A partnership between private- and public-sector organizations, brokered by INIBAP, is helping small-scale growers in Luzon return to producing their preferred traditional cultivar, Lakatan, after a devastating disease epidemic.

Bringing back an old favourite, the capitalist way

Most Filipinos reckon that the Cavendish dessert banana, the staple of world trade, is good for only one thing: export to less discerning consumers overseas. They prefer the more complex ‘sweet-acid’ taste (with aromatic overtones) of their own Lakatan variety. However, an outbreak of banana bunchy top virus (BBTV) that has been building steadily over the last three decades (see A stealthy attack) has effectively put out of production the small producers of the Philippines’ northern island of Luzon, who previously supplied much of the national market. You can still find Lakatan in the busy fruit markets of Manila, the capital, but the price is high and much of the crop is now grown by large-scale producers, some of them multinationals, in plantations on the southerly island of Mindanao. Producing Lakatan

The key to success seems to lie in assuring a reliable supply of high-quality tissue culture plants at the right price

Intensive banana plantations in the south of the Philippines support rehabilitation of smallholder production in the north.
for the home market provides a profitable side-line to their principle business of exporting Cavendish bananas to Japan and Korea. From a technical point of view, there is a relatively straightforward solution to the BBTV problem, based on the use of tissue-culture plantlets that are free of the virus and indeed other pests and diseases. Where the virus pressure is fairly low, growers may be able to get away with uprooting and replacing only the infected plants. However, there are multiple advantages, even for small-scale producers, in going over entirely to replanting regularly with tissue culture plants - if necessary annually - as many of the large plantations have done. There are fewer uncertainties in such a system and farmers have the option of introducing rotations with other crops, such as legumes, that diversify their sources of income and help to restore soil fertility. The rotation can also prove beneficial in managing other key soil-borne pests, such as nematodes.

So why hasn't everyone switched over to using tissue-culture plants? Some farmers may be daunted by the labour involved in clearing and replanting their entire crop. However, the key to success seems to lie in assuring a reliable supply of high-quality tissue culture plants at the right price. “The government has tried before to supply tissue-culture plants directly to small-scale farmers,” recalls Gus Molina, INIBAP’s team leader in the Philippines. “But resources were invested in small-scale facilities, run by the public sector, that often did not have the necessary management skills to deliver an adequate product at a viable price.” It takes only one bad batch of plants, already infested with the virus or showing ‘somaclonal variation’ – mutations that often occur after plants have been maintained for too many cycles in tissue culture - to undermine the confidence of farmers in this technology and deter them from investing in it.

**A second chance**

INIBAP is revisiting the problem, bringing in private partners. With the support of the national government, through the Philippines Council of Agricultural Resources Research and Development (PCARRD) and the Department of Agriculture-Bureau of Agricultural Research (DA-BAR), INIBAP has teamed up with one of the largest national producers of bananas, Lapanday Foods, based near Davao in the southern island of Mindanao, to provide the springboard for a major new effort to help the smallholder producers of Luzon. Why should it be different this time? Lapanday has large-scale tissue-culture facilities, producing some 3 million Cavendish plantlets each year to support its own export plantations. These provide the technical base and economies of scale that allow Lapanday to supply high-quality plants of other varieties at a price that even small-scale farmers can afford. Lapanday assures quality by keeping its stock cultures of mother plants free of viruses and other diseases. Plants are ‘indexed’ to ensure they are
humanitarian initiatives that the company undertakes. “Yes, we embarked on this initially as just another way of trying to help local communities,” explains Emily Fabregar, Research and Development Manager of the subsidiary Lapanday Agricultural and Development Corporation that supplies the plantlets. “We had some spare capacity in our production facilities and this seemed a useful way to keep them busy.” However, this sideline is showing signs of growing into a viable business. Last year, Lapanday produced some 800 000 plantlets of several traditional cultivars and a few new hybrids, mostly to growers in the northern part of the country. “So far, this is not a real money-spinner for us,” continues Fabregar “but we are now covering our costs and that’s a good start on the way to profitability!” The supply of other cultivars can be fitted into ‘dips’ in the Cavendish production and the

plantlets go to growers who do not compete directly with Lapanday’s export banana business – which also makes sense from the perspective of business strategy.

Good quality plantlets are, however, only the first part of the story. Tissue culture plantlets are too small and tender to go straight into the field. They must be carefully grown on, under light shade and with ample water, to produce robust planting material. This is where other pilot projects have sometimes foundered: individual farmers may not be able to cope with large numbers of plantlets, in need of intensive care. Yet, if specialist nurseries take on the task of hardening and distributing the plants, costs can quickly get out of hand. In a pilot version of the scheme, mentioned in last year’s Annual Report, INIBAP and national scientists trained

The plantlets are hardened off in nurseries (Quirino State College nursery, above) before being planted by farmers (right).

A network of partners to reach farmers

INIBAP — Annual Report 2004

Emily Fabregar of Lapanday, the private company that produces plantlets for small-scale farmers.
some farmers to carry out the hardening off as a small business. They purchase the plants at the equivalent of 0.10 US$ and plant them in specially prepared compost (often based on coir dust, a by-product of the Philippines coconut industry), in plastic bags. They grow them for six weeks in plastic bags under shade netting and sell the robust, ready-to-plant bananas to other farmers at a price of about 0.30 US$. That is a manageable price for most growers but provides the nursery owners with an adequate margin. Of course, what is ‘manageable’ depends a good deal on the circumstances and perceptions of the individual farmer. For some, micro-credit enterprises can play an important role in helping to make tissue-culture plantlets a viable proposition. In Quirino province, for instance, one of the farmers working with the project, Mercurio ‘Mokong’ Antimano, participated in the September 2003. On the basis of his early success, Mokong intends to use his grant money to expand his planting by two-and-a-half hectares. Asked which he would rather use, tissue-culture plantlets or suckers, Mokong confidently answers: “tissue-culture plantlets, due to uniformity and more income.”

