds were not sufficient to cover sequencing and creating an actual phylogenetic tree using the results, so capacity building activities for the laboratory (equipment) and research staff (training) were the main outcomes from this initial funding.

The UNSW in collaboration with one of the SROS Managers (former UNSW student) offered assistance to identify the microbes isolated from rotten breadfruits using their extracted DNA. The DNA extracts from nine microbial isolates (photos 12 to 16) used during staff training were sent to UNSW for preliminary identification.

Stage 1:Collect rotten fruits


Photo 12: Rotten *Maopo* variety – whole and cut fruit.

Stage 2:Microbial Isolation

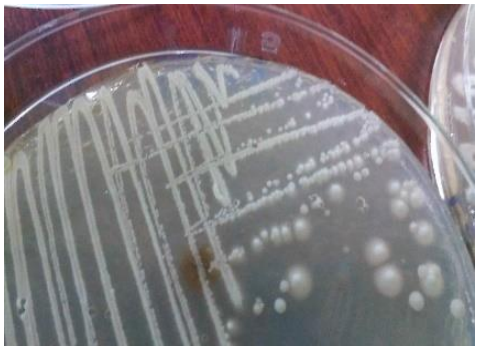



Photo 13: Isolated bacteria – pink and white.

Photo 14: Isolated yeast and fungi.

Stage 3:DNA extraction and PCR

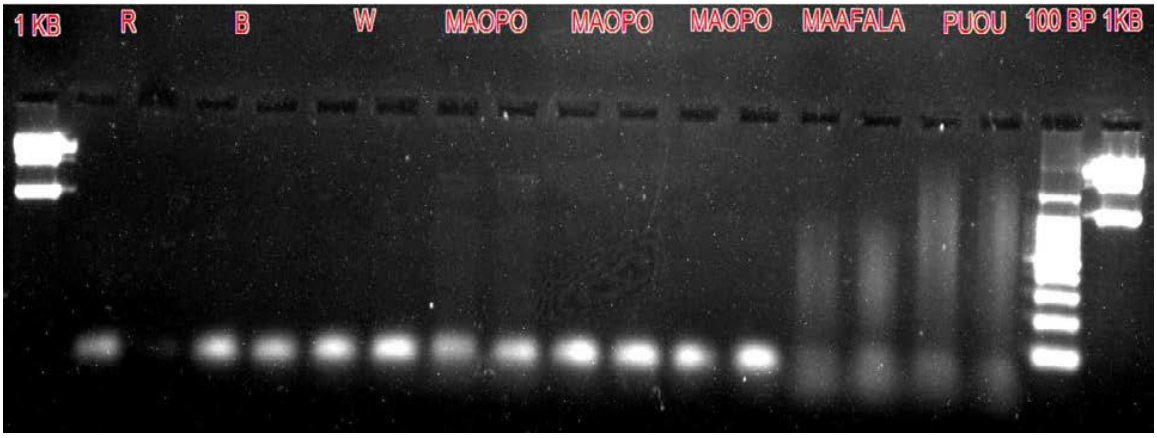


Photo 15: Bacteria DNA UV images.

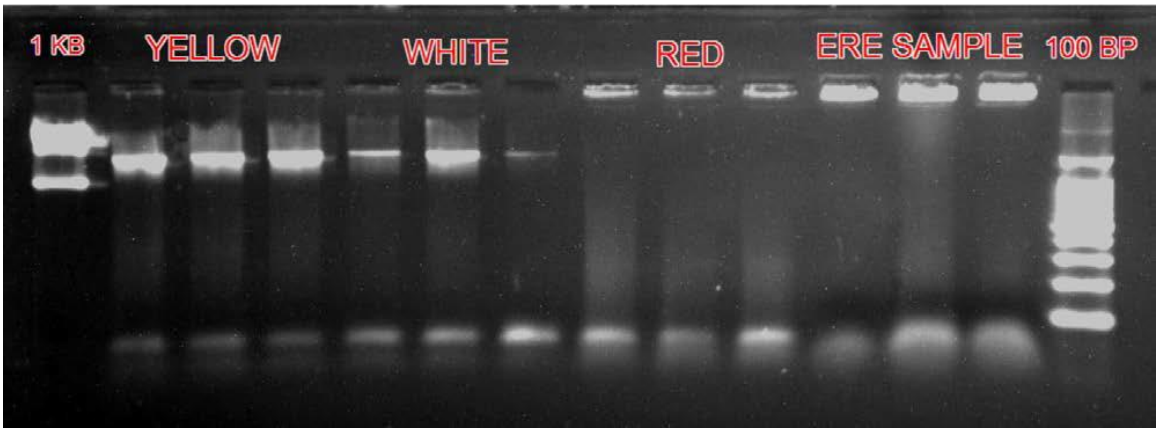


Photo 16: Fungi DNA UV images.

The nine samples consisted of five bacteria and four fungi DNA which were stained onto filter papers for identification purposes. The polymerase chain reaction (PCR) was performed on all submitted DNA samples to verify the presence of DNA and provide the template for sequencing. The same primers were used for both PCR and sequencing with both bacterial and eukaryotic primer sets. The results from UNSW are summarised in table 3 and below are the primer details:

(~ 490 bp amplicon)
Bacterial 16S primers 27f AGAGTTTGATCMTGGCTCAG 519R GWATTACCGCGGCKGCTG

(~200 bp amplicon)
Eukaryotic 18S primers 1391f GTACACACCGCCCGTC EukBr TGATCCTTCTGCAGGTTCACCTAC

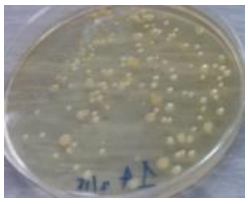
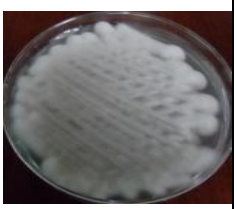
Table 3: Results for microbial DNA samples identification.

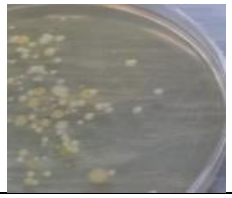
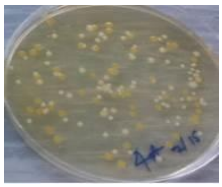
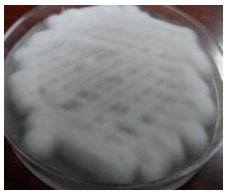
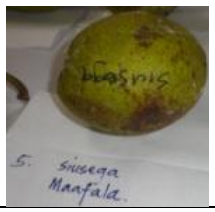
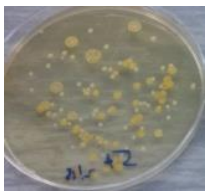
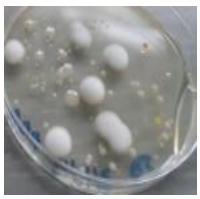
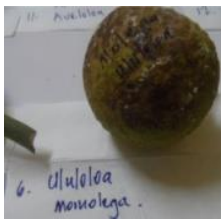
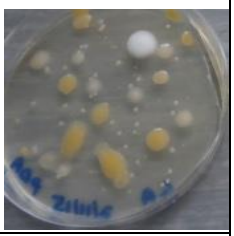
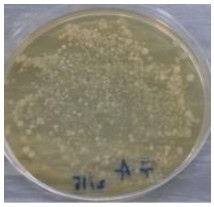
Sample	Putative Identification	Notes
S1	Not conclusive	See BLAST match data
S2	*Bacillus sp*. (possibly *B.megaterium* *Candida sp.*)	Yeast with bacterial contaminant?
S3	No significant match	
S4	16S sequence not done	
S5	*Klebsiellavaricola or Klebsiellapeuomoniae* 1391f primer gave *Dickeyachrsanthemi* however with low sequence coverage	Ignore fungal result as PCR band is wrong size
S6	*Pantoea sp. (Pantoeadispersa)*	
S7	*Sphingomonas sp. or Sphingobium sp.*	2 bands present with Eukaryotic primers
S8	*Sphingomonas sp. or Sphingobium sp.*	2 bands present with Eukaryotic primers. Blast returns 16S sequences
S12	*Pantorea sp. (P. dispersa)*	Eukaryotic PCR product is the wrong size Use bacteria PCR results only

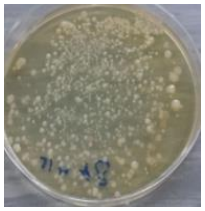
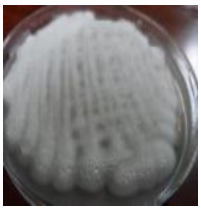
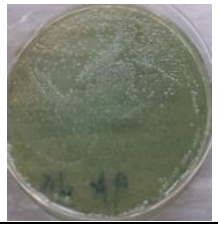
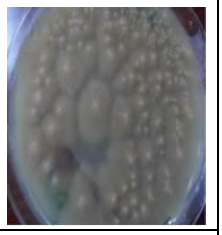
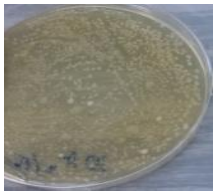
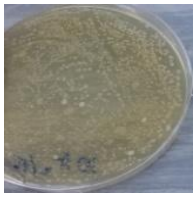
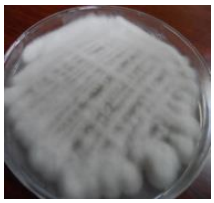
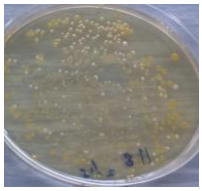
The DNA extracts from the microbes allowed clear identification for most of the bacterial agents while the eukaryotic primers used only gave possible names for fungi and yeast found on the rotten fruits.

This preliminary identification is a very good indication of the successful extraction of DNA from microbes and also improvements to be made on the process. The primers used were general for bacteria and fungi and more specific primers will be brought in to allow more accurate identification of specific microbes. The isolation and extraction process was also improved so there is no cross contamination of bacteria with fungi and vice versa.

Another lot of rotten breadfruits were collected from 16 villages around the Apia urban area for microbial isolation and subsequent DNA extractions (photo 17).

Village	Variety	Bacteria	Fungi
1. Toamua	Momolega 		

Village	Variety	Bacteria	Fungi
2. Faleula	Sagosago 		
3. Nu'u	Maopo 		
4. Vaitele Uta	Maafala 		
5. Siusega	Maafala 		
6. Ululoloa	Momolega 		
7. Alafua	Puou 		

Village	Variety	Bacteria	Fungi
8. Vaimoso	Puou 		
9. Lalovaea	Puou 		
10. Malifa	Maopo 		
11. Vaivase	Aveloloa 		
12. Moataa	Puou 		
13. Fagalii	Maafala 		

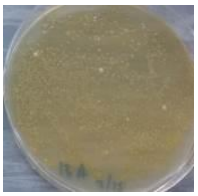
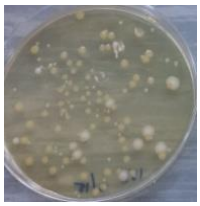
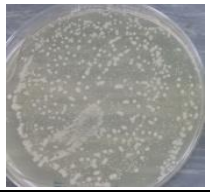
Village	Variety	Bacteria	Fungi
14. Vailele	Maopo 		
15. Letogo	Maafala 		
16. Tanugamanono	Maopo 		

Photo 17: Villages and associated varieties of breadfruit collected for isolation of pathogens.

No specific variety was selected as the only general criterion was that the fruit had to be showing signs of rotting while still attached to the trees. All pathogens as shown in photo 17 were isolated with DNA extracted and cleaned. All the cleaned samples were forwarded to UNSW to be identified and results are still pending.

Interests have also been expressed by the Pacific Horticultural and Agricultural Market Access (PHAMA)/Market Access Working Group (MAWG) to conduct a study to identify the varieties of cocoa Samoa given the many hybrids growing in the country. To take advantage of the DNA extraction facilities on site, consumables for DNA extraction from the various local cocoa hybrids in an attempt to identify their true varieties have been ordered. Collection of cocoa pods will be underway once these consumables arrive which is likely to be in the beginning of the next financial year.

b) FAO Consultancy – Fruits and Vegetables Postharvest Loss and Food Safety

The activities for this FAO funded consultancy was completed during this financial year. The FAO hosted a two day workshop at Hotel Tanoa Tusitala in July 2015 for the project stakeholders whereby the results from the postharvest assessment of Samoa's horticultural value chains conducted by the lead consultant Professor Steven Underhill and SROS were presented.

The results from the SROS component of the study found that the occurrences of microbiologically related food safety risks for vegetables in Samoa are most likely impacted upon by the following factors:

- availability of clean quality water for on farm use;
- practices implemented by the farmers during growing, harvesting and postharvest activities;
- storage facility conditions and its use;
- preparation and display of goods for sale; and,
- limited knowledge and/or concern for food safety by those involved throughout the chain.

The following recommendations were suggested for improvement and future work:
- future studies should determine the proportion of population serviced by the different means (subsistence, stores, markets, road side stalls) for vegetables and their associated food safety issues;
- use of good agricultural practices and the development of practical code of hygienic practices for fruits and vegetables;
- draft local regulations needs to include *L. monocytogenes* as it is an important food health and safety indicator; and,
- pesticide (chemical) residues to be investigated as another source of food safety concern.

The following SROS report was accepted by FAO and the lead consultant:

- Kuinimeri Asora-Finau, Siope Pele, Alfram Nukuro, Militini Tagoai, and David Hunter (2015) Analysis of microbiological risks for selected leafy green vegetable chains in Samoa. Technical Report. SROS Component for the project on postharvest loss and food safety risks in Samoa's fruit and vegetable value chains. 15 pp.

From this initial consultancy work, FAO identified the need to build the capacity of targeted private sector and institutions to assist improve the farmers capacities to supply and market safe quality food. SROS with its testing and postharvest laboratory infrastructure was identified as a major player to assist with the training and also receive capacity building in the following two areas: Postharvest management; and, Food safety testing. This new work was formalized in this financial year with SROS receiving USD$76,720 to implement the agreed activities. The consultancy work started with a stakeholder meeting and site visits to farmers to identify the target areas for the project. Discussions are ongoing for the planning of farmer postharvest management training, and SROS technical team have started acquiring the equipment and consumables needed for the development of pesticide residue testing; a critical testing service that has been constantly requested by SROS stakeholders, including MAF and MNRE.

The project partners from the University of Sunshine Coast, Professor Steven Underhill, Dr Lila Peterson and Dr Sarah Burkhart also visited Samoa to conduct initial consultations as well as market surveys for the fruit and vegetable supplies. SROS Assistant Research Scientist Veronica Vaaiva accompanied Dr Peterson and Dr Burkhart to all their market surveys conducted both in Upolu and Savaii. Dr Burkhart a nutritionist by profession also delivered a very informative presentation on the status of nutrition in Samoa to all SROS staff.

c) PHAMA & TCM/EIF-funded Cocoa

1) PHAMA-funded Cocoa Fermentation Study

PHAMA
Pacific Horticultural & Agricultural Market Access Program

Funded by PHAMA to the value of AUD$10,000 in the last financial year, sensory evaluations for the chocolate samples in collaboration with Devonport Chocolates (Auckland, New Zealand) using dried and fermented cocoa beans sourced from the pre-selected cocoa farmer in Upolu, were conducted during three consecutive weeks using SROS internal staff, visitors to SROS as well as the MAWG for PHAMA. Results from these sensory evaluations are given in table 4. Chocolate sample A is chocolate processed from cocoa beans that were fermented using the current local method, while chocolate sample B represents the beans fermented using the method recommended by the study conducted in Vietnam. Chocolate sample B was consistently preferred by the tasters (higher mean rating) across all three evaluations, indicating that the Vietnam fermentation method produces beans that are highly favourable for chocolate making compared to the current local practice.

