



Pictured recently at chlorotic streak trials at Woodford are SRA staff Priyanka Wickramasinghe, Kathy Braithwaite, Barry Croft, Mona Singh, and Chuong Ngo.

## Pathology research puts industry on a strong footing

*Retiring SRA plant pathologist Barry Croft has played an integral role in vital industry research into biosecurity issues over 38 years. By Amy Claireton*

There's never a dull moment when it comes to dealing with exotic pests and diseases that threaten the cane industry and retiring SRA plant pathologist, Barry Croft has certainly been in the thick of things during his 38-year career.

Based in Tully for 17 years, Barry led the pathology team investigating possible causes for poor root syndrome, which was suppressing yields for farmers despite significant advances in varietal performance.

The outcome of their investigations was the identification of an oomycete that was completely new to science, later named *Pachymetra*. This fungus-like organism was found to be present in soils throughout the cane growing regions of Australia.

While the only crop it affects is sugarcane, *Pachymetra* is only found in Australia so, although not confirmed, the expectation is that it probably also has native plant hosts.

Having identified *Pachymetra* root rot as one of the causes of poor root syndrome, a new area of work opened up for the pathology team to help the Yield Decline Joint Venture to develop farming systems to address the wider problem of yield decline.

Barry developed a method of rating varieties for their resistance to *Pachymetra*, a major control measure now used to supply the industry with varieties that produce well in the presence of *Pachymetra* in the soil.

The close working relationships that Barry fostered between the plant pathology and plant breeding teams has served the industry well through the responses to orange rust and sugarcane smut outbreaks and, most recently, to lessen the effect of chlorotic streak disease on yields.

Although ratoon stunting disease (RSD) had been identified in Australia in 1944, diagnosis remained a problem because

the disease has no external symptoms. Barry trained Productivity Service staff in using microscopes to diagnose the disease and then developed a new ELISA test in 1993 that has since been the industry standard method and been used to process over 500,000 samples in laboratories at Tully, Mackay and Indooroopilly. The ELISA test is also used to screen varieties for resistance to RSD.

Barry worked closely with Productivity Services to develop protocols to ensure the highest level of quality control for the 'disease-free' or 'approved seed schemes' that operate in each growing area.

The nucleus of disease free material is hot water treated in successive years before planting into the plots to ensure the planting material distributed to farmers is free of RSD.

The protocols Barry prepared for the 'disease-free seed scheme' have stood the test of time and although the scheme is now being replaced with tissue culture propagation in some growing areas, the SRA disease-free plots still provide starting material for tissue culture of new varieties.

In 1995, the pathology and plant breeding teams identified sugarcane smut as a disease with a high risk of causing production losses in Australia, the disease having already spread to nearly every other sugarcane producing country. A contingency plan was prepared and published in 1997 only to be implemented almost straight away when sugarcane smut was identified in the Ord, WA, in 1998.

Once again, screening varieties for their resistance to the disease has been a central component to the industry's response. Initially screening was conducted on an isolated Indonesian island where it was possible to test more clones against the sugarcane smut pathogen before they advanced through the breeding program.

The eight years of screening varieties prior to the eventual outbreak in Queensland in 2006 had rated the existing varieties and ready to release varieties for resistance to the disease and so Barry was able to provide growers with the information they needed to move as quickly as possible to resistant varieties.

With sugarcane smut now present in all growing areas the screening program in Indonesia was closed and the work is now done at the SRA research station at Woodford, along with screening for other diseases.

Barry says the smut screening program initially tested 2000 clones/year and found 50–60 percent were susceptible to sugarcane smut, but 10 years later the best smut-resistant parents have been identified and as many as 80 percent of the clones tested each year now 'pass' the sugarcane smut test.

Just as he started, Barry is finishing his career with SRA with another world-first discovery to solve a 90 year-old mystery.

He and fellow pathologists Kathy Braithwaite and Chuong Ngo have uncovered the cause of chlorotic streak disease. The new protozoan will soon be described to the scientific world in a published paper but already Barry and the team have set up the variety screening protocols where new varieties can be inoculated with the pathogen and rated for their resistance.

Barry is thrilled to be leaving SRA on such a high note later this year, having been instrumental in identifying the cause of a disease that affects sugarcane crops across the world, using the latest of DNA technology along with traditional plant pathology laboratory techniques to isolate the pathogen and grow the cultures for the inoculum.

Barry is confident that the Sugar Industry Biosecurity Plan recently developed with Plant Health Australia, and the individual contingency plans for known exotic insect pests and diseases, will serve the industry well into the future.



Left: Barry Croft during the sugarcane smut incursion at Childers in 2006.



Below: Barry Croft speaks to ABC television recently regarding SRA's biosecurity and disease work.