**Enlarging the partnership**

Having proved the basic viability of the system, INIBAP, PCARRD and DA-BAR are now teaming up with various public-sector partners to help move the project on to the next level. Lapanday has a minimum order of 2000 plantlets – enough for about one hectare of plantation. These can be sent by air freight and courier service to any part of the Philippines that has an air service. Few individual farmers in Luzon can envisage ordering and planting so many plants at once, so a strategically chosen set of regional universities are currently acting as intermediaries, consolidating orders from many farmers and training some of them, as INIBAP has done previously, to set up nurseries and harden off the plants.

Cavite State University is one such institution that has taken up the challenge. Building on a sound reputation in coffee research and development, the staff at Cavite has taken up the project with enthusiasm. “This is the kind of work, bringing research and the results of research to local communities, at which we excel and which we really enjoy” enthuses Simeon Crucido, Vice-President for Research and leader of Cavite’s banana research team.

Along with the familiar Lakatan, farmers are testing new dessert and cooking bananas that are emerging with good report cards from INIBAP’s International Musa Testing Programme. Some farmers are certainly finding that the new production system and new varieties meets their needs. Domingo ‘Domeng’ Mojica, a banana farmer in Banaba Cerca, is one of the groups working with Cavite State University. He initially obtained 100 tissue-culture plantlets of Lakatan, Bungulan, FHIA-23, FHIA-25 and Grande naine from Quirino State University in INIBAP — Annual Report 2004
A stealthy attack

“...It’s hard to pinpoint the start of the banana bunchy top epidemic,” according to INIBAP’s coordinator for Asia and the Pacific, Dr Gus Molina – a pathologist and Filipino banana enthusiast. “The disease has been here since at least the 1950s and 1960s but it has spread rather slowly and unevenly. In a way the severity of the situation has crept up on us and many small-scale producers were put out of business or switched to other crops before we were able to help them find ways to get on top of the disease.”

The virus is spread by the banana aphid, Pentalonia nigronervosa. Their infestation of the crop is much less obvious than that of many other aphids because their relatively small colonies mostly remain hidden within the overlapping leaf bases that form the ‘trunk’ of a banana plant. The aphid causes little obvious damage by its feeding and the first symptoms of the virus it has transmitted may be obvious only during the plant’s next growing cycle when the sucker, intended to replace the ‘mother plant’, instead emerges severely stunted. Large-scale plantation growers are highly disciplined about uprooting such infected plants at the first sign of disease and so keep ahead of the disease. No further fruit can be expected from the virus-infected plants but smallholders, perhaps not understanding the nature of the disease or the urgency of the threat it poses, may well leave the plant to become a source of infection for the rest of the farm. “By the time they have realized how bad the problem is and obtained a proper diagnosis of the disease from an extension agent, it’s probably too late to save the crop”, explains Molina. “Many farmers do not have the resources, the reserves, to recover from a wipe-out like that.”

As so often with pest and disease problems, especially those involving vector-borne diseases whose stealthy spread may be poorly understood by farmers, the path to a solution begins with farmer education. Once farmers understand the ecology of pest and disease problems, they are better able to make informed decisions on counter-measures, including any decisions on investment to be made in new technologies such as tissue-culture plants. Meanwhile, researchers have their own work cut out, to add to our understanding of the disease. For instance, they need to discover whether any of the numerous alternative host plants for the aphid vectors are, in practice, important to the epidemiology of the disease and whether other crops or wild species can serve as reservoirs for the virus. At the moment researchers are not even sure whether other banana cultivars such as Saba – a cooking banana, also popular in the Philippines – that do not show virus symptoms may actually be harbouring the disease.

Production is taking hold again in Luzon but in the meantime the new varieties offer the possibility of diversifying farmers’ production and so spreading their risks.

The universities or other public-sector bodies will probably continue to be partners in the sense of providing technical back-up, perhaps quality control for the plantlets, and watching out for any future threats to the system. The Philippines government has enough confidence in the future of this initiative to have taken over the support of the present development phase from INIBAP’s international donors and there is already talk of building up to a nation-wide project.

Meanwhile, INIBAP is continuing to work with some of the research partners to put in place the next steps and other options for a viable, resilient production system. Among the questions still being investigated are the length of time that a farmer can expect to go before needing to replant with fresh tissue-culture bananas and the best crops to use as rotations with banana to prevent the build-up of nematodes. Molina expects annual re-planting to be necessary only in the areas subject to the heaviest BBTV pressure – and research is being conducted, for instance on the epidemiology of the virus, to try to understand what it is about these areas that favours the virus.

Among the lessons that INIBAP is learning through this project is how to work with diverse public- and private-sector partners to solve practical problems within the constrains of an economically competitive industry. And, as the technical problems are resolved in the Philippines, INIBAP is working through its BAPNET regional networks to identify new partners with whom to sow the seeds of the same success in other countries.

October 2003. By his own admission, he was very sceptical at first: how could these tiny plants ever give him a vigorous plant with a big bunch? But with the new plants and advice from INIBAP and Cavite State, Domeng was able to maintain his farm disease free and turn a profit. His mother plants produced heavy bunches and he is currently able to sell his bananas at PhP250-300/bunch. “I earn enough income from bananas which now go to my savings,” he muses. For the next planting season, Domeng has orders pending for more tissue-culture plantlets. It’s too early to say whether Lakatan bananas which now go to my farmers' production and so spreading their risks