Table 4: Results for three sensory analysis for taste preference of panelists between the chocolate samples A and B.

	Chocolate tablet	
Sensory	A	B
1	3.2b[¥]	3.7a
2	3.3b	3.9a
3	3.2b	4.2a

[¥]Mean ratings in the same row (within sensory) followed by different letter are different at $p < 0.05$ using LSD.

Another sensory evaluation was conducted using chocolate samples processed from Devonport Chocolates, using cocoa beans sourced from the pre-selected farmer in Savaii. The downside to this comparison was that the two samples, chocolate sample A (cocoa fermented using local method) and sample B (cocoa beans fermented using the Vietnam method) did not contain the same amount of sugar. Sample A contained 80% cocoa and 20% sugar while sample B contained 62% cocoa and 38% sugar meaning sample B would be sweeter than sample A. The results given in figure 4 clearly show a preference for sample B which is similar to the results given in table 4. Unfortunately, the differences in cocoa (and sugar) contents for the samples make the comparison biased.

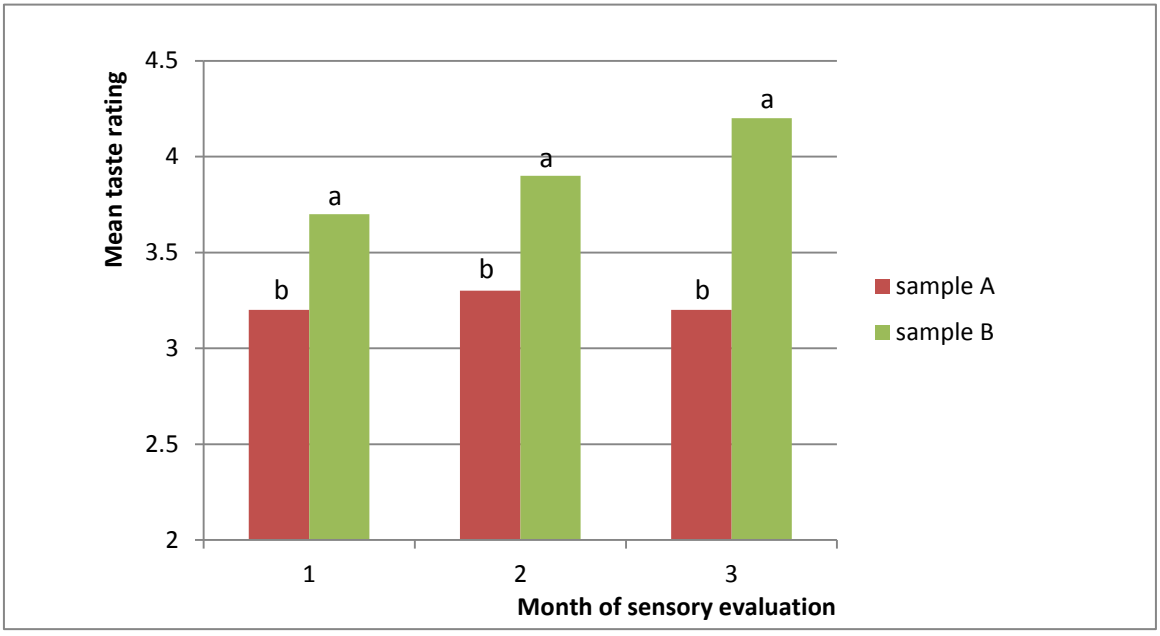


Figure 4: Sensory results for chocolate samples A (local fermentation) and B (overseas fermentation). Taste key: 1 = dislike; 2 = neutral; 3 = good; 4 = very good; 5 = excellent. Mean taste ratings in the same month followed by different letter are different at $p < 0.05$ using LSD.

The effect of the fermentation practices used on the development of chocolate flavor for cocoa beans is well known and has again been proven in this study. The local cocoa farmers are of the belief that their traditional methods of fermentation produces the best quality beans particularly those intended for the export market, and this study has proven that it can be further improved with the incorporation of a few minor activities. These activities include the following;

- Holding pods for at least five days before breaking;
- Spreading beans in the sun for a few hours before fermentation;
- Fermentation for at least five days with daily stirring;
- Washing after fermentation; and,
- The use of a solar dryer, if possible, for efficiency of the drying stage.

The chocolate samples produced from cocoa beans fermented with the recommended Vietnam method were preferred over the chocolate samples prepared from beans fermented using the local method. The use of a solar dryer was also proven to be efficient in terms of drying time and also convenient during the rainy period.

From these studies, the local farmers growing cocoa for the chocolate industry should be informed of the results of this study and be encouraged to incorporate the above changes to their fermentation methods to ensure the production of quality beans intended for this industry. There also appears to be differences in the macronutrient content of cocoa beans sourced from the two islands and this has an impact on the resultant quality of value added products (table 5). Future studies may focus on determining whether the differences are varietal, agronomical, seasonal or other. This should also then link to identification of the best cocoa varieties (or clones) for mass propagation to ensure a continuously thriving local cocoa industry.

The second phase of this cocoa study for farmer trials have started with two local farmers having solar dryers built under the PHAMA export development grant. SROS's cocoa quality monitoring equipment have also been ordered and paid for directly by PHAMA and are expected to arrive in the next quarter.

On-site monitoring of cocoa drying as well as laboratory quality testing will commence once these equipment arrive.

Table 5: Nutritional values of dried and fermented cocoa beans analysed by Assure Quality Laboratories, Auckland, New Zealand.

Test (unit)	Result
Ash (%m/m)	4.0
Carbohydrate by Difference (%m/m)	41.1
Moisture (%m/m)	6.2
Protein (%m/m)	13.7
Fat SBR (%m/m)	35.0
Cadmium (mg/kg)	0.094

2) TCM EIF Tier 2 cocoa and coconut value adding

The Trade, Commerce and Manufacturing (TCM)/Enhanced Integrated Framework (EIF) Tier 2 project, involving cocoa and coconut in which SROS, WIBDI and STEC are key stakeholders under component 2, focuses on private sector enhancement. For cocoa in particular, this project links with the fermentation and drying activities, to actual farmer practices before further value adding and subsequent export trials for the resulting products. SROS has finalized its work plan and associated budget after frequent consultations with WIBDI, STEC and MCIL is now in the process of implementing the activities. The production of cocoa mass (also known as cocoa liquor) is the simplest least expensive value added form for cocoa beans in which it can be sold to the chocolate and cocoa processors overseas. This form (as a solid bar) not only allows value addition for a higher return for our farmers but also eliminates the quarantine issues associated with exporting dried beans. SROS have identified the necessary processing equipment and have been seeking quotes from various suppliers. Most quotes provided were of large processing plants with capacities too big for our local supply to economically utilise, and so equipment with capacities below 50kg/hr were sought. Two companies, one in Italy (Bifaro International Company) is able to manufacture the bulk of the equipment, and the other in England (Commodity Processing Systems Ltd) provides the competitive price for one of the key equipment.

Discussions and on-site visits with WIBDI have also been continuing with an understanding now in place that all cocoa processing equipment will be housed in WIBDI's new warehouse funded under the same project. SROS's role will be to provide the technical and research support particularly with regards to the quality assurance for the whole process and product. All the value added activities on by-products from the production of VCO, as originally agreed with STEC has not progressed due to STEC's change in direction with recent indications that they will now focus on the supply side of the value chain. SROS now has to look at collaborating with other small virgin oil producers to develop value adding processes to their coconut oil byproducts.

d) Frozen breadfruit slices and fries

Packages of 1-kg breadfruit fries (photo 18) produced from the *Puou* and *Maopo* varieties were distributed to eight local bars and restaurants for local market testing. Comments from these local places were generally positive with some negative feedback highlighting some fries being too hard when cooked. Onsite tasting confirmed the varietal difference in taste with fries from *Maopo* producing harder fries while those made from *Puou* being softer and most preferred. Packages of breadfruit fries (both varieties) were also sent to a Japanese resort, Hawaiian Resort Tokyo, and to Pacific Islands Trade and Invest (PTI) in Auckland New Zealand for some preliminary feedback and

comments received from PTI indicated the product to be well received by the Pacific people who tasted it. The same comment was also received regarding some fries being too hard.

Photo 18: 1-kg breadfruit fries.

Trials have also started with frozen baked breadfruit (photo 19). To date personal consignment for baked breadfruit are still banned from New Zealand and Australia, and PHAMA had provided assistance to Farmer Joe to have its commercial oven certified to provide this service to the travelling public. However, to date no family has made use of this service and an alternative solution was requested to make it easy for families to take breadfruit and also for Farmer Joe to better utilize its newly acquired capacity. Trials of oven baking, packaging and freezing of breadfruit were conducted with very positive results

Photo 19: Frozen baked breadfruit sample.

The research activities for all three frozen products developed for breadfruits (fries, slices and baked) have completed with limited market trials conducted for breadfruit fries only. The *Puou* variety was the preferred variety over *Maopo* both in terms of appearance and taste over a three month storage period (table 6). The only difference in treatment that was assessed was whether the method of freezing had an impact on the taste and appearance of product. All products were vacuum packed for a more presentable product and to avoid the buildup of ice crystals which would otherwise form if loosely

packed. Results given in table 7 show that the method of freezing has little impact on the product with variety *Puou* still the most preferred over *Maopo* if processed either way. Given the stringent biosecurity protocols for sending fresh or baked breadfruit to New Zealand and Australia, the semi-processed frozen pathway was the obvious strategy to explore for exporting.

Table 6: Results for sensory evaluation for the two baked breadfruit varieties for product appearance and taste.

	Appearance			**Taste**	
Variety	Maopo	Puou		Maopo	Puou
Month 1	3.9b[¥]	4.4a		3.6b	4.3a
Month 2	3.8	3.9		3.8b	4.2a
Month 3	3.7b	4.3a		3.9b	4.6a

[¥]Mean ratings for taste and appearance in the same row followed by different letter are different at $p < 0.05$ using LSD. Taste key: 1 = dislike; 2 = neutral; 3 = good; 4 = very good; 5 = excellent.

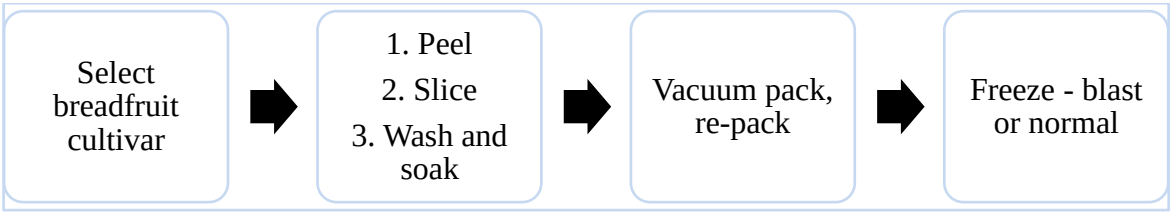
Table 7: Sensory results for the two breadfruit varieties processed in two different ways.

	Month 1		**Month 2**		**Month 3**	
Freezing method	Slow Freeze	Blast Freeze	Slow Freeze	Blast Freeze	Slow Freeze	Blast Freeze
Variety	**Taste**					
Puou	4.1a	4.5a	4.2a	4.1a	4.6a	4.6a
Maopo	3.6a	3.7a	3.8a	3.8a	3.9a	3.8a
Variety	**Appearance**					
Puou	4.4a	4.4a	4.1a	3.8b	4.2a	4.4a
Maopo	3.8a	4.0a	3.7b	3.8b	3.7a	3.6a

[¥]Mean ratings for taste and appearance in the same month followed by different letter are different at $p < 0.05$ using LSD. Taste key: 1 = dislike; 2 = neutral; 3 = good; 4 = very good; 5 = excellent.

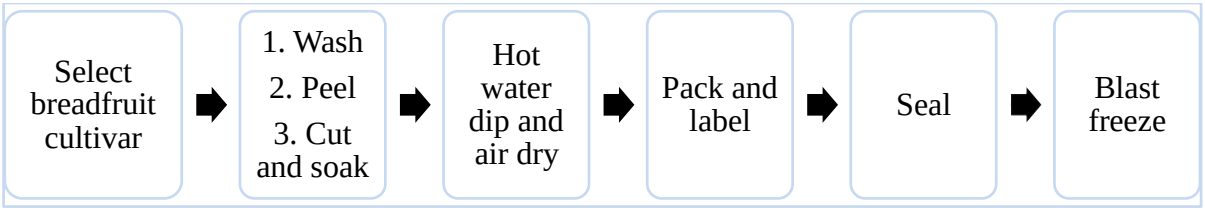
All the frozen breadfruit development activities have been finalized with processes now in place for producing uncooked slices, uncooked fries and baked slices. The potential and interested users of this pathway for processing frozen breadfruit can confidently produce all or either the sliced, fries or baked goods using the processes described below.

The recommended process for frozen uncooked slices is as follows:



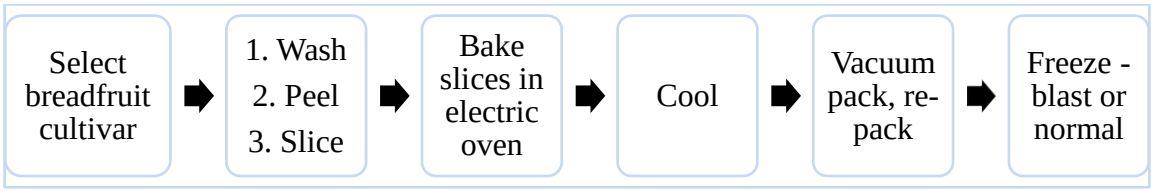
For this product, the method of packaging specifically vacuum packaging has a marked effect on product quality in terms of taste and appearance. Blanching and method of freezing did not have an obvious impact on product quality. The *Puou* variety was preferred over *Maopo*.

The recommended process for making fries is as follows:



For this product, blanching was noted to be an essential treatment to produce a quality product irrespective of how it was packed, i.e., loosely sealed or vacuum packed. The *Puou* variety was preferred in terms of quality although *Maopo* was found to be higher yielding in terms of product per fruit.

The recommended process for baked breadfruit pieces is as follows:



The baking process and vacuum packaging are key to ensuring product quality. This is an excellent convenient product which only needs a microwave to prepare for consumption.

All things considered, some of the major findings of this study include:

- Vacuum packaging is essential when breadfruit product in not blanched or cooked;
- Blast freezing is crucial when handling many produce at the same time to ensure all products are frozen;
- Vacuum packaging is essential for the baked product as it prevents icicle formation and saves space when stacking products; and,
- The Puou variety is the most preferred when used for making all three frozen products.

e) Japanese Embassy-funded Sustainable Growth of Fragrant plants for Poverty Reduction Project – orchid propagation component

One of the two activities for this project which is to propagate selected orchids commenced in this financial year, and training of SROS scientists by the SROS JICA Senior Volunteer on manual pollination, propagation and tissue culturing of orchids was also undertaken.

The nursery for selected orchid propagation has been built (photo 20) and the construction of growing benches and installation of a 5000-L water tank for the sprinkler irrigation system are also completed. The nursery is now being used to house and nurse selected locally grown wild orchids (photo 21).

Photo 20: Orchid nursery built on site at SROS Nafanua.

Photo 21: Selected locally available wild orchids being housed and nursed in the SROS nursery.

The permit for importing orchid plantlets from Japan has been received from MAF and forwarded to the Japanese supplier for their purposes. The SROS team is now awaiting the arrival of these plantlets for mass propagation and distribution to the local floral industry members for their purposes.

f) ACIAR-funded Regional Fruit Tree Project

Australian Government
Australian Centre for International Agricultural Research

This four-year multi-partner project is funded by the Australian Centre for International Agricultural Research (ACIAR) and involves collaboration between research partners from Fiji, Tonga and Samoa. For Samoa, SROS and MAF will be collaborating with the University of the Sunshine Coast and SROS. SROS received AUD$311,000 to support its activities.

