

Keeping blight off the landscape

Previously free of potato late blight, Papua New Guinea is witnessing the invasion by an aggressive disease strain that is devastating many smallholders



International scientists examine a potato crop in the highlands of PNG.

BY RACHEL SULLIVAN

The highlands of Papua New Guinea were, until recently, home to a flourishing potato industry. In early 2003, healthy potato plants started rotting where they stood. Potato late blight, the disease responsible for the Irish potato famine in the 1840s, had made landfall, and immediately began devastating one of the PNG highlands' important cash crops.

Potato late blight is caused by the fungus *Phytophthora infestans*, and various strains are found in potato-cultivating regions throughout the world. Over time, management strategies, including the development of fungicides and the introduction of new, blight-resistant potato varieties, have helped combat the disease. But recently, new virulent strains from Central America started spreading rapidly throughout North America, Europe, Africa and Asia, having a dramatic impact on

potato crops wherever they appeared. It is this aggressive fungus that has invaded previously blight-free PNG.

Before the outbreak, commercial trade from smallholders and a few larger commercial growers had reached 15,000 tonnes of potatoes each year, with a total value of 10–15 million kina. Barter trade was also widespread. According to Dr Birte Nass-Komolong from the PNG National Agricultural Research Institute (NARI), the wholesale destruction caused by potato late blight has devastated many smallholders.

“Only a limited number of crops can be grown at high altitude,” she says. “Slow-growing sweet potatoes are a food staple, while quick-growing ‘spuds’, known locally as English potatoes, are grown partly for the farmers’ own consumption, and partly as a source of income to pay for school fees, kerosene, sugar and salt. Without this income, survival becomes a real struggle.”

The highlands climate is ideal for late blight, she says, meaning that intensive control regimes such as spraying with fungicides are essential. Unfortunately, these are also expensive: crops need to be sprayed every three to five days, and the replacement seed potatoes, chemicals and equipment are beyond the means of most smallholders.

“Even though people have lost confidence in growing English potatoes, they find it very difficult to switch over to cultivating a new crop, so it is essential we identify and distribute resistant varieties,” Dr Nass-Komolong says. And while commercial growers have been affected, late blight has not had the same impact as it has on smallholder farmers because commercial growers are able to afford seed, crop sprays and the labour to apply them. However, exposure to large amounts of chemicals is an issue for the labourers, the environment and possibly consumers.



Potatoes (cultivar Sequoia) on sale in the Mt Hagen market.



Potato late blight symptoms on potato leaves.



A potato crop in Mt Hagen is sprayed with fungicides to control potato late blight.

Supported by ACIAR since 2005, NARI, in association with PNG's Fresh Produce Development Agency (FPDA), has been collaborating with other agencies around the world, including the International Potato Center (CIP), Australia's Victorian Department of Primary Industries and the University of Queensland.

As the foundations of a suite of safe and cost-effective integrated management strategies are being developed for the new cultivars, these agencies are working together to evaluate and introduce affordable, resistant potato varieties to minimise the need for fungicides, and to identify low-impact, reliable fungicides in case of emergencies. Over the longer term, NARI and its allies have also set up an extension program, working with local farmers to help rebuild local confidence in potato cultivation.

Approximately 50 different potato clones, developed by the CIP for the tropical highlands climate, are being evaluated by NARI and FPDA researchers. Using tissue culture to multiply the available plant material for further testing, four varieties are being fast-tracked so the seed can be given to local farmers to grow alongside their existing crops.

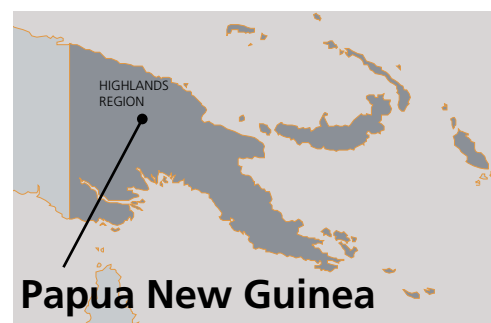
As part of a process of identifying and field-trialling resistant new varieties,

these farmers will provide feedback to NARI and FPDA researchers about tuber shape and size, number of tubers, foliage growth, growing period, taste and cooking requirements. The resistant varieties will then be placed in the hands of farm extension networks, where liaison officers will work with villagers to ensure they will again be earning an income from potatoes.

However, at the moment seed potatoes remain very expensive and in short supply. To help boost stocks, a NARI pathologist and agronomist recently spent two weeks in Australia working with the Victorian Department of Primary Industries' Dr Rudolf de Boer and his team on advanced tissue culture and field-evaluation techniques. This follows on from similar training given to a NARI potato propagation specialist in 2006.

Dr De Boer says that this is part of an ongoing mentoring program that not only helps ensure PNG's protocols are up to speed, but helps enhance Australia's disease awareness and preparedness, and ensures the biosecurity of the region.

"Potato late blight is one of the most important diseases on the planet," he says. "By helping our nearest neighbour, we are also helping ourselves to prepare for the possibility of an outbreak of this resistant strain in Australia." ■



Papua New Guinea

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Potato late blight facts

- Caused by the fungus *Phytophthora infestans*.
- Symptoms include pale lesions on the tips or margins of young foliage, eventually turning black and sometimes surrounded by a yellow halo; downy white mildew on the underside of leaves in humid conditions; the skin of tubers develops purple-brown blotches.
- Various strains found in potato-growing areas throughout the world, including the Americas, Europe, Asia, Africa, the tropics and Australia.
- Spread through infected tubers, or by wind or water dispersal of spores carried on the underside of leaves.