Oil palm is the most valuable export crop in Papua New Guinea (PNG), supporting about 18,600 registered smallholder families and an estimated 200,000 people. It also drives the cash economies of the five provinces in which it is grown: West New Britain, Northern, Milne Bay, Morobe and New Ireland.

Safeguarding the more than K1 billion (A$471 million) derived from exports of oil palm is of critical national importance. ACIAR’s partnership with the PNG Government and research agencies helps ensure these economic benefits continue and flow down to smallholders. For the scientists working in PNG through ACIAR support this translates to a strong focus on supporting environmentally sustainable management practices.

On the ground, the net results are multi-faceted partnerships between Australia, PNG...
SUSTAINABLE MANAGEMENT OF SOIL AND WATER RESOURCES
Sustainable oil palm cultivation is supported by ACIAR through the project Sustainable management of soil and water resources for oil palm production systems in Papua New Guinea (SMCN/2009/013). The Roundtable on Sustainable Palm Oil (RSPO) was formed in 2004 with the participation of all PNG oil palm producers to explicitly pursue the growth and use of sustainable oil palm products.

The scientific expertise assembled through this project makes it possible to develop practical indicators for environmental sustainability that are also of agricultural and economic value to PNG’s palm oil industry, including its smallholders.

These efforts contribute to something essential for the industry’s long-term viability, given international sustainability concerns over the production of food (PNG’s main focus) and biofuels—environmental accreditation. The science that makes this possible revolves around three key areas:

1. The identification of the main risks to sustainability that smallholder oil palm growers face and development of options for managing these risks.
2. The establishment of management practices that ensure sustainable use of soil and water resources.
3. The development of indicators to assess performance and guide management that is complementary to the RSPO.

Taking part is agronomist Steve Nake and his team from PNG Oil Palm Research Association (OPRA). When I met him in West New Britain Province, his team was taking soil samples from

At a glance
Oil palm is a popular crop as it produces six to 10 times more oil per unit area than other vegetable oils such as soybean or sunflower. Due to its high yield per unit area, oil palm has become a major agricultural crop in many tropical countries where it has helped alleviate rural poverty.

In Papua New Guinea, the oil palm industry is small by international standards—in total oil palm is cultivated on 134,000 hectares, which accounts for about 1% of global palm oil production. It is nonetheless the nation’s largest agricultural export earner. Oil palm is grown in plantations owned by two companies and on more than 18,000 smallholder blocks.
around an oil palm tree nestled at the base of a hill. Activities like these are one of several components involved in enhancing agricultural productivity by safeguarding the conservation of soil and water resources.

"I'm the guy on the ground in regards to research of oil palm in West New Britain," Steve Nake says. "My key concern is to determine the optimum nutrient requirements for oil palm grown in different areas. Everything works hand in hand here: look after the oil palm production and you look after the community."

**BENEFITS OF PRIVATE SECTOR INVESTMENT**

Commercial sector partnerships in the oil palm industry in PNG are part of ACIAR's research approach. It is a decision that has helped spread information about best management practices, in addition to raising smallholder productivity and incomes.

The commercial sector invests heavily in the industry, including through the provision of farm management advice, in the sale of inputs to smallholders and in the establishment of joint-venture companies with customary landowner groups.

Of particular value has been the development of effective land-use agreements between the commercial sector and customary landowners. These agreements, along with the rollout of an innovative payment system for inputs to lift production, is helping manage the realities of smallholder production.

These positive developments rely heavily on an R&D strategy that understands smallholder issues, providing four areas for further development:

- an understanding of the socioeconomic factors that affect productivity among smallholders;
- improvements to smallholder agronomic and farm-management strategies;
- an understanding of smallholder livelihood strategies and their influence on smallholder production; and
- analysis of recent socioagronomic changes occurring among smallholder producers.

One of the participating companies is the Oil Palm Industry Corporation (OPIC) in Hoskins, West New Britain Province. One of its managers, Frank Bao, looks after 1,600 oil-palm-growing smallholder farmers.

"The palm oil is a good cash crop, but I do have problems with stick insects and Sexava grasshoppers," he says.

**ENTOMOLOGY AND THE CONTROL OF PESTS**

Charles Dewhurst is the head of entomology at PNG OPRA and his passion for his work shows through. His eyes light up when asked a question about his favourite insect, the Sexava—PNG's principal oil palm pest.

Sexava is a group of insect species from the Tettigoniidae family—variously known as long-horned grasshoppers, katydids or bush crickets. These insects cause damage by feeding on the oil palm fronds. Where populations are high, the resulting defoliation can be extremely severe, resulting in reductions in photosynthesis and lower fruit yields.

"Our main focus is on integrated pest..."
The control of basal stem rot

The most serious disease of oil palm is basal stem rot, caused by the wood-rotting fungus *Ganoderma boninense*. It is a disease that reduces oil palm yields in most production areas of the world. Although the cause of the disease was identified more than 50 years ago, there is still no fully effective means to control it and the disease appears to be on the increase.

Where basal stem rot incidence increases progressively, it slowly but inevitably erodes profitability. In 1997 it was identified as a major threat to the oil palm industry in Solomon Islands. In 1998, PNG OPRA initiated a research program (funded by the European Union) that recorded disease levels in some blocks as high as 43%.

One of PNG OPRA’s field technicians Lazarus Kewaka explains that *Ganoderma* produces enzymes that degrade the oil palm tissue and affect the infected oil palm xylem. This causes serious problems for the transportation of water and other nutrients to the top of the palm tree.

Basal stem rot leaves growers with little choice but to remove any infected trees in the hope of slowing its spread. This causes problems where replanting occurs in coconut and oil palm plantations. During replanting, if the felled oil palm trunks and stumps are left to rot in the field, numerous fruiting bodies of *Ganoderma* may be produced and spread the disease. The fungus is also believed to spread through the soil from infected stumps and roots.

A regional approach is emerging to tackle this issue. ACIAR has funded research in Solomon Islands, partnering with PNG OPRA to examine management options. Researchers are seeking ways to reduce the carry-over of the disease during replanting and, for the longer term, are using molecular techniques to identify sources of resistance to the disease that can be developed through plant breeding. However, progress takes time, especially in a slow-growing crop like oil palm, where even an infected palm may take several years to manifest symptoms of the disease.

“It is sad to say, this deadly disease has long been discovered, but currently there is no effective measure to eliminate it,” Lazarus Kewaka says. “*Ganoderma* is fast becoming a major threat to oil palm cultivation and palm oil production in PNG.”

Field control of basal stem rot through control of the infection cycle of the pathogen is an important component of Lazarus Kewaka’s research. His Plant Pathology division carries out training for both plantation and smallholder farmers in measures they can take to slow the spread and mitigate the impact of the disease.

“The most effective method is to remove the tree and expose the stem rot to sunlight,” he says.

GROWING VEGETABLE CROPS ALONGSIDE OIL PALM

Far from focusing on the cultivation of oil palm in isolation, in PNG it is often dealt with in the context of greater food security. This is the case for Jesse Anjen, one of PNG OPRA’s socioeconomists. His latest trial project is to create wider spaces between oil palm trees to enable farmers to plant food crops.

Jesse Anjen is working with Carl Tuoro, senior extension officer at OPIC, and Emmanual Gemis, an economics supervisor at PNG OPRA. This team is looking at the effect of current population growth on the oil palm areas and the increasing food demand of these local communities.

For Emily Flowers, ACIAR’s country manager for PNG, this kind of commitment to smallholders and attention to detail strongly reflects a longstanding commitment to Australia’s Pacific neighbour. When it comes to PNG, ACIAR is in for the long haul, she says.

“ACIAR has a formal program of consultation with PNG to establish priorities in research collaboration, as well as regular smaller consultations and industry workshops to finetune these priorities.”

“PNG is one of Australia’s most important development partners and ACIAR’s investment is based on—and committed to—improved adoption of innovations that respond to real needs and deliver meaningful benefits to PNG.”