The official launching of the Regional Fruit Tree project funded by ACIAR was hosted by SROS in Samoa in June 2016. Highlighting increasing regional horticultural collaboration, this workshop was attended by senior representatives from the Ministry of Agriculture, Food, Forests and Fisheries (MAFFF) of

Tonga, Fiji Ministry of Agriculture (MA), Pacific Community (SPC), UN-FAO, Universities of the Sunshine Coast and Queensland and SROS (photo 22).

Photo 22: Workshop participants (L to R): Tilafono David Hunter (SROS), Shalendra Prasad (MA), Losaline Ma'asi (MAFFF), Professor Steven Underhill (USC & UQ), Tim Martyn (UN-FAO), Tuimaseve Kuinimeri Finau-Asora (SROS), Dr. Siosiua Halavatau (SPC).

During the workshop, attendees were briefed on proposed research to increase production and postharvest efficiency of pineapple in Samoa, Fiji and Tonga, research to improve domestic mango production in Fiji, and efforts to re-build the Tonga domestic citrus industry. The workshop attendees were also advised on potentially groundbreaking research that seeks to develop low-growing (dwarf-like) breadfruit trees that could be more cyclone tolerant and easier to harvest.

One of the major objectives of this regional project is to increase the efficiency of fruit value chains through improved productivity and postharvest handling practices. Under this objective, SROS has been assigned activities to improve the commercial viability of sea-freight exports of breadfruit from Samoa by developing postharvest protocols for mixed-crop small consignment shipments. In line with this, the project team identified that one of the main issues in prolonging the shelf-life of breadfruit for sea-freight is postharvest rotting. To address this issue, a preliminary trial was initiated by Professor Ron Wills (SROS Honorary Research Fellow) and implemented by SROS team to identify microbial species responsible for postharvest rotting in breadfruits.

Breadfruit of the Puou variety were harvested, weighed and randomly selected for treatment at either one of two temperatures: 25°C (control temperature) and 12°C (treatment temperature). The quality of the fruits was monitored daily for the development of rot. After one week, all fruits that were kept at 25°C either became ripe, or developed rot. Microbial isolation from these fruits produced various types of bacterial and fungal species (photo 23). All fruits that were kept at 12°C treatment survived the one week but all appeared to have sustained chilling injury, exhibited through significant hardening of the

fruit as well as browning of the skin. After two weeks, fruits kept a 12°C started developing rot. Interestingly, unlike fruits that were kept at 25°C, microbial species isolated from rot that developed in fruits kept at 12°C were primarily fungal, with only two distinct bacterial species (photo 24). Work is continuing to identify these microbial (both bacterial and fungal) species.

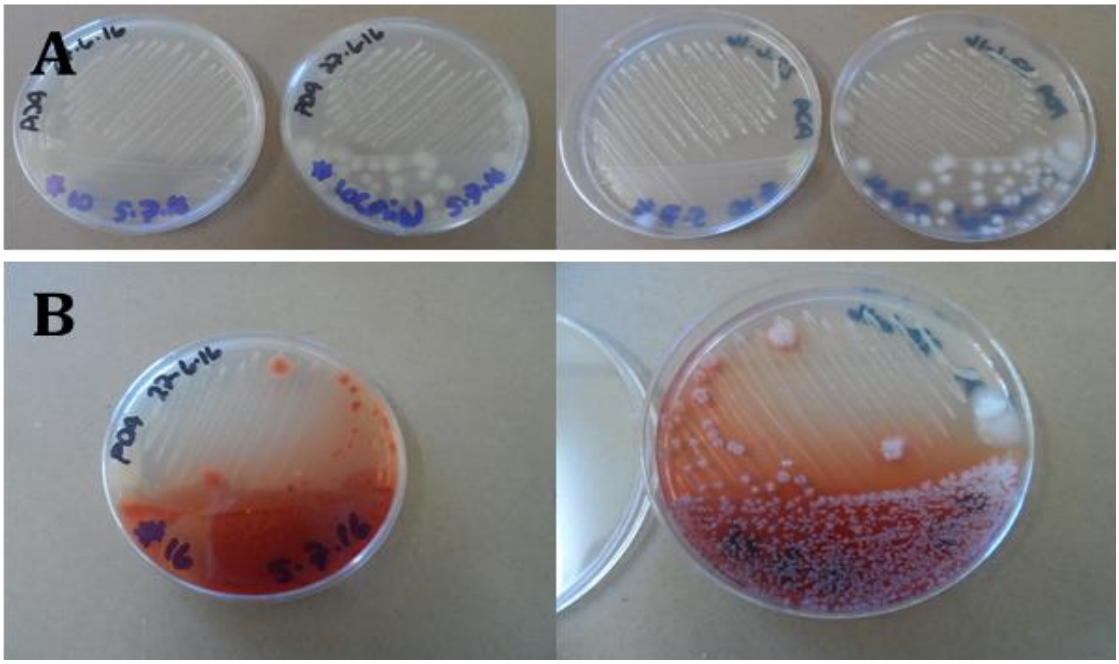


Photo 23: Exemplar of fungal isolate morphologies from breadfruit stored at 25°C.

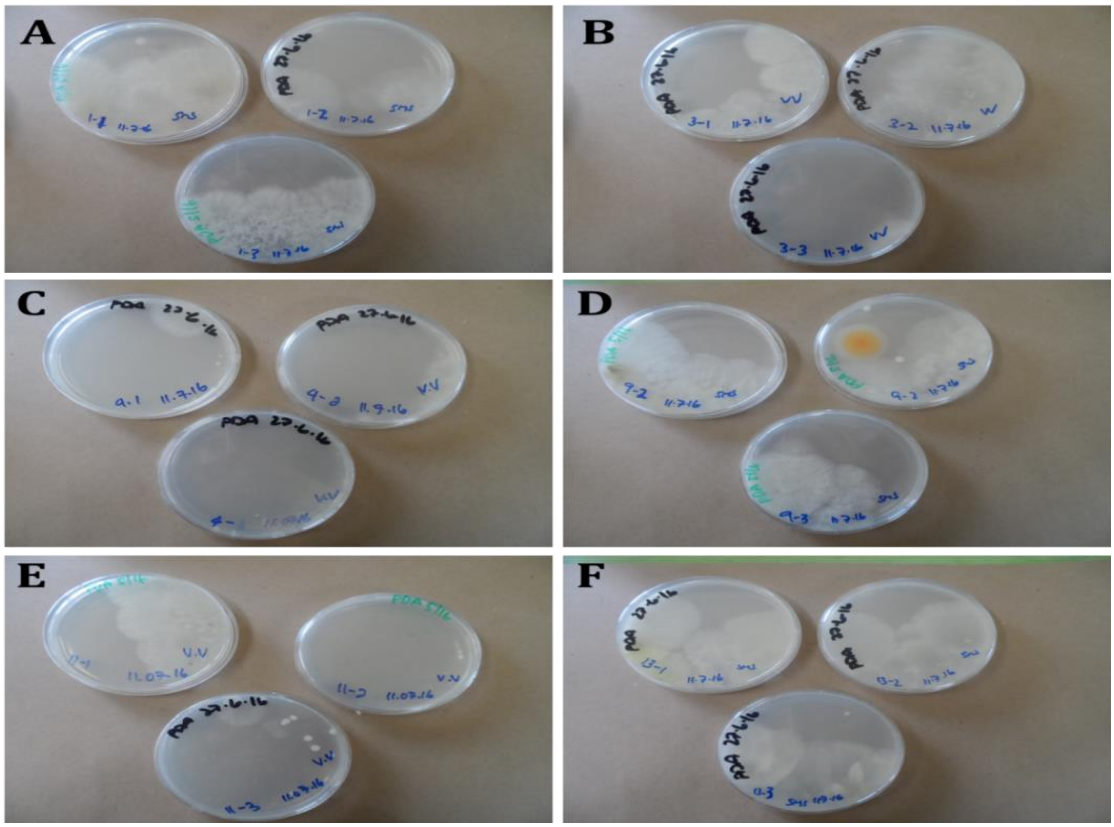


Photo 24: Fungal isolates from breadfruit stored at 12°C.

3.2.3 Industrial Research Division (IRD)

The IRD is responsible for Output 4 – Industrial Product Development Services –and undertakes research on food materials and processing into new product prototypes and agro-processing techniques, and uses of appropriate technologies to improve the commercial prospects for food products, including food preservation and packaging.

The following sections highlight work in progress of IRD during this financial year.

a) Gluten-free Breadfruit Flour

The SROS continued to discuss and negotiate with interested parties from the private sector potential commercialization of breadfruit flour production. A non-disclosure agreement for the business plan including a financial model for breadfruit flour production that was developed by SROS, was signed with Yazaki Samoa Ltd which showed interest in the commercial production of the product, and up to the end of this financial year, SROS had still to receive any response from them. SROS also continued to collaborate with Pacific Island Centre (PIC) based in Tokyo, Japan, to promote breadfruit flour with Japanese chefs as an organic gluten free alternative to rice flour and other gluten free flour products in the Japanese market. Furthermore, SROS as a subscribed member of SAME continues to work closely with them and the University of Hawaii's Pacific Business Center Program (PBCP), to progress the regional breadfruit initiative involving Samoa and other Pacific island countries to develop products from the breadfruit, which also includes breadfruit flour, for the growing multi-billion dollar gluten free market in USA.
A sample of the SROS produced breadfruit flour was also sent to Assure Quality Laboratory in Auckland, New Zealand, for independent complete analysis of essential nutritional values, to support the promotion of the flour to interested processors and users locally and abroad, and the results are given in table 8.

The production procedure for the flour has also been modified to increase yield and minimize production time. The modified procedure involves the drying stage whereby about 120-130 sliced fruits (8-10 mm thickness) can be dried per maximum oven load compared to 60-70 sliced fruits (3-5 mm thickness) previously. This has also resulted in less coarse and brown flour particles, and more white flour particles when milled. During drying, the thicker slices harden on the outside and leave whiter portions inside resulting in increased white flour yield per production batch when milled.

Table 8: Independent complete analysis of SROS breadfruit flour undertaken by Assure Quality Laboratory.

Test (unit)	Result
Ash (%m/m)	3.2
Carbohydrate by Difference (%m/m)	71.4
Energy (kcal/100g)	343
Total dietary fibre ((%m/m)	11.2
Moisture (%m/m)	8.3
Protein (%m/m)	4.28
Cholesterol (mg/100g)	<0.5
Total vitamin B6 (mg/100g)	0.55
Total vitamin C (mg/100g)	<1
Vitamin D3 (IU/100g)	<20
Vitamin A (IU/100g)	<10
Saturated fat (g/100g)	0.6

Test (unit)	Result
Trans fat content (g/100g)	<0.1
Fructose (%m/m)	<0.5
Glucose (%m/m)	<0.5
Anhydrous lactose (%m/m)	<0.1
Monohydrate lactose (%m/m)	<0.1
Maltose (%m/m)	<0.1
Sucrose (%m/m)	0.8
Total sugar (%m/m)	1.4
Galactose (%m/m)	<0.1
Fat SBR (%m/m)	1.6
Calcium (mg/kg)	540
Iron (mg/kg)	17
Sodium (mg/kg)	92

b) Avocado Oil

Following the withdrawal of Apia Bottling Co Ltd as the winning bidder for the purchase of the avocado oil processing equipment as reported in the last financial year, another call for expression of interest (EOI) for the equipment was advertised in the local media in October 2015, and no party submitted an EOI during this call. Another call for EOI was advertised in the local media in June 2016. The SROS Board of Directors in its meeting held in the same month instituted a Select Bid Evaluation Committee to evaluate WIBDI's EOI. The Committee members comprise of representatives from SROS (Board Director, Chairman), AGO, MOF, MCIL and MPE. The Committee's evaluation of WIBDI's bid is work in progress.

The processing equipment were also used to extract oil from scraped coconut, as some local entrepreneurs are interested in the centrifugation method of coconut oil extraction because it gives no smoked odour that other extraction methods produce. This will have economic benefits to parties interested to commercialise avocado oil production using the equipment, as it will provide an alternative use for the equipment for revenue generation during the avocado off season.

Avocado oil extraction was implemented during the December 2015 to early April 2016 avocado fruiting season, and it yielded about 165 L of oil. Altogether, 12 batch productions using less than half of the maximum capacity of the processing plant during each run yielded 63 ± 4.3%w/w of fresh pulp from the fruits, 2.3 ± 0.59%v/w of oil from the fruits or 3.4 ± 0.92%v/w of oil from the fresh pulp. These production levels are very low compared to what the processing plant can maximally produce, which is 10-14%v/w of oil from the fresh pulp according to the manufacturer of the plant (Alfa Laval, Italy). These low levels may be attributed to the inherently low oil levels in the fruits of the locally grown avocado varieties bought for oil production.

The desired avocado varieties for oil production in terms of yield and quality of oil are Hass and Fuerte. The tree numbers for these two varieties locally grown are very low. To address this issue, SROS is collaborating with MAF to sort out quarantine compliance for the importation of avocado scions or seedlings of the desired high oil yielding varieties for grafting and propagation purposes, to further bulk up the supply of avocado trees for distribution to interested farmers. The intent of this activity which SROS and MAF plans to establish by the end of 2017, is to further develop the supply side of the value chain for avocado oil production, so that there will be sufficient and sustainable fruit supply of the

desired avocado varieties, to match the maximum production capacity of the oil processing plant, and realise its commercial potential by 2020.
A sample of the SROS produced avocado oil was sent to Assure Quality Laboratory in Auckland, New Zealand, for independent complete analysis of essential nutritional values to support the promotion of the oil to interested processors and users locally and abroad, and the results are given in table 9.

Table 9: Independent complete analysis of SROS avocado oil undertaken by Assure Quality Laboratory.

Test (unit)	Result
Density (g/mL)	0.91
Ash (%m/m)	<0.1
Energy (kcal/100g)	884
Fat by Difference (%m/m)	99.9
Moisture (%m/m)	0.10
Protein (%m/m)	<0.1
Vitamin D3 – Food (IU/100g)	<20
Vitamin A (IU/100g)	<3
Fructose (%m/m)	<0.1
Glucose (%m/m)	<0.1
Anhydrous lactose (%m/m)	<0.1
Maltose (%m/m)	<0.1
Sucrose (%m/m)	<0.1
Total sugar (%m/m)	<0.1
Galactose (%m/m)	<0.1
Calcium (mg/kg)	<0.91
Magnesium (mg/kg)	<0.28

The SROS produced avocado oil was also tested (general appearance, taste & smell) and compared with the OLIVADO Extra Virgin Avocado oil imported from New Zealand, during the SROS Stakeholders' consultation on its new Corporate Plan 2017-2020 that was held in April 2016. The sensory results are given in table 10. The results show that the SROS produced avocado oil was preferable by the tasters compared with the imported OLIVADO avocado oil in terms of general appearance, taste and smell.

Table 10: Results from the sensory evaluation of SROS and OLIVADO avocado oils undertaken during the SROS Stakeholders consultations in April 2016 (n = 16).

Rating	Avocado oil	
	SROS	OLIVADO
GENERAL APPEARANCE:		
Excellent	11	6
Good	3	10
Average	2	0
Poor	0	0
TASTE:		
Excellent	6	3
Good	8	9
Average	2	3
Poor	0	1
SMELL:		
Excellent	6	2
Good	5	9

Rating	Avocado oil	
	SROS	OLIVADO
Average	5	5
Poor	0	0

c) Coconut Oil Refinement

In the SROS Board meeting held in February 2016, the CEO informed the Board that trials have demonstrated that the combination of river sand and locally produced activated biochar is able to strip the odour of the coconut oil. However, the challenge faced is the scaling up of the developed process to a desired scale for commercial realization, in the light of competition from other internationally well-established technologies such as distillation and deodorizer, that have already being tested in the markets for the purified coconut oil they produce, although they are relatively more expensive. The largest coconut oil producer in Samoa, Pacific Oil, has procured commercial scale equipment to strip the coconut odor for their bottled coconut oil product, after successful testing of the local and export markets using a commercial deodorizer located in Auckland, New Zealand. In view of this, it was then proposed to the Board to translate the research results to be utilized by our communities for their coconut oil refinement activities, given raw materials to develop and establish a small scale filtration process are available locally and at reasonable prices. It was further proposed to the Board for the remaining funds from this project to be reallocated towards the procurement of the margarine making machine under the avocado margarine project. The Board collectively endorsed the reallocation of the remaining funds from the coconut oil refinement project to contribute towards the procurement of the margarine making machine.

Subsequently, the coconut oil refinement project completion report was presented at the CDC meeting held in June 2016. The project objective was not achieved in its entirety, in that a feasible commercial filtration process has not been realised. Nevertheless, SROS deemed that the developed filtration process can be applied and replicated at the community level as an economic development activity to enhance the livelihoods of rural households, women and/or youth groups. Consequently, CDC approved for SROS to utilise the remaining project balance of SAT$270,769 to assist with the replication of the developed filtration process to interested stakeholders at the community level, and the procurement of a pilot scale margarine making machine for the completed Margarine project, which CDC in its "Economic Sector" meeting held in November 2015, had approved in principle the utilisation of the remaining funds of SAT$204,019 from that project, for the same purpose.
A sample of the SROS refined coconut oil was sent to Assure Quality Laboratory in Auckland, New Zealand, for independent complete analysis of essential nutritional values to support the promotion of the oil to interested processors and users locally and abroad, and the results are given in table 11.

Table 11: Independent complete analysis of SROS refined coconut oil undertaken by Assure Quality Laboratory.

Test (unit)	Result
Density (g/mL)	0.91
Ash (%m/m)	<0.1
Energy (kcal/100g)	884
Fat by Difference (%m/m)	99.86
Moisture (%m/m)	0.13
Protein (%m/m)	<0.1
Vitamin D3 – Food (IU/100g)	1520
Vitamin A (IU/100g)	<3

Test (unit)	Result
Fructose (%m/m)	<0.1
Glucose (%m/m)	<0.1
Anhydrous lactose (%m/m)	<0.3
Maltose (%m/m)	<0.1
Sucrose (%m/m)	<0.1
Total sugar (%m/m)	<0.1
Galactose (%m/m)	<0.1
Calcium (mg/kg)	<0.91
Magnesium (mg/kg)	<0.28

d) Avocado Margarine

Trials for finding an acceptable blend to produce a good margarine product continued with the green distinctive avocado colour and taste predicted to differentiate it from other margarine products. Trials have also produced margarine using coconut oil and coconut water as another potentially commercially viable margarine product.

In the CDC meeting held in November 2015, the avocado margarine completion report was approved, and it was also approved in principle to utilize the remaining project funds of SAT204,019 to procure a pilot scale margarine making machine (40kg margarine/hour). The machine will help alleviate the lack of stable crystal formation during margarine production, as the laboratory equipment currently used to make the margarine are unable to bring the two phases (water & oil phases) to the right crystal forms.

The SROS developed avocado and coconut margarine prototypes were tested (general appearance, taste & smell) during the SROS Stakeholders' consultation on its new Corporate Plan 2017-2020 that was held in April 2016. The sensory results are given in table 12. The results show that the SROS developed coconut margarine prototype was preferable by the tasters compared with its avocado equivalent in terms of general appearance, taste and smell.

After the stakeholders' consultation, the locally owned Krissy Company expressed interest to commercially produce the coconut margarine in partnership with SROS, and negotiations are in progress.

Table 12: Results from the sensory evaluation of SROS avocado and coconut margarine prototypes undertaken during the SROS Stakeholders consultations in April 2016 (n = 23).

Rating	SROS margarine prototype	
	Coconut	Avocado
<u>GENERAL APPEARANCE:</u>		
Excellent	18	10
Good	5	12
Average	0	1
Poor	0	0
<u>TASTE:</u>		
Excellent	17	15
Good	4	6
Average	2	2
Poor	0	0

SMELL:		
Excellent	16	12
Good	4	10
Average	3	1
Poor	0	0

3.2.4 Technical Services Division (TSD)

The TSD is responsible for Output 5 – Commercial Technical Services – which provides the technical analyses, to support the private sector and exporters in their efforts to expand primary food production, manufacturing/processing and the service industries.

The following sections highlight work in progress of TSD during this financial year.

a) Accreditation

The annual surveillance assessment of our internationally accredited Chemistry and Biological testing laboratories was conducted in November 2015 by International Accreditation New Zealand (IANZ) for compliance and conformity of SROS testing laboratories with the requirements of the international standard for testing laboratories, NZS ISO/IEC 17025:2005. After the assessment, our testing laboratories were found to comply with in-house procedures and accreditation criteria, and were subsequently recommended to continue with accreditation status. Laboratory staff members were commended for the positive outcome of the assessment in that only two corrective actions were found, and had already been addressed.

In July 2015, two Managers of SROS attended training workshops on "Testing Laboratories Management and Quality Assurance in Laboratories" in Suva, Fiji. The training outputs from the workshops are facilitating our work on quality assurance standards and implementing ways to properly manage the laboratories and sustain their accreditation status.

The SROS testing laboratories continued to participate in two international inter-laboratory competency programmes (ILCPs), namely the Global Proficiency Testing Programme (GPTP) and Food Analysis Performance Assessment Scheme (FAPAS). The former programme validates the performances of our accredited methods for meat chemistry, dairy chemistry, food microbiology, water microbiology and pathogens, whereas the latter validates for histamine and mercury analysis in food. The Chemical testing laboratory performed well and received good results for meat chemistry analysis, while the Biological testing laboratory did not participate in any of the microbiological analysis.

b) Narcotics Analysis

The SROS Narcotics Laboratory continued to provide its service for narcotic analysis to assist the MOP and AGO with court cases related to narcotics crimes under the Narcotics Act 1967, by providing confirmatory and purity analysis for suspected drugs and our analysts attend court cases to testify as expert witness in court. Currently, our Narcotics Laboratory has the necessary capacity (analytical instruments and expertise) to test for *Cannabis*, methamphetamine and its precursors, and can extend to other controlled drugs.

The Narcotics Laboratory also produced a brochure detailing the types of narcotics analysis we can do and allied analysis costs, to promote to potential clients, especially drug enforcement agencies, in other Pacific island countries via the website of Samoa's National Prosecution Office (NPO).

In addition, these services are expected to expand to cover narcotics analysis in biological samples such as urine. The narcotics analysis in biological samples is one of the essential components of the Alcohol and Drugs Court that was recently established by MJCA. In association with this, the Institute of Environmental Science and Research (ESR) in New Zealand, has been approached to conduct trainings for SROS Narcotics Analysts, and assist with the setup of such analysis services for SROS to provide. The

trainings will build the capacity for SROS analysts in regards to drugs analysis in biological samples. The training will mainly focus on sampling of biological samples from suspects and analysis for specific drugs in the submitted biological samples. The negotiations between MJCA, ESR and SROS for a training programme are in progress.

c) Bottled Water Monitoring Programme with MOH

The SROS Biological testing laboratory is still being utilised by MOH to conduct microbiological analysis of bottled water samples as part of the latter's ongoing monitoring of the quality and safety of bottled water produced by various bottled water companies for human consumption, and for compliance to the Samoa National Drinking Water Standards (SNDWS). During this financial year, a total of 231 bottled water samples were received from MOH for analysis and test results indicated that about 18% (or 42) of the samples received and tested were non-compliant with higher than normal counts for Total Coliform, Total Faecal Coliform and *E. coli*.

It is expected that the bottled water companies will be directly submitting their bottled water samples to SROS and pay for the microbiological analysis, under a revised arrangement which is yet to be finalised, instead of submitting their samples via MOH to pay for the analysis.

d) SPC-Funded Soil Biodiversity Project

Australian Government
Department of Foreign Affairs and Trade

The biological analysis to determine the effects of the biochar and *Mucuna* treatments on microbial activity in soils have been completed, and the end-of-project report is being written. It is expected that this report will be completed and submitted to SPC by the end of 2016.

e) MNRE-funded Waterfront Project

The SROS formalized an agreement with MNRE to the value of SAT$48,000 for the former to provide water quality analysis to monitor the water quality environment of the Apia Waterfront. The water quality of the Apia Waterfront is determined by the microbial assessment using two fecal bacteria indicators, namely *Escherichia coli* (*E. coli*) and *Enterococci.* The two indicator bacteria provide a measure of the likely risks of the Waterfront water environment (fresh and sea water) to human health. *E. coli* is the preferred indicator fecal bacteria in fresh water and *Enterococci* is the preferred indicator fecal bacteria in sea water.

Sixteen (16) sites were pre-selected for this monitoring activity with 30 samples to be collected from each site during the life of the agreement. The baseline data to be generated from this monitoring activity will enable MNRE to make informed decisions about certain activities that could be implemented at the Apia Waterfront. At the end of this financial year, 12 rounds of sampling have been completed and 192 samples were received and analyzed. The results were compiled and submitted to MNRE for their purposes.

f) Other technical service related activities

- Funded by the TCM/EIF Tier 2 project on value added products from cocoa and coconuts to the value of USD$30,000, testing capabilities (test methods, analytical instruments and consumables)

for quality and safety parameters of cocoa beans and cocoa products are expected to be established by the end of 2016.

- Funded by the MNRE MDG (NE: 1-9092-R77) as per FK(15)27 to the value of SAT$90,000, testing capabilities (test methods, analytical instruments and consumables) for pesticide residue analysis of water are expected to be established by the end of 2016.

- Funded by the FAO TCP/SAM/3503 ("Improving the capacity of small farmers to market a consistent supply of safe, quality food") to the value of USD$76,720, testing capabilities (test methods, analytical instruments and consumables) for pathogen identification/quantification and pesticide residue analysis of primary food production (mainly fruits and vegetables) are expected to be established by the end of the first quarter of the next financial year.

3.3 Progress in achieving the Corporate Plan (CP) for the year

During this financial year, significant technical progress has been achieved, critical strategies to facilitate the translation of technical developments into products and services suitable for uptake by relevant stakeholders have advanced considerably, and operational procedures continued to be improved. SROS nevertheless continued to seek to improve its ability to achieve its mandate and objectives as outlined by the SROS Act 2008 and Corporate Plan 2014-2017.

Corporate Plan Priority Objectives	Activity Outcomes
• To promote the national economy of Samoa based on research and development.	• Ongoing negotiations with the local private sector and overseas food manufacturers to develop the international market for breadfruit flour and avocado oil. • Development of a cost-effective processing pathway for frozen taro completed and ongoing promotion of frozen taro products locally and abroad. • Development of a cost-effective processing pathway for frozen fresh and baked breadfruit and breadfruit fries completed. • PHAMA-funded cocoa drying and fermentation project completed. • ACIAR- funded regional Fruit Tree Postharvest Handling Systems project in progress. • FAO funded consultancy work on postharvest losses and food safety in progress. • TCM EIF Tier 2 project on value adding for cocoa and coconut in progress. • Development of a concept for a small fish cannery for Samoa in progress.
• To undertake scientific and technical research with the primary aim of adding value to local resources and services.	• Research to develop a process for the purification of coconut oil as cooking oil partially completed. • Research to optimize a vanillin extraction process from dried vanilla pods in progress. • Research to identify potential locally available fruits as raw materials to develop a process for making fruit spirits in progress.

• To develop functional prototypes of products and processes based on scientific and technical research for the local or overseas markets.	• Research to develop a process to make a margarine product using avocado and coconut oil blends in progress. • Research on essential oil extraction from selected fragrant plants grown locally in progress. • Evaluation of a locally fabricated solar drier for drying breadfruit slices and cocoa beans in progress.
• To establish partnership with the private sector and commercial interests to support the Organisation's activities.	• SROS membership and participation in the SCCI and SAME monthly meetings, promoting SROS research and technical laboratory capabilities and engaging in product development forums. • Promoting SROS developed products abroad in collaboration with Pacific Trade an d Invest (Auckland, New Zealand) and Pacific Islands Centre (Tokyo, Japan). • One-on-one meetings held with potential business partners and/or up-takers of SROS technologies associated with SROS's avocado oil and gluten-free breadfruit flour, and other product development activities initiated by the small business partners. • Discussions with MJCA to establish SROS testing capabilities for alcohol and drug levels in biological samples in progress. • Requests from PUMA for water sampling and analysis for EIA purposes (e.g., MNRE/PUMA Waterfront project) ongoing. • Samples from local manufacturers for both chemical and microbiological analysis ongoing. • Monthly MOH-coordinated microbiological testing of bottled water samples for compliance to national drinking water standards; • Testing of wastewater for both government ministries and local manufacturers ongoing. • Stakeholders' consultation to develop SROS Corporate Plan 2017-2020.
• To ensure effective training for researchers and technical research.	• Regular in-house training of SROS technical staff in chemical and microbiological tests, calibration methods, and research methods. • Overseas training of SROS research staff on research related skills and techniques. • Partnership with University of Sunshine Coast, Queensland, Australia for and FAO-funded consultancy on postharvest losses and food safety, and ACIAR-funded Tropical Fruit project. • Ongoing formal training of SROS scientists with VUW via a MOC: o Seeseei Molimau-Samasoni (Principal Research Scientist, PFTD), PhD studies, VUW, March 2013-May 2016; o Annie Toailoa (Principal Research Scientist, PFTD), MSc studies, VUW, February 2015-November 2016; and, o Luanda Ainuu (Senior Research Scientist, TSD), PGD studies, VUW, July 2015-November 2016. • Partnership with NZ VSA on volunteers to support the commercialization activities of SROS [Sililo Iuli (Jan-May 2016)] • Partnership with distinguished international scientists to

	support the research activities of SROS [Professor Ron Wills (postharvest technologies; ongoing); Dr Ron Bowrey (oil and margarine processing; ongoing)].
• To augment and effectively manage financial and human resources of the Organisation.	• Facilities and asset register are maintained, and necessary repairs completed according to set schedules. • Financial position updated for monthly review by the Management. • Performance feedback to individual staff formally provided once a year via the staff performance appraisal process. • Delay in completion of quarterly and annual reports.

3.4 Overview of financial performance and financial results for the year

3.4.1 Financial – Key Performance Measures

The figures shown in table 13 below are the different revenue streams SROS has generated during this financial year in order to achieve its targeted Cost Recoveries of $148,988. It is also noted below that SROS has exceeded its overall collection for this financial year against its target by $145,958 or 98%, which is an increase of 40% in collections when compared to $211,200 from the previous financial year. We also would like to highlight that TSD exceeded its target by 21% when compared to its target recoveries, while Biodiesel sales recorded only a 1% collection, as the joint promotion of biodiesel as an environmentally friendly alternative by SPREP, MNRE, STEC and SROS, ceased early in this financial year consequently resulting in no more sales of the biodiesel.

The collection shown below does not include SROS's ability to secure additional funding through research grant funding assistance.

Table 13: Revenue generated in this financial year compared to the last financial year.

