

## Dr Priya Joyce

Project Leader

### Sugarcane plastid transformation, CRC SIIB

Priya experiments with sugarcane chloroplasts for a living, with a view to using them to fast track new and beneficial products into sugarcane. Way off in the future, this could mