

# SPC ACTIVITIES

## NEARSHORE FISHERIES DEVELOPMENT AND TRAINING SECTION

### Initial fish silage test in Niue

*On 2 October 2009, Angus McNeil (Nelson Consultants) and Michel Blanc (SPC's Fisheries Training Adviser) took the weekly flight from Auckland, New Zealand to Niue. In their personal baggage they carried latex gloves, safety goggles, a pH-metre and a large guillotine cutter. Those of us who have been forced to give up our Swiss army knife or nail clippers to airport security might wonder how they were allowed on...*

Their toolkit was, in fact, extra gear that would be needed to produce fish silage. The process is simple: fisheries waste is recovered and put through a grinder. The enzymes in the fish cause it to liquefy while the natural formic acid that is added inhibits putrefaction, and in particular the awful smell. The result is a brownish liquid that can be used as fertiliser, either by pouring it directly on the ground or spraying it on plants. It can also be used as a feed supplement for pigs and chickens (see *Fisheries Newsletter* #126 for a detailed description of the process and how this product is used). The product can be stored for up to two years.

Following a pilot project in 2008 that SPC conducted on Lifou Island in New Caledonia, and a presentation that was made at the 6<sup>th</sup> SPC Heads of Fisheries

meeting, Niue asked SPC to hold a training session on producing fish silage there.

Upon their arrival in Niue, Angus and Michel, together with Brendon Pasisi, Director of Niue's Department of Agriculture, Fisheries and Forestry, assembled the motorised grinder that had been shipped from New Zealand. The cutter, which was to be used to pre-cut big pieces of fish, particularly the heads, was bolted to a workbench. Formic acid had been ordered well ahead of time and fish waste was collected for this trial run.

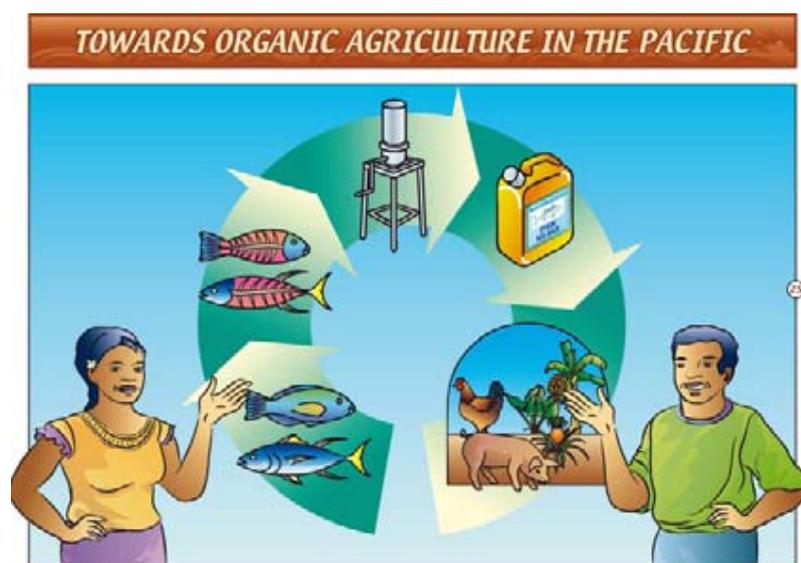
Operations began on the second day. Vanessa Marsh from Niue Fisheries worked with another woman to chop up the fish with the cutter, while Brendon and Angus worked at the grinder. The ground fish waste was

collected in a bucket under the machine.

On average, fishing activities on Niue produce 1.5 tonnes of waste per month that can be used for processing. About one tonne comes from the offshore fishing activities of the island's only longliner. The remainder comes from about 20 motorised boats and aluminium skiffs, which mainly trawl for wahoo. In addition, there are a number of small canoes used for fishing around Niue, but these are not economically viable as a source of waste for processing, as they catch relatively few fish, and are spread out around the island.

The grinder is a prototype adapted from gear found on some fishing boats, particularly in New Zealand. Small reef fish grind up much more easily than large oceanic fish that have very large and hard heads. The grinder seized up several times and even after smaller pieces were cut with the guillotine, the motor ended up "blowing a gasket". We found an electronics engineer who was able to identify the broken part. By the afternoon, the grinder was once again ready to use and Angus and Michel made a giant leap forward in the learning curve for this project.

Several batches of ground waste were prepared over the week and mixed with formic acid. These trials confirmed that the amount of viscera, which contain the liquefying acid, and the freshness of the waste have an



A page of the comic book on fish silage produced by SPC (see: <http://www.spc.int/coastfish/Fishing/Silage/Silage.htm>)

effect on the hydrolysis process. The 15 farmers and fishers who attended the fish silage training session each left with a litre of freshly made fertiliser, which they will be able to dilute and test on farm and food crops.



Vanessa Marsh from Niue Fisheries adds formic acid to the ground fish waste.

### Enriches the earth and nourishes bacteria

Fish silage is not new, and Australia and New Zealand have produced and used it for many years. Fish silage is a natural product that can be used for organic farming, and is of particular value due to the fish oil and trace elements it contains.

Regular fertilisers made from fish waste are emulsions, in which the fish oil has been removed (it is used for other purposes, most notably in the cosmetics industry). Because consumers want high nitrogen levels, these emulsions are high in urea, which can be absorbed directly and efficiently by plants. These fertilisers do not help enrich the soil or protect plants from pests, however, because they harm the soil's microbiology.

In contrast, fish silage enriches the soil and contains all the nutrients that micro-organisms need (e.g. trace minerals, selenium, omega oils). By feeding the bacteria and fungi in the soil, fish silage helps improve and preserve soil structure. As a result, lower nitrogen, phosphorus, and potassium levels are required, because their yields are increased by the soil's microbiology. Bacteria act like nitrogen captors in the soil, while bacteria on leaves transport the nitrogen the plant takes out of the air. Thus silage poured on the ground or sprayed on leaves contributes to the reproduction of such "worker" bacteria. The bacteria's activity and the enzymes they secrete enrich the soil and nourish the plants. We also know that micro-organisms in the soil reduce the need for water, which leads to better resistance during drought-like conditions.

In addition to being a source of nutrients, the texture of the fish oils in the silage helps hold nutrients in the soil longer. In addition, the sticky nature of silage makes herbicides used in farming adhere to the plant, thereby ensuring they do not drain into the ground and then into the water table.

### Sustainable development and economic activity

Using fish silage for fertiliser contributes to sustainable agricultural development. The environment is preserved, and rather than targeting optimal yields over the short-term (e.g. one season), producers condition and protect their main resource — the soil — thereby making their activities sustainable.

Sustainable development is at the heart of SPC's concerns, and the advantages of fish silage extend beyond farming. This project combines the practical needs of the fishing industry (which must deal with its waste), a growing awareness of the need to preserve our environment, and the economic imperative to create work for island communities.

SPC has produced a comic strip that describes the stages involved in producing fish silage, including a summary of the project's advantages in terms of sustainable development.

The fish silage project is a very accessible example of a sustainable development project.

## TOWARDS ORGANIC AGRICULTURE IN THE PACIFIC

Every year, hundreds of tonnes of fish waste are thrown away in the Pacific Islands. This waste is often disposed of in rubbish dumps, where it attracts flies, rats and other pests that can carry diseases and contaminate water. As we have just seen, fish waste can easily be processed into liquid fish silage. The potential for fish silage production in the Pacific is therefore very high.

#### Fish silage offers many benefits:

- It contributes to a more sustainable use of increasingly scarce fishery resources and adds value to them.
- It helps reduce costly imports of chemical fertilisers.
- It is a low-cost solution for improving the poor soils of coral atolls.
- The process used to make fish silage is environmentally friendly, as the only chemical required is a small quantity of organic acid.
- Fish silage production does not require highly qualified people. It can therefore be made in most of the island communities of the Pacific. It can also offer women a new income-generating activity.
- Producing fish silage on varying scales offers a good economic development opportunity to many different fishers, including those working in the longline fishing industry.



Fish silage is an easy way of improving food security and the quality of daily life for Pacific Island communities.

Manual grinders are available, meaning silage can be produced at an individual level as well as on an industrial scale. The pilot projects on Lifou and Niue were funded by SPC, but communities that want to invest in this activity will find that the initial investment is well within their means and they will get rapid returns on that investment.

It costs about AUD 20,000 for a big machine like the one used on Lifou and about AUD 4,000 for a grinder like the one used on Niue.

In Noumea, New Caledonia, the existing volume of fish waste and potential market for silage suggest a high potential for this type of investment. The Cook Islands and Nauru have also shown interest in this technique.



Workshop participants could go back home with a bottle of freshly made fish silage.

**Meanwhile on Niue...**

Fish silage continues to be produced on Niue. The fertiliser is being tested on various farm produce to measure both its nutritional and financial

advantages. Niue will have to organise the collection of fish waste, build appropriate facilities, identify who will be in charge, and set a per-litre price for silage.

**Fair winds and happy sailing to Terii Luciani...**



One of the direct results of the severe financial crisis SPC experienced in 2009 was a “freeze” placed on several professional staff positions. The Marine Resources Division did not escape from this and it was

with very heavy hearts that we had to say goodbye to Terii Luciani at the end of December.

Terii joined the Fisheries Training Section in 1997 from the French Polynesia Fisheries Department. He brought his development experience in island settings, his knowledge of aquaculture, and his strong computer and desktop publishing skills. Terii then became Fisheries Training Adviser when the Training and Development Sections were combined into one unit.

Terii’s many talents perfectly matched those of the other members of the new Section: William Sokimi, Steve Beverly, Jonathan Manieva, Christine Bury, and Jennifer Corigliano. A short, very fruitful period (2006–2009) then followed; the

Section was active and innovative in several areas such as shallow-water inshore FADs, fish silage production, and developing coastal sport fishing. Terii took part in these initiatives while continuing to coordinate the Section’s capacity building activities, including holding yearly courses on safety at sea and fisheries techniques, and keeping our databases up to date. He also brought an “artistic touch” to all our documents, manuals, posters, brochures and DVDs.

Our team is deeply grateful for his 12 years of contributing to capacity building in the Pacific Islands fisheries sector.

Thanks for everything and happy sailing, Terii!