Revenue Streamline	FY2015/2016		FY2014/2015	
	Amount	Cost Recoveries Target	Amount	Cost Recoveries Target
Technical Services	166,769	137,540	128,981	128,540
Biodiesel Sales	124	11,448	48,150	10,493
Sale of Breadfruit Flour	268	-	14,646	-
Consultancy Fees	0	-	11,280	-
Other Income	127,786	-	8,143	-
Total	**$294,946**	**$148,988**	**$211,200**	**$139,033**

3.4.2 Total Revenue

Total revenue received for the year was $3,905,365 of which $3,334,494 (85.4%) consists of Government Grant and remaining $570,871 (14.6%) from the different avenues listed below under Other Income and its comparison to the previous year as highlighted in table 14:

- $166,769 Technical Services
- $5,934 SPC/PARDI Fund
- $9,161 Coconut Oil Refinement Fund
- $10,648 Avocado Margarine Fund
- $17,868 PHAMA Frozen Taro Project Fund
- $6,464 PHAMA Cocoa Fermentation Project Fund
- $24,019 FAO Consultancy Fund
- $63,205 TCM EIF Tier II Project Fund
- $8,590 Photosynthesis Bacteria Research Fund
- $105,931 ACIAR Project Fund
- $24,104 Amortisation Income
- $124 Sales Biodiesel Fund
- $268 Sales Breadfruit Flour – Gluten Free Fund
- $127,786 Other Income

Table 14: Details of Other Income for this financial year compared to the last financial year.

	FY2015/2016 SAT$	**FY2014/2015 SAT$**
Technical Services	166,769	128,981
Secretariat of the Pacific Community / PARDI fund	5,934	17,547
Coconut oil refinement fund	9,161	(1,244)
Avocado margarine fund	10,648	31,172
PHAMA Frozen Taro Project fund	17,868	21,686
PHAMA Cocoa Fermentation Project fund	6,464	12,640
FAO Consultancy fund	24,019	-
TCM EIF Tier II Project fund	63,205	-
Photosynthetic Bacteria Research fund	8,590	-
ACIAR Project Fund	105,931	-
Turkey Grant - Ethanol Project fund	-	10,703
Amortisation Income	24,104	2,009
Sales Biodiesel fund	124	48,150
Sales Breadfruit Flour - Gluten Free fund	268	14,646
IUCN Biodiesel fund	-	6,199
Republic of Korea funds - Fruit Wine fund	-	18,248
Turkey grant - Breadfruit project fund	-	17,450
Consultany fees	-	11,280
Other income	127,786	8,143
TOTAL OTHER INCOME	**570,871**	**347,609**

Highlighted below are the total grant funds remaining which are classified as “Deferred Income” under current liability in the Balance Sheet and also under Note 18 in the Notes to the Financial Statement for projects held by MOF, until such time these funds are fully utilized for research project purposes. These include:

- $125,197 SPC & PARDI Projects
- $270,769 Coconut Oil Refinement Project
- $194,183 Avocado Margarine Project
- $5,963 PHAMA - Frozen Taro Project

- $3,214 PHAMA -Cocoa Fermentation Project
- $72,190 FAO Consultancy Project
- $71,857 TCM EIF Tier II Project
- $8,000 Photosynthesis Bacteria Research Project
- $63,000 Water Supply & Sanitation Project – MNRE
- $12,725 Biomedical Research Project – US Embassy
- $94,407 SIDS Assets donated to SROS
- **$921,505** **Total Deferred Income**

- $51,829 Turkey Grant – Ethanol Project
- $23,283 IUCN Biodiesel Project – MNRE
- $5,567 Turkey Grant – Breadfruit Project
- $283,306 Republic of Korea – Fruit Wine Project
- $26,154 Japanese Embassy Orchid Propagation & Essential Oil Extraction
- 47,735 ACIAR funded Regional Fruit Tree Project
- **$437,874** **Total Project Grants held by MOF**

As a public beneficiary body reliant on Government grant and funding from external donor agencies, SROS continues to strive to effectively manage its financial resources and strengthen its earning capacity. We would also like to note the additional donor funds secured in this Financial Year 2015/2016 of $105,931 for the Regional Fruit Tree Project funded by ACIAR for a period of four years.

3.4.3 Total Expenditure

The overall expenditure of $3,577,590 was incurred during this financial year which is within the budgeted forecast of $3,677,449 as summarized in table 15.

We note a positive variance although a decrease compared to the positive variance recorded in the previous financial year. This is due to controlled spending under Administrative costs and savings under Personnel costs for the year. Similar to previous years, we note the high spending items compared to the budget forecast for the year as seen largely under Other costs of $334,754. This was mainly due to the increase in project spending to the amount of $251,821 detailed in note 16 of the financial statements. This is only a 9% increase in Other costs actuals compared to the previous financial year.

Table 15: Total Expenditure for this financial year compared to the last financial year.

Expenditure Particulars	FY2015/2016				FY2014/2015		
	Actual	Budget	Variance	%	Actual	Budget	Variance
Audit fees	19,300	8,004	(11,296)	-141%	9,550	8,004	(1,546)
Audit fees-FY14/15 under-accrued	4,279	-	(4,279)	-100%	-	-	-
Directors fees & board expenses	66,476	48,000	(18,476)	-38%	40,456	15,600	(24,856)
Depreciation	266,483	230,000	(36,483)	-16%	226,993	871,780	644,787
Personnel costs	1,753,181	2,232,061	478,880	21%	1,742,435	1,950,047	207,612
Occupancy costs	308,199	300,030	(8,169)	-3%	255,282	350,000	94,718
Administrative costs	405,427	439,864	34,437	8%	513,356	501,762	(11,594)
Other costs	754,245	419,490	(334,754)	-80%	690,203	434,245	(255,958)
	$ 3,577,590	**$ 3,677,449**	**$ 99,859**	**-349%**	**$ 3,478,275**	**$ 4,131,438**	**$ 653,163**

The above table also shows an overall increase in total actual expenditure by $99,315 or 3% in this financial year compared to the last financial year, and this is due to the increase noted in Depreciation ($39,168), Occupancy costs ($52,918) and Other costs ($64,042).

3.4.4 Statement of Financial Position and Income and Expenditure Summary

Table 16 below provides a snap shot of SROS's Financial Position/Balance Sheet and its Statement of Income and Expenditure/Profit and Loss with detailed notes outlined in the audited financial statements section of this report.

It is noted in table 16 the surplus of $327,775 for this financial year which is again an increase compared to the previous financial year's surplus of $170,236.

The table also portrays that SROS has achieved its target current ratio of 2:1 (current assets vs current liabilities) at the end of this financial year, which dropped to 2.1:1 compared to 2.3:1 in the previous financial year's ratio. This is due to the increase in Current Assets by 36% followed by a subsequent increase in Current Liabilities by 47% for the Organisation. Even though this positive ratio ensures SROS will meet its short term obligations/liabilities, we are still determined to continue to find alternative revenue streams to assist the Organisation's funds for its on-going activities.

Table 16: Statement of Financial Position and Statement of Income and Expenditure for this financial year compared to the last financial year.

	FY2015/2016		FY2014/2015	
PARTICULARS	**ACTUAL**	**BUDGET**	**ACTUAL**	**BUDGET**
Revenue	3,334,494	3,334,495	3,300,902	3,266,703
Other Income	570,871	280,689	347,609	139,033
Total Income	**3,905,365**	**3,615,184**	**3,648,511**	**3,405,736**
Expenditure	3,577,590	3,677,449	3,478,275	4,038,498
Net Profit	**327,775**	**(62,265)**	**170,236**	**(632,762)**
Current Assets				
Cash and cash equivalent	2,254,712	1,336,552	1,383,557	1,256,656
Debtors	152,435	69,642	337,505	73,307
Prepayments	37,773	6,427	31,146	6,765
Stock on hand	137,121	157,703	150,912	225,687
Total Current Assets	**2,582,041**	**1,570,323**	**1,903,120**	**1,562,415**
Non Current Assets	2,354,819	2,347,258	2,322,420	2,260,522
Total Assets	**4,936,860**	**3,917,581**	**4,225,540**	**3,822,937**
Current Liabilities				
Trade Payables	116,441	7,892	6,263	10,419
Accruals	108,493	64,456	51,156	85,093
Allowance for staff benefits	58,950	63,693	57,771	71,896
Deferred income	921,505	699,752	706,654	784,904
Total Current Liabilities	**1,205,389**	**835,792**	**821,844**	**952,312**
Working capital	1,376,652	734,531	1,081,275	610,103
Current Ratio	2.1:1	1.9:1	2.3:1	1.6:1
No of employees	**52**		**52**	

3.5 Capital Expenditure and Projects for the Financial Year

Overall we note a decrease of about 25% in Capital investment for the Organisation in this financial year when compared to the previous financial year (table 17).

The major capital investment made in this financial year is under Motor Vehicles for the procurement of the new Double Cab vehicle co-funded by the Government of Samoa and ACIAR of $105,000 and Office and Other Equipment of $88,651, these were mainly for two printers at $29,000, SROS server upgrade $20,999, three replacement laptops for Manager AFD, Manager ERED and CEO $9,496, security cameras for Narcotics and other SROS assets $8,919, three replacement weedeaters $6,056, relocation of the PABX system $5,274 and the professional camera for Office visits and promotional activities $4,011.

The total investment under Building and Roads amount to $69,052, this includes the cost of materials and labour for the building of the SROS Nursery for Orchids to the amount of $53,292 and the rest was for the Narcotics security door ($6,477) and the release of the 10% retention fee for the road resealing at Nafanua ($9,283).

Table 17: Capital Expenditure during this financial year compared to the last financial year.

PARTICULARS	**FY2015/2016**	**FY2014/2015**	
	ACTUAL	**ACTUAL**	**VARIANCE**
Building & Roads	69,052	116,546	(47,494)
Furniture and Fittings	4,157	69,701	(65,544)
Laboratory Equipment	32,023	48,033	(16,010)
Office & Other Equipment	88,651	82,255	6,396
Motor Vehicles	105,000	80,000	25,000
			-
Total Capital Expenditure	**298,883**	**396,535**	**(97,652)**

Other capital additions recorded under the different asset classifications are highlighted below:

Laboratory Equipment include the Cathode Lamp, $1,028 for testing; V400 Hitachi for fruit ripeness testing, $1,849; Viscometer 2-Cannon Calibrated for testing, $1,496; and the HPLC set for Fruit Spirits project testing, $27,650.

Lastly we note spending under Furniture and Fittings which include the Nursery benches to the value of $3,358 and cupboards for the PFTD to the amount of $799.

3.6 Human Resource Development

Staff development activities undertaken in the financial year comprised of overseas and local workshops, courses and seminars attended by SROS staff. They include the following:

28th June – 2nd July 2015: Tuimaseve Kuinimeri Asora-Finau (Manager, PFTD) attended the PARDI Impact workshop and Market Day event held in Suva, Fiji. Moafanua Tolo Iosefa (SPC taro breeder)

presented on behalf of Samoa's project team (MAF, SROS & USP-SAFT) along with Valerie Tuia of SPC, the Project Coordinator. The Market Day event was held on the second day whereby products and services were on display for all participants to witness and sample. Samples from SROS that were showcased at the event included breadfruit and taro flours and fruit spirits.

3rd – 13th July 2015: Tuimaseve Kuinimeri Asora-Finau (Manager, PFTD) attended a one-week international symposium on Breadfruit hosted by the University of West Indies, Trinidad and Tobago. The workshop focused on research and value adding activities and a poster on SROS's product development efforts on producing flour from breadfruit was displayed. Researchers, academics and business entrepreneurs from the Pacific, Africa, South America and Caribbean regions attended and presented on the work they have and are presently implementing utilising the breadfruit. In addition to Tuimaseve, the Pacific delegation included one representative from Fiji and three researchers from SPC. Their participation were funded by the European Union Pacific Agriculture Policy Project (EU-PAPP) coordinated by SPC.

6th – 10th July 2015: Pousui Dr Fiame Leo (Manager, TSD) attended the Laboratory Quality Assurance workshop held in Suva, Fiji which was funded by EU.

7th – 9th July 2015: Lilo Samani Tupufia (Manager, ERED) attended a workshop on Ecosystem Conservation and Sustainable Development in SIDS, held in Jeju Republic of Korea which was funded by UN.

12th – 18th July 2015: Mamea Samuel Ieremia (Manager, AFD) attended the Laboratory Management Workshop held in Suva, Fiji which was funded by EU.

15th July 2015: Tilafono David Hunter (CEO), Siope Pele, Semua Militini and Alfram Nukuro (scientists, PFTD) attended a workshop on CODEX and GAP/HACCP, held at Tanoa Tusitala, which was hosted by FAO. The SROS team presented their key findings on food safety issues for selected leafy vegetables as part of the consultancy with FAO.

28th July – 21st August 2015: Fauono Sina Mualia (Business Development Specialist) attended a seminar on Small and Medium Enterprise Development of Samoa held in Shanghai, China which was an opportunity made possible through SAME and funded by the People's Republic of China. The seminar consisted of both lectures and field trips that covered areas such as China's national and economic situation, SMEs' development and current situation analysis, construction of innovative mechanism and service system of China's SMEs, overseas investment and cross-border mergers and acquisition of Shanghai SMEs and their financial services.

6th August 2015: Mamea Samuel Ieremia (Manager, AFD) attended the Public Administration Sector Plan 2014-2018 Annual Review consultations that were hosted by PSC.

20th August 2015: Sosefina Luamanuvae (Senior Finance Officer, AFD) attended the second Customs awareness session on Excise Rates Increase coordinated by MfR. The purpose of the session was basically to raise public awareness and discuss goods that have social, health and environmental impacts, and encourage shift to renewable energy sources.

2nd September – 27th October 2015: Sara Vaai-To'omata (Research Scientist, ERED) and Alesana Malo (Professional Officer, IRD) attended the 2015 Training Course on Biotechnology Application in Food Industries for Developing Countries, which was held in China and funded by the People's Republic of China. The training covered developments and achievements by China in food biotechnology.

20th – 26th September 2015: Tuimaseve Kuini Finau-Asora (Manager, PFTD) visited Devonport Chocolates Ltd in Auckland, New Zealand, to sight the processing equipment and learn the processes necessary for implementing the cocoa research activities funded by MCIL-coordinated EIF Tier 2 project.

13th – 16th October 2015: Telesia Ah Sam, Senior Administration Officer of AFD, was nominated to attend a 4-days training for HR Trainers at PSC to further develop training skills of HR personnel as well as to increase the pool of qualified HR trainers to continue with training.

16th October 2015: Helmy Sasulu, Technical Officer of TSD, and Semua Militini Tagoai, Professional Officer of PFTD, were nominated to attend Quality Management Systems (ISO9001:2008) workshop. The training covered quality management, administration, sales and marketing, and products and services. The workshop aimed to build good control of assets and effective values of gaining accreditation.

19th – 23rd October 2015: Ilo Faavaoga, Groundsman of AFD, was nominated to attend training on the rights of persons with disabilities provided by SCCI. The training raised the awareness of the private sector regarding the International Convention on the Rights of Persons with Disabilities. The workshop provided a clear understanding of what convention is and it also highlighted general principles, rights and social inclusion of persons with disabilities.

16th – 20th November 2015: Notise Faumuina, Principal Research Scientist of IRD, was nominated to attend GAP/HACCP training course by SCCI in partnership with FAO. The course covered mainly practical on-farm management needs, good agriculture practice (GAP) and practical postharvest training, hazard analysis and critical control point (HACCP) training and support. The workshop aimed to build the capacity of commercial farmers, development of practitioners and professionals from NGOs on issues related to facilitating simple GAP/HACCP applicable to Samoa's context.

8th – 9th December 2015: Sara Vaai To'omata, RS of ERED, attended the two-days training on assessing biodiversity impacts through the EIA process. The training was a follow up on the inaugural joint PUMA-SPREP EIA workshop which was held in February 2015. EIA is a two-way process to strengthen participant skills in EIA scoping and review.

29th February 2016: Moon Chan (Principal Research Scientist, ERED) attended a two-day workshop hosted by SCCI called the "Public Sectors Project Management", which was held at Hotel Elisa. The objectives of the workshop were to describe project management as well as its key principles for application to work projects while also identifying areas for complications so contingency plans may be made. Project Management encompasses initiating, planning, executing, controlling and closing the work of a team to achieve specific goals and meet specific success criteria.

25th – 26th February 2016: Helmy Sasulu (Assistant Research Scientist, TSD) and Fiaigoa Malolo (Assistant Research Scientist, TSD) attended a "Technical Training on Hazardous Waste Management" organised by MNRE and held at Hotel Elisa. This training targeted all relevant key stakeholders that are involved with the main aspects of chemical and hazardous waste in Samoa. It will also serve as a basis for strengthening cooperation amongst key stakeholders, to identify ways for safely treating, transporting and disposing of hazardous wastes.

14th – 18th March 2016: Telesia Ah Sam (Senior Administration Officer, AFD) and Mamea Samuel Ieremia (Manager, AFD) attended a five half days workshop on ICT Business Management organised by

SCCI for further skills development in human resources, marketing and finance for public and private businesses/organisations.

21st – 23rd March 2016: Fauono Sina Mualia (Business Development Specialist, SROS), Moon Chan (Principal Research Scientist, ERED) and Fonoti Samani Tupufia (Manager, ERED) attended the Workshop for the Protection of Intellectual Property (IP) in Samoa organised by MESC, MCIL, SPC and PIFS. The workshop was part of the EU-ACP "Enhancing the Pacific Cultural Industries, Fiji, Samoa and Solomon Islands" project, managed by SPC's Social Development Division in collaboration with PIFS and MESC. Its main purpose was to bring all cultural industry stakeholders in Samoa together, including the public, private and civil society sectors, to map out the future directions of the industries in relation to IP by assessing current challenges and issues, and proposing solutions and ways forward. The workshop was held at Hotel Elisa.

21st – 24th March 2016: Janet Scanlan (Administration Officer, AFD) attended the Samoa In-Country Training hosted by PSC on "Basic Office Administration". The main objective of this training was how to apply administration key principles to day-to-day tasks for improvement. Also, to identify and solve some of the challenges faced which can contribute to the success of the organisation/ministry, and to understand the duties and responsibilities of an Administration Officer.

8th April 2016: Fauono Sina Mualia (BDS, SROS) and Helmy Sasulu (Assistant Technical Scientist, TSD) attended the SAME HACCP/Food Safety Management Systems Training.

20th April – 10th May 2016: Phillip Reti (Senior Technical Scientist, TSD) attended the Seminar on Bamboo and Rattan Standardization for Developing Countries, held in Beijing, China. The Seminar encouraged the participation of officials from developing countries to engage in areas like forestry, natural resources, science and technology in developing the use of bamboo and rattan trees.

2nd – 20th May 2016: Semua Militini Tagoa'i (Research Scientist, PFTD) attended the course on "Quality, Safety and Post-Harvest Handling of Organic Crops" that was hosted by the Government of Italy. The course basically focused on quality assurance, safety of agricultural products starting from farm to consumer. It also discussed the aspects of food quality in relation to the main international market requirements. Organic farming was an ideal farming method operated under GLOBAL GAP (good agricultural practice) strategies. Its goal was to produce a wide variety of high quality organic food products by processes which do not harm the environment, human health or welfare of plants and animals. This will helped to reduce exposure to food and product safety, reputational risks, gain access to local and global market suppliers and retailers, improve the efficiency of farm management, save costs and comply with legislation of food safety and environmental protection.

28th May – 28th June 2016: Julian Wong Soon (Principal Research Scientist, ERED) attended a staff mobility scholarship program funded under EU CARIBU program in which SROS is an associate partner in. The exchange was between SROS and Mendel University in the Czech Republic. The training focused on the utilization of essential oil in antiseptic research.

6th – 7th June 2016: Fonoti Samani Tupufia (Manager, ERED) attended the Pacific Energy Conference held in Auckland New Zealand which focused on the key energy issues the Pacific is facing. Topics included access to electricity, financing higher levels of renewable energy, innovative technologies and response and adaptation to climate change.

7th – 8th June 2016: Seeseei Samasoni (Principal Research Scientist, PFTD) attended a two-day Stakeholders Consultation Workshop on Antimicrobial Resistance (AMR) National Plan, which was

coordinated by MOH. Antimicrobial resistance is an ever-increasing problem around the world and a Global Action Plan was prepared and was endorsed in 2015, highlighting the need for WHO member countries to prepare national action plans to combat this issue.

8th – 24th June 2016: Fiti Laupua (Research Scientist, ERED) and Fiaigoa Malolo (Assistant Technical Scientist, TSD) attended a field work and training with SPC technical experts on field plotting exercise and assessments at STEC Mulifanua for biomass project funded by EU GIZ.

9th June 2016: Fauono Sina Mualia (BDS, SROS) attended the MCIL workshop on business model facilitated by TDI.

21st June 2016: Dr Sarah Buckhart (University of Sunshine Coast, Australia) gave a presentation to SROS scientists on non-communicable diseases in Samoa.

28th – 30thJune 2016: Tilafono David Hunter (CEO, SROS) attended with the VC and senior academic staff of NUS, the PECENET PLUS bi-regional platform meeting in Nadi, Fiji. The objectives of the platform meeting were to: deliver the outcomes of the seed funding as well as all the think tanks; deliver the outcomes of innovation activities; discuss the policy recommendations that have been already elaborated in the framework of the project, to contribute to the visibility of research in ST&I for development within the Pacific regional policy instruments, and; agree on an Action Plan dedicated to implement a sustainable institutionalised High Level Dialogue Platform in ST&I between the two regions – EU and Pacific.

3.7 Staff Movements during this Financial Year

3.7.1 Departures

Tulia Molimau-Alesana was hired in July 2008 as a Research Scientist under the Plant & Food Technology Division and resigned on the 28th August 2015 as Principal Research Scientist of the Industrial Research Division, take up a new challenge at Paradise Beverages.

Isamaeli Time was hired in June 2014 as a Senior Research Scientist under the ERED and resigned on the 11th September 2015 as the Principal Research Scientist within the same division, to take up a new post at STA.

Fa'amoetauloa Tuese Tulia was hired as the Senior Maintenance Officer under AFD and resigned on the 9th October 2015 as the Senior Leading Hand/Maintenance Officer of AFD to take up a blessed opportunity to serve the Lord.

Oiner Nafatali Vaeau joined SROS in October 2012 as a Technical Officer and later promoted to Research Scientist of ERED. She resigned on the 23rd October 2015 due to family reasons/migration to Australia.

Kenji Sakamoto, a Senior Volunteer from JICA Japan was assigned to work with SROS in 2014. He contributed substantially in SROS research activities including orchid propagation, biomedical and essential oil, as well as imparting his technical knowhow to SROS scientists. He departed SROS on the 6th January 2016 when he completed his 2 years as a volunteer.

Nadia McFall was hired in August 2013 as a Professional Officer under IRD. She resigned on 5th February 2016 as the Assistant Research Scientist within the same division to take up a new role as a Lecturer at NUS.

Sara Vaai-To'omata re-joined SROS in April 2015 as the Research Scientist in the ERE division and later on resigned on the 17th February 2016 to take up her new role as a Lecturer at NUS.

Luaao Fa'atili was hired in July 2010 as a Professional Officer under the IRD. She resigned from SROS on the 2nd March 2016 as the Research Scientist within the same division for greener pastures overseas with her family.

Losia Tema was recruited in November 2010 as a Groundsman under AFD. He resigned from SROS on the 25th March 2016 as the Research Assistant under the ERE division due to family priorities in Savaii.

Tinacheemarie Neru was hired in August 2015 as the Finance Officer under AFD. She later on resigned on the 27th May 2016 to take up her new role at the Gambling Control Authority.

Sililo Iuli was assigned by NZ VSA in January 2016 for a one-year placement with SROS to support the commercialization efforts, exited SROS in May 2016 for personal reasons.

3.7.2 Appointments

Moon Chan was promoted from Senior Research Scientist of TSD to Principal Research Scientist of ERED on the 7th October 2015.

Alesana Malo (Assistant Research Scientist, IRD) was seconded to TSD and promoted to Research Scientist on the 2nd February 2016.

Helmy Sasulu was promoted to Assistant Research Scientist; Faataga Jnr Faataga was promoted Research Scientist; and, Phillip Reti was promoted to Senior Research Scientist on the 2nd February 2016.

Semua Militini Tagoai is a graduate from the University of the South Pacific at Alafua and he was promoted to Research Scientist for PFTD on the 5th February 2016.

Maserota Ofoia is a graduate from the National University of Samoa and was appointed as the Assistant Research Scientist for ERED on the 8th February 2016.

Aitaua Okesene is a graduate from the National University of Samoa and was appointed as the Assistant Research Scientist for IRD on the 23rd February 2016.

Lotumaalii Sefo Iosefo is a graduate from the APTC and was appointed as the Senior Maintenance Technician for AFD on the 7th March 2016.

Linatupu Punimata is a graduate from the National University of Samoa and was appointed as the Assistant Research Scientist for ERED on the 7th March 2016

3.8 Official & Promotional Visits to SROS

28th July 2015 – Manumalo Baptist School students visited SROS as part of their Awareness Programme event to explore prospective career paths in the field of Science. Such visits satisfy one of SROS's objectives which is to promote Science as a career option for Samoan students and youth.

30th July 2015 – A group of primary school teachers from Japan via the Embassy of Japan, visited SROS to learn more about SROS's research and development activities.

16th October 2015: The Ambassador of Thailand, H.E. Maris Sangiampongsa, visited SROS to discuss potential areas in value adding and food processing that may be of interest to Thailand business people to invest in Samoa.

10th November 2015: The Minister for SROS, Hon. Fa'amoetauloa Dr. Fa'ale Tumaali'i, hosted the visit from Ms. Lizbeth Cullity (UNDP Resident Representative) and Professor Dr. Gavin Wall (FAO Sub-Regional Representative) at SROS premises to discuss funding possibilities for some of our product development and research activities, particularly margarine making equipment using locally produced avocado and coconut oils.

7th December 2015: SPC IACT Team Leader, Samu Turagacati, visited SROS for discussion on possible collaboration on trade and agro-processing opportunities and toured SROS research and technical facilities.

17th December 2015: Dr. Ghirotti from the Italian Ministry of Foreign Affairs visited SROS in connection with the IUCN project on bioidiesel that SROS is a research partner with MNRE and LTA and which is co-funded by Italy and Austria.

8th February 2016: Meeting with Yazaki Representatives from Australia on potential commercialization options for the establishment of an industrial breadfruit flour production in Samoa as part of their business diversification activities.

23rd February 2016: Emele Ainu'u & a PHAMA Consultant visited SROS to conduct a brief survey on gender equality issues involved in the production of cocoa and focusing on the involvement of women along the supply chain.

11th March 2016: Students & Staff from the American Samoa Community College visited SROS to observe research and testing facilities as part of the College's promotion of Science as a field of study and career pathway.

3rd May 2016: CEO and Management of MPE presented on the public-private partnership framework to SROS Management, and how the framework can assist SROS with its commercialization efforts with the private sector.

4th May 2016: Fauono Sina Mualia (BDS, SROS), Tuimaseve Kuinimeri Finau (Manager, PFTD), Afea Notise Faumuina (Acting Manager, IRD) and Sililo Iuli (SROS/VSA Commecialisation Advisor) visited Pacific Oil Ltd to check out their newly acquired centrifuged oil equipment.

20th May 2016: SROS Management hosted Australian based company (Living Koko Pty Ltd) and WIBDI to discuss potential future collaboration in avocado oil processing and value adding activities on cocoa.

24th May 2016: SROS Management hosted the Hope4Cancer visit which was organized by MPMC, and US Ambassador to Samoa who also visited to be briefed on the US Embassy funded biomedical screening project.

25th May 2016: SROS Management visited KRISSY Company to check out their set up/equipment/products and discuss the SROS developed margarine prototypes as a possible add on to their range of products.

13th June 2016: SROS hosted in Samoa the official launching of the Regional Fruit Tree project funded by ACIAR. The launching workshop was attended by senior representatives from the Ministry of Agriculture, Food, Forests and Fisheries (MAFFF) of Tonga, Fiji Ministry of Agriculture (MA), Pacific Community (SPC), UN-FAO, Universities of the Sunshine Coast and Queensland and SROS.

23rd June 2016: Fauono Sina Mualia (BDS, SROS) attended with Tagaloa Eddie Wilson (SAME President) the meeting with the Thai envoy, to discuss possible future collaboration for SROS and potential markets for SROS developed prototypes in Thailand.

3.9 Outlook for next year

SROS is committed to continue engaging the private sector via participation in SAME and SCCI monthly meetings, and potential local and foreign investors and donors to commercialize SROS scientifically tested product prototypes such as its gluten-free breadfruit flour, avocado oil and frozen taro technologies, as well as future product developments like refined coconut oil, avocado margarine, frozen breadfruit and breadfruit chips technologies, vanillin and essential oil extraction processes and fruit spirit making. As part of this commitment, SROS endeavors to commercialize at least one of the above-mentioned products on its own or via a public-private partnership (PPP) agreement arrangement desirably by December 2016.

The strengthening of SROS's technical service capabilities will build up SROS's accredited and non-accredited testing capacities including narcotics (*Cannabis* and methamphetamine analysis) to cater for Samoa's needs. It is also expected that these capabilities will be extended to support the testing of biological samples for the purposes of MJCA's Alcohol and Drugs Court.

Continued work in research projects and consultancy contracts mentioned in earlier sections of this report to complete within agreed timeframes, and progress to commercialisation stages.

3.10 Future risks and uncertainties

Funding sustainability and commercialization of developed products and technologies continue to be ongoing challenges for SROS given its dependence on Government and external funding for its operations and research mandate. With increasing competing funding requests made to Government and with the Government's strategy to reduce the national debt by promoting self-sustainability of SOEs and tightening annual budget provisions, the challenges for SROS are to:

- continue to strengthen its earning capacity via increased engagement in commercial activities/opportunities to achieve its mandated objectives;
- continue to scope long term research and business investment partners to pursue meaningful research activities that are industry driven and will benefit partners and the Samoan economy as a whole; and,

- develop Intellectual Property (IP) ownership to SROS scientific research outcomes which could potentially lead to an outright sale of the research results and/or some form of commercial partnership with another party to achieve financial gain.

To address the above-mentioned challenges, SROS intends to reform its IRD structure to operate as its commercial arm or establish a company to commercialize its scientific research outcomes (products and processes) for trading purposes either on its own or via a public-private partnership (PPP) agreement arrangements with interested business entity(ies). This proposal may require some amendments to the SROS Act 2008 which the Board and Management plans to complete by the end of 2016 for Cabinet and subsequent Parliament endorsement considerations.
The realignment of SROS with MAF under the leadership of the Minister of Agriculture and Fisheries should expedite the addressing of the above-mentioned challenges. Furthermore, SROS's evolving and expanding scientific research mandate also puts pressure on available resources (human, financial & infrastructure) to successfully deliver expected outcomes within specific timeframes. Having said this, SROS is committed to effectively and efficiently utilize its limited resources to achieve the best possible outcomes.

3.11 CSO implementation (where applicable)

Not applicable to SROS in this financial year.

I wish to express on behalf of Management and Staff, my most sincere appreciation to the former Minister responsible for SROS, Honourable Fa'amoetauloa Lealaiauloto Taito Nanai Dr. Fa'ale Tumaali'i, new Minister, Honourable La'aulialemalietoa Asiata Leuatea P.F. von Schmidt, former Chairman of the SROS Board of Directors, Fonoti Perelini Perelini, new Chairman, Sulamanaia Montini Ott, and all Board Directors, for their continued support and valuable guidance during this challenging year. I also gratefully acknowledge our Government and Development Partners for their continued financial investments in SROS's research mandate and activities. Last but not least, I thank the Management and Staff of SROS for their diligent work which has contributed positively to SROS's research and development efforts in this financial year.

Ma le fa'aaloalo lava

Tilafono Leatiogie David J. Hunter
Chief Executive Officer
Scientific Research Organisation of Samoa

4. Auditor's Opinion

Telephone: 27751
Fax: 24167
Email: info@audit.gov.ws
Website: www.audit.gov.ws

Please address all correspondences to the Controller and Auditor General

P.O Box 13
APIA, SAMOA

AUDIT OFFICE

REPORT OF THE AUDIT OFFICE

SCIENTIFIC RESEARCH ORGANISATION OF SAMOA

We have audited the accompanying Financial Report of the Scientific Research Organisation of Samoa (SROS), which comprises the Statement of Financial Position as at 30 June 2016, the Statements of Financial Performance, Cash Flows and Changes in Equity for the year then ended, a summary of significant accounting policies and other explanatory notes. The Accounting Firm of Betham & Co, Chartered Accountants and Business Advisors, assisted in this audit.

Excluded from the Scope of our audit.

Note 18 to the Financial Statements discloses the balances of grants that SROS carries out as an Implementing Agency. The project funds are maintained and disbursed by the Government's Ministry of Finance and therefore the transactions are not recorded in SROS's general ledger or books of account. We did not audit these particular project funds as this was outside the scope of our audit on the financial statements of SROS and therefore our audit opinion excludes the transactions of the Project Grants as disclosed in Note 18 to the financial statements.

The Responsibility of the Board of Directors for the Financial Report

The Board of Directors is responsible for the preparation and fair presentation of the Financial Report in accordance with International Financial Reporting Standards. This responsibility includes establishing and maintaining internal controls relevant to the preparation and fair presentation of the Financial Report that is free from material misstatement, whether due to fraud or error; selecting and applying appropriate accounting policies; and making accounting estimates that are reasonable in the circumstances.

Auditor's Responsibility

Our responsibility is to express an opinion on the Financial Report based on our audit. We conducted our audit in accordance with International Standards on Auditing. These Auditing Standards require that we comply with relevant ethical requirements relating to audit engagements and plan and perform the audit to obtain reasonable assurance whether the Financial Report is free from material misstatement.

An audit involves performing procedures to obtain audit evidence about the amounts and disclosures in the Financial Report. The procedures selected depend on the auditor's judgment, including the assessment of the risks of material misstatement of the Financial Report, whether due to fraud or error. In making those risk assessments, the auditor considers internal controls relevant to the entity's preparation and fair presentation of the Financial Report in order to design audit procedures that are appropriate in the circumstances, but not for the purpose of expressing an opinion on the effectiveness of the entity's internal control. An audit also includes evaluating the appropriateness of accounting policies used and the reasonableness of accounting estimates made by the Board of Directors, as well as evaluating the overall presentation of the Financial Report.

We believe that the audit evidence we have obtained is sufficient and appropriate to provide a basis for our audit opinion.

Unqualified Audit Opinion

In our opinion, the Financial Report of the Scientific Research Organisation of Samoa is in accordance with the Research and Development Institute of Samoa (RDIS) Act 2006 and Amendments, including:

1. Giving a true and fair view of the financial position of the Scientific Research Organisation of Samoa as at 30 June 2016, and of its financial performance, and cash flows for the year then ended; and

2. Complying with International Financial Reporting Standards.

Apia, Samoa
31 October 2016

Afele
Fuimaono Papali'i C.G. Afele
CONTROLLER AND AUDITOR GENERAL

5. Audited Financial Statements 2015 – 2016 Financial Year

DIRECTOR'S REPORT

THE SCIENTIFIC RESEARCH ORGANISATION OF SAMOA
DIRECTOR'S REPORT
FOR THE YEAR ENDED 30 JUNE 2016

The Directors present their report together with the financial statements of the Scientific Research Organisation of Samoa for the year ended 30 June 2016 as set out on the accompanying pages and the auditors' report thereon in accordance with the Public Finance Management Act 2001 and the Public Bodies and Accountability Act 2001.

Directors

The directors of the Organisation at any time during the financial year were:

• Fonoti Perelini S. Perelini	Chairman	(up to 8 June 2016)
• Sulamanaia Nuuetolu Montini Ott	Director	(Chairman from 8 June 2016)
• Lalauena Palagi Fetalaiga Fuimaono	Director	(up to 8 June 2016)
• Dr. Taema Imo	Director	(up to 8 June 2016)
• Dr. Satupaitea Viali	Director	
• Manuleleua Dr. Sonny Lameta	Director	
• Suluimalo Amataga Penaia	Director	
• Jewel Monica Adeline Cook	Director	(from 8 June 2016)
• Tusani Iosefatu Reti	Director	(from 8 June 2016)
• Fonoiava Sealiitu Sesega	Director	(from 8 June 2016)
• Tilafono David Hunter	Ex-Officio/CEO	

The new Board Directors' appointments were formalised on the 8 June 2016 for a term of three (3) years as per F.K.(16)22.

Principal Activity

The principal activity of the Scientific Research Organisation of Samoa is to conduct scientific research and develop technologies which outcomes are of great value in the development and sustainability of value added goods and services for export and to achieve reduction on fuel imports and greenhouse gas emissions. There has been no significant change in the principal activity of the Organisation during the year or any of the classes of business that it operates in.

State of Affairs

In the Opinion of the Directors:

(i) the accompanying Statement of Financial Performance, Statement of Changes in Equity and Statement of Cash Flows are drawn up so as to give a true and fair view of the operations and results of the Organisation for the year ended 30 June 2016.

(ii) the accompanying Statement of Financial Position is drawn up so as to give a true and fair view of the state of affairs of the Organisation as at 30 June 2016.

Operating Results

The net surplus for the year is **$ 327,775** (2015: Net Surplus **$ 170,236**)

Dated at _____ this _____ day of _____ , 2016.

Signature
Sulamanaia Nu'uetolu Montini Ott
Chairman

Apia, Samoa
28/10/2016.

Signature
Dr. Satupa'itea Viali
Director

Apia, Samoa
28/10/2016

MANAGEMENT'S REPORT

THE SCIENTIFIC RESEARCH ORGANISATION OF SAMOA
MANAGEMENT'S REPORT
FOR THE YEAR ENDED 30 JUNE 2016

MANAGEMENT'S RESPONSIBILITY FOR FINANCIAL REPORTING

The accompanying financial statements are the responsibility of Management. The financial statements have been prepared according to International Financial Reporting Standards and include amounts based on management's best estimates and judgments.

Management has established and maintains accounting and internal control systems that include written policies and procedures. These systems are designed to provide reasonable assurance that our financial records are reliable and form a proper basis for the timely and accurate preparation of financial statements, and that our assets are properly safeguarded.

The Board of Directors oversees Management's responsibilities for financial reporting. The financial statements have been reviewed and approved by the Board of Directors on recommendation from Management.

Our independent auditors (Betham & Co.), having been re-appointed by the Government Controller and Chief Auditor, have audited our financial statements. The accompanying auditors' report outlines the scope of their examination and their opinion.

Signature
Tilafono David Hunter
Chief Executive Officer

Apia, Samoa

Dated: 28/10 , 2016.

Signature
Mamea Samuel Ieremia
Manager Administration & Finance

Apia, Samoa

Dated: 28/10 , 2016.

STATEMENT OF FINANCIAL POSITION

THE SCIENTIFIC RESEARCH ORGANISATION OF SAMOA
STATEMENT OF FINANCIAL POSITION
AS AT 30 JUNE 2016

ACCUMULATED FUNDS	Notes	2016 SAT$	2015 SAT$
Opening balance		3,403,696	3,233,460
Add: Surplus		327,775	170,236
Closing balance		**3,731,471**	**3,403,696**
Represented by:			
Current assets			
Cash and cash equivalent	**3**	2,254,712	1,383,557
Debtors		152,435	337,505
Prepayments	**4**	37,773	31,146
Stock on hand	**5**	137,121	150,912
Total current assets		2,582,041	1,903,120
Current liabilities			
Trade Payables		116,441	6,263
Accruals	**6**	108,493	51,156
Allowance for staff benefits	**7**	58,950	57,771
Deferred income	**9**	921,505	706,654
Total current liabilities		1,205,389	821,844
Working capital		1,376,652	1,081,276
Non Current assets			
Property, plant and equipment	**10**	2,354,819	2,322,420
Net assets		**3,731,471**	**3,403,696**

The accompanying notes form an intergral part of the above financial statement.

STATEMENT OF INCOME AND EXPENDITURE

THE SCIENTIFIC RESEARCH ORGANISATION OF SAMOA
STATEMENT OF INCOME AND EXPENDITURE
FOR THE YEAR ENDED 30 JUNE 2016

		2016	2015
INCOME	**Notes**	**SAT$**	**SAT$**
Grants from Government of Samoa	**8**	3,334,494	3,300,902
Other income	**12**	570,871	347,609
Total income		**3,905,365**	**3,648,511**
EXPENDITURES			
Audit fees - current		19,300	9,550
Audit fees - FY14/15 under-accrued		4,279	-
Directors fees & board expenses		66,476	40,456
Depreciation	**10**	266,483	226,993
Personnel costs	**13**	1,753,181	1,742,435
Occupancy costs	**14**	308,199	255,282
Administrative costs	**15**	405,427	513,356
Other costs	**16**	754,245	690,203
Total expenditures		**3,577,590**	**3,478,275**
Net Surplus		**327,775**	**170,236**

The accompanying notes form an intergral part of the above financial statement.

STATEMENT OF CHANGES IN EQUITY

THE SCIENTIFIC RESEARCH ORGANISATION OF SAMOA
STATEMENT OF CHANGES IN EQUITY
FOR THE YEAR ENDED 30 JUNE 2016

	Accumulated Fund SAT$	Total SAT$
2015		
Balance as at 1 July 2014	3,233,460	3,233,460
Add: Surplus	170,236	**170,236**
Balance as at 30 June 2015	**3,403,696**	**3,403,696**
2016		
Balance as at 1 July 2015	3,403,696	3,403,696
Add: Surplus	327,775	**327,775**
Balance as at 30 June 2016	**3,731,471**	**3,731,471**

The accompanying notes form an intergral part of the above financial statement.

STATEMENT OF CASH FLOW

THE SCIENTIFIC RESEARCH ORGANISATION OF SAMOA
STATEMENT OF CASH FLOWS
FOR THE YEAR ENDED 30 JUNE 2016

			2016	2015
Cash flows from/(to) operating activities		**Notes**	**SAT$**	**SAT$**
Cash received from Government of Samoa			3,334,494	3,031,445
Cash received from the Republic of Turkey (Ethanol)			-	10,703
Cash received from IUCN			-	64,158
Cash Received from Republic of Korea (Fruit Wine)			-	18,319
Cash received from the Republic of Turkey (Breadfruit)			-	17,450
Cash received from	- Secretariat of the Pacific Community		5,934	-
	- Coconut oil refinement fund		9,161	-
	- Technical services		166,847	128,981
	- Biodiesel sales		124	48,150
	- Sales Breadfruit Flour - Gluten Free fund		268	1,475
	- PHAMA		24,333	21,786
	- Consultancy services		-	9,000
	- ACIAR Project Funds		105,931	-
	- FAO Consultancy		91,336	-
	- Photosynthetic Bacteria Research Fund		16,590	-
	- Biomedical Research Fund-US Embassy		12,725	-
	- TCM Project Funds		135,062	-
	- Other income		139,002	8,660
Cash paid for expenses			(2,871,769)	(2,960,510)
Net cash flow by operating activities			**1,170,038**	**399,616**
Cash flows from/(to) investing activities				
Purchase of property, plant and equipment		**10**	(298,883)	(396,535)
Net cash used by investing activities			**(298,883)**	**(396,535)**
Net increase/(decrease) in cash			871,155	3,081
Cash and cash equivalent at the beginning			1,383,557	1,380,476
Cash and cash equivalent at the end		**3**	**2,254,712**	**1,383,557**

The accompanying notes form an intergral part of the above financial statement.

NOTES TO THE FINANCIAL STATEMENTS

THE SCIENTIFIC RESEARCH ORGANISATION OF SAMOA
NOTES TO FINANCIAL STATEMENTS
FOR THE YEAR ENDED 30 JUNE 2016

1. GENERAL

The Research and Development Institute of Samoa is an independent corporate body constituted and operating under the provisions of the Research and Development Institute of Samoa (RDIS) Act 2006 and amendments. Its name changed to The Scientific Research Organisation of Samoa (SROS) on 20th November 2008 following ammendment of the Act. It is currently located at Nafanua.

The SROS objectives are:

a) to promote the national economy of Samoa based on research and development;

b) to undertake scientific and technical research with the primary aim of adding value to local resources or services;

c) to develop functional prototypes of products and processes based on scientific and technical research for the local or overseas markets;

d) to establish partnership with the private sector and commercial interests to support the Organisation's activities; and

e) ensure effective training for researchers and professionals engaged in scientific and technical research.

2. ACCOUNTING POLICIES

a) Statement of compliance

The statements have been prepared in accordance with International Financial Reporting Standards adopted by the International Accounting Standards Board (IASB), and interpretations issued by the Standing Interpretations Committee of the IASB.

b) Basis of preparation

The financial statements are prepared on the historical cost basis. They are presented in Samoan Tala.

c) Grants, aids in assistance, donations and capitalisation

The above are treated in the accounts in accordance with their nature and the form in which they are received;

i.) All items which are intended for the support and financing of the Organisation's operations and received in cash are taken to income on receipt.

ii.) All items which are received in the form of depreciable assets, are taken to income in the year of receipt.

iii.) All items that are received in the form of depreciable assets from the Government of Samoa are capitalised.

d) Cash and cash equivalents

Cash and cash equivalents comprises of petty cash, cash at bank and cash held by other Government Ministries for relevant projects form an integral part of the Organisation's cash management are included as a component of cash and cash equivalents for the purpose of the statement of cash flows.

e) Functional and presentation currency

The financial statements are presented in Samoan Tala (SAT$), which is the Organisation’s functional currency and all values presented in Samoan Tala have not been rounded.

2. ACCOUNTING POLICIES (Con't)

f) Property, plant and equipment

Items of property, plant and equipment are measured at cost less accumulated depreciation and any accumulated impairment losses.

Depreciation is charged so as to allocate the cost of assets less their residual values over their estimated useful lives, using the straight-line method.

The following rates are used for the depreciation of property, plant and equipment:-

Buildings and improvements	5%
Roads	20%
Motor vehicles	20%
Laboratory equipment	20%
Furniture & fittings	20%
Office and other equipment	20%

g) Foreign currency translation

Transactions in foreign currency are translated to Tala at the foreign exchange rates ruling at the date of the transaction. Monetary assets and liabilities denominated in foreign currencies at balance date are translated to Tala at exchange rates ruling at that date. Foreign exchange differences arising on translation are recognised in the statement of income and expenditure.

h) Deferred Income

Deferred Income represent grants that has been received by SROS from its Donor Partners in relation to Research and Product Development under the different Divisions within SROS (mostly via Project Proposals), which include the Food Science & Technology Division, Plant & Postharvest Technologies Division, Environment & Renewable Energy and Technical Services Division, which are supported by the Administration and Finance.

i) Income tax

The Scientific Research Organisation of Samoa is not subject to taxation.

j) Stock on hand

Stock on hand are stated at the lower of cost and net realisable value.

k) Leases

Leases are classified as finance leases whenever the terms of the lease transfer substantially all the risks and rewards of ownership to the lessee. All other leases are classified as operating leases. Rentals payable under operating leases are charged to statement of income and expenditure on a straight-line basis over the term of the relevant lease.

l) Provisions

A provision is recognized in the statement of financial position when the Organisation has a present legal or constructive obligation as a result of past event, and it is probable that an outflow of economic benefits will be required to settle the obligation.

m) Employee Benefits

i.) Salaries and wages, annual leave and long service leave

Liabilities for employees' entitlements to salaries and wages, annual leave, long service leave and other current employee entitlements (that are expected to be paid within twelve months) are accrued at undiscounted amounts, and calculated at amounts expected to be paid as at reporting date.

Liabilities for other employee entitlements, which are not expected to be paid or settled within twelve months of reporting date, are accrued in respect of all employees at the present value of future amounts expected to be paid. A provision of one-third of sick leave balance as at year end is taken into account as a liability.

2. ACCOUNTING POLICIES (Con't)

ii.) Superannuation contributions

The organisation contributes towards the National Provident Fund, a defined contribution plan in accordance with local legislation and to which it has no commitment beyond the payment of contribution. Obligations for contributions to the defined contribution plan are recognised immediately in the statement of income and expenditure.

3. CASH AND CASH EQUIVALENT		**2016 SAT$**	**2015 SAT$**
Petty cash		500	500
Cash at ANZ Bank (Samoa) Limited - main account		885,937	332,035
Cash at Westpac Bank Ltd - Technical Services		417,158	229,973
ANZ Bank (Samoa) Limited: project account	- SPC / PARDI Funds	125,197	95,585
	- Coconut Oil Refinement Fund	270,769	279,473
	- Avocado Margarine Fund	194,183	204,373
	- PHAMA	9,178	3,838
	- TCM EIF Tier II Project Fund	72,857	-
	- Water Supply & Sanitation Fund - MNRE	63,000	-
	- Photosynthetic Bacteria Research Funds	8,000	-
	- Others	207,934	237,780
		2,254,712	**1,383,557**

4. PREPAYMENTS		
Prepaid Insurance	29,048	17,417
Other Prepayments	8,725	13,729
	37,773	**31,146**

5. STOCK ON HAND		
Lab consumables on hand	137,121	150,912
	137,121	**150,912**

6. ACCRUALS		
Accrued expenses	78,572	27,512
Audit fees	19,300	8,004
Electricity	10,546	15,595
Land lease	75	45
	108,493	**51,156**

7. ALLOWANCE FOR STAFF BENEFITS		
Staff annual leave entitlements	58,950	57,771
Total allowance for staff benefits	**58,950**	**57,771**
Movement for Allowance of Staff Benefits		
Balance at beginning of the year	57,771	68,472
Additional allowance during the year	33,067	23,228
Utilised during the year	(31,888)	(33,929)
Balance at year end	**58,950**	**57,771**

	2016 SAT$	2015 SAT$
8. GRANTS FROM GOVERNMENT OF SAMOA		
Cash received from Ministry of Finance	**3,334,494**	**3,300,902**

9. DEFERRED INCOME

Donors	Opening Balance (2015)	Additional Funding	Costs Incurred	Ending Balance (2016)
SPC / PARDI Fund	95,585	35,546	5,934	125,197
Coconut Oil Refinement Fund	279,473	457	9,161	270,769
Avocado Margarine Fund	204,373	457	10,648	194,183
PHAMA - Frozen Taro Project Fund	478	23,353	17,868	5,963
PHAMA - Cocoa Fermentation Project Fund	3,360	6,319	6,464	3,214
FAO Consultancy Fund	4,874	91,336	24,019	72,190
TCM EIF Tier II Project Fund	-	135,062	63,205	71,857
Photosynthetic Bacteria Research Fund	-	16,590	8,590	8,000
Water Supply & Sanitation Fund - MNRE	-	63,000	-	63,000
Biomedical Research Fund-US Embassy	-	12,725	-	12,725
SIDS Donated Assets	118,511	-	24,104	94,407
Total Deferred Income	**706,654**	**384,845**	**169,994**	**921,505**

10. PROPERTY, PLANT & EQUIPMENT

Cost	Buildings & Roads SAT$	Furniture & Fittings SAT$	Laboratory Equipment SAT$	Office Equipment SAT$	Motor vehicles SAT$	TOTAL SAT$
1 July 2015	2,421,061	300,131	3,663,199	1,414,061	372,483	8,170,935
Additions	69,052	4,157	32,023	94,948	105,000	305,180
Disposals	-	-	-	(6,297)	-	(6,297)
At 30 June 2016	2,490,113	304,288	3,695,222	1,502,712	477,483	8,469,818
Accumulated depreciation						
1 July 2015	660,753	224,337	3,355,464	1,315,478	292,483	5,848,515
Depreciation	136,921	16,841	81,792	23,560	8,000	267,113
Disposals	-	-	-	(630)	-	(630)
At 30 June 2016	797,674	241,178	3,437,256	1,338,408	300,483	6,114,999
Carrying amount						
30 June 2015	**1,760,308**	**75,794**	**307,735**	**98,583**	**80,000**	**2,322,420**
30 June 2016	**1,692,439**	**63,110**	**257,966**	**164,304**	**177,000**	**2,354,819**

11. AMORTISATION SCHEDULE

The Amortisation Schedule relates to the donated Assets for SROS Activities from the Government of Samoa after the hosting of the SIDS meeting in September 2014. These Assets are amortised to income over 5 years for Office Equipments which are the same rates at which the Assets are depreciated.

Costs of Donated Assets	2016 SAT$	2015 SAT$
SIDS Assets funded by the Government of Samoa	120,520	120,520
Total cost of assets	120,520	120,520
Accumulated Amortisation		
Opening accumulated amortisation	2,009	-
Amortisation for current year	24,104	2,009
Closing accumlated amortisation	26,113	2,009
Unamortised Amount	**94,407**	**118,511**
Current portion of amortisation	24,104	2,009
Non - current portion of amortisation	70,303	116,502
Unamortised amount	**94,407**	**118,511**

THE SCIENTIFIC RESEARCH ORGANISATION OF SAMOA
NOTES TO FINANCIAL STATEMENTS
FOR THE YEAR ENDED 30 JUNE 2016

	2016	2015
12. OTHER INCOME	**SAT$**	**SAT$**
Technical Services	166,769	128,981
Secretariat of the Pacific Community / PARDI fund	5,934	17,547
Coconut oil refinement fund	9,161	(1,244)
Avocado margarine fund	10,648	31,172
PHAMA Frozen Taro Project fund	17,868	21,686
PHAMA Cocoa Fermentation Project fund	6,464	12,640
FAO Consultancy fund	24,019	-
TCM EIF Tier II Project fund	63,205	-
Photosynthetic Bacteria Research fund	8,590	-
ACIAR Project Fund	105,931	-
Turkey Grant - Ethanol Project fund	-	10,703
Amortisation Income	24,104	2,009
Sales Biodiesel fund	124	48,150
Sales Breadfruit Flour - Gluten Free fund	268	14,646
IUCN Biodiesel fund	-	6,199
Republic of Korea funds - Fruit Wine fund	-	18,248
Turkey grant - Breadfruit project fund	-	17,450
Consultany fees	-	11,280
Other income	127,786	8,143
	570,871	**347,609**
13. PERSONNEL COSTS		
Salaries and wages	1,625,173	1,643,040
NPF employer contributions	96,925	79,273
ACC Employer Levys	16,030	17,073
Higher Duty Allowances	15,053	3,049
	1,753,181	**1,742,435**
14. OCCUPANCY COSTS		
Electricity	308,184	255,267
Land lease	15	15
	308,199	**255,282**
15. ADMINISTRATIVE COSTS		
Advertising and promotions	53,630	23,389
Accounting fees - current year	3,159	-
Bank charges	1,772	1,007
Internet charges	29,996	26,454
Fees, License and registrations	11,935	4,088
Car rental	-	8,478
Fuel and oil	17,610	74,303
Printing and stationery	61,829	73,856
Repairs and maintenance - motor vehicles	21,972	20,151
Repairs and maintenance - building	8,286	4,179
Repairs and maintenance - office equipment	7,039	10,288
Repairs and maintenance - plant & equipments	3,812	16,889
Repairs and maintenance - furniture and fittings	2,011	4,354
Subscriptions	1,910	500
Telephone, fax and postages	14,911	20,178
Travel and accomodation	27,987	80,674
Water supplies	5,274	4,628
Insurance	72,469	84,166
Local travel	2,952	622
Consultancy fees	8,167	6,687
General expenses	48,706	48,465
	405,427	**513,356**

	2016	2015
16. OTHER COSTS	**SAT$**	**SAT$**
Secretariat of the Pacific Community / PARDI costs	5,934	
Coconut Oil Refinement costs	9,161	-
Avocado Margarine costs	10,648	15,268
PHAMA Frozen Taro Project costs	17,868	-
PHAMA Cocoa Fermentation Project costs	6,464	12,596
FAO Consultancy costs	24,019	-
TCM EIF Tier II Project costs	63,205	-
Photosynthetic Bacteria Research costs	8,590	-
ACIAR Project costs	105,931	-
Lab consumables	149,129	153,228
Freight and handling costs	22,475	26,770
Accreditation project costs	58,842	84,568
Biodiesel Project costs	-	7,836
Soil bio Project costs	-	1,428
Jatropha Project costs	-	6,199
Fruit Wine Project costs	2,008	21,048
Other projects costs	20,174	61,909
Plant hire expenses	3,984	2,830
Gas expenses	112,274	148,044
Clothing allowance costs	6,200	5,800
Cleaning expenses	23,306	16,910
Staff training costs	26,243	31,206
Telephone allowances costs	3,600	3,600
Professional services expenses	31,728	23,684
Awareness expenses	25,760	50,420
Office catering costs	16,702	16,859
	754,245	**690,203**
17. RELATED PARTY DISCLOSURES		
i. Salaries and short-term employee benefits	616,346	712,491
Balance represents remuneration of key member of management during the year.		
ii. Board expenses	775	6,668
Balance represents board expenses for meetings held throughout the year.		
iii. Directors' fees	65,063	22,100
iv. Board of directors allowances	638	11,688

The above amount consist of sitting allowance & annual Directors fees paid to eligible Directors who include; Dr. Satupaitea Viali, Dr. Sonny Manuleleua Lameta, Lalauena Palagi Fetalaiga Taulealo and Sulamanaia Nuuetolu Montini Ott. Other Directors, who are public servants, were not paid sitting allowance & annual Directors fees.

18. PROJECT GRANTS

a) The following projects are currently carried out by SROS as the Implementing agency, in which the actual funds are held by Government via the Ministry of Finance (MOF). Per confirmation from MOF, the following balances represent the unused funds at balance date.

Project Description	Balance as at 30/06/2015	Funds received	Funds expended	Balance as at 30/06/2016
Turkey Grant (Ethanol Project)	51,829	-	-	51,829
IUCN Biodiesel Project Funds - MNRE	23,283	-	-	23,283
Turkey Grant (Breadfruit Project)	5,567	-	-	5,567
Republic of Korea - Fruit Wine Project	285,396	-	2,090	283,306
Japanese Embassy - Sustainable Growth of Fragrant Plants for Poverty Reduction Project	237,875	-	211,721	26,154
ACIAR funded Regional Fruit Tree Project	-	105,931	58,196	47,735
Total Project Grants held at MOF	**603,950**	**105,931**	**272,007**	**437,874**

18. PROJECT GRANTS (Con't)

i. Turkey Grant (Ethanol Project): Purpose: To develop and optimize a process to produce bioethanol from the identified starchy feedstock by maximizing sugar production from flour.

ii. IUCN Biodiesel Project Funds - MNRE: Purpose: To determine the optimum conditions and characteristics of the alkali process for biodiesel production using *Jatropha* oil as a feedstock.

iii. Turkey Grant (Breadfruit Project): Purpose: To identify breadfruit pathogens, especially virulent strains, present during pre- and post-harvest of breadfruits, and determine phylogenetic relation between the isolated pathogen strains.

iv. Republic of Korea - Fruit Wine Project: Purpose: To produce wine-like beverages from various ripen fruits that are grown, available and abundant in Samoa, for domestic and export markets.

v. Japanese Embassy - Sustainable Growth of Fragrant Plants for Poverty Reduction Project: Purpose: To promote orchids and fragrant oils as another means for income generation and job creation in the rural communities.

vi. **New Project received in June 2016, within this Financial Year 2015/2016:**
ACIAR funded Regional Fruit Tree Project: Purpose: To increase the efficiency of breadfruit and pineapple value chains through improved productivity and postharvest handling practices, and to enhance private sector and Government research and extension capacities in support of fruit industry development.

b) Equipments procured under Sustainable Growth of Fragrant Plants for Poverty Reduction Project:
The total funds expended under this project held with MOF to the amount of SAT211,721 comprises of research equipments related for this project. i) SAT$202,209 (USD$77,021.25 equivalent) for lab equipments procured in December 2015, ii) SAT$9,460 (USD$5373.00 equivalent) for lab equipment procured in May 2016, iii) SAT$52 for bank related fees. These equipments are planned to be utilised in the new Financial Year 2016/2017 when the project activities begin, and some of these equipments will be transferred to the Private Sector for Commercialisation purposes.

19. CAPITAL COMMITMENTS

The Ministry of Finance has approved a budget of SAT$3.33 million (2015: SAT$3.27 million) for the period ended 30 June 2016. There were no Capital Budget for this financial year 2015/2016.

20. CONTINGENT LIABILITIES

The directors are not aware of any contingent liabilities for the period ended 30 June 2016. (2015: SAT$NIL).

21. EVENTS OCURRING AFTER BALANCE SHEET DATE

There are no events subsequent to balance date which require recognition or disclosure in this financial statement. (2015: SAT$NIL).

22 APPROVAL OF FINANCIAL STATEMENTS

The board of directors approved the financial statements of the Organisation on **..28... / ..10.. / ..2016..**

6. Annex (Analysis of Financial Performance Measures)

Table of Key Performance Measures

Performance Measures	This Year Actual 2015-2016	Last Year Actual 2014-2015	Budget Next Year 2016-2017	Comments
Revenue	3,334,494	3,300,902	3,317,148	We note a slight increase in Revenue or Government Grant for this year's actuals compared to the previous year FY2014/2015 mainly from a 6% increase in Personnel. A decrease however compared to the Budget for next year due to a 10% Operating reduction and a 6% Personnel increase.
Other Income	570,871	347,609	151,294 (cost recoveries target)	We note an increase of 64% in the overall Other Income mainly due to the high project fund utilization during the year, and also an increase in Technical Services Division Cost Recoveries of $166,769 compared to $128,981 in the previous year.
Total Revenue	**$3,905,365**	**$3,648,511**	**$3,468,442**	
Expenditure (Personnel, operating & depreciation)	3,577,590	3,478,275	3,682,125	The utilization for this financial year is 3% higher than the previous year mainly due to increase in spending for Occupancy costs and Other costs.
Surplus / (Deficit)	327,775	170,236	(213,683)	The surplus achieved in this FY2015/2016 is a 93% increase compared to the previous year due to SROS's continued controls on operating spending as well as savings from its Personnel funding on staff turnover in higher positions. SROS continues to seek funding from overseas to conduct its research and development functions to assist with Government Grants each year.
Current Assets	2,582,041	1,903,120	2,242,580	Increase in current assets is mainly due to the increase in Cash and Cash equivalents including new project funding for SROS for research.
Total Assets	**$4,936,860**	**$4,225,540**	**$4,581,200**	
Current Liabilities	1,205,389	821,844	1,013,616	The increase in Current Liabilities is mainly from the four new projects to the value of $227,377 in total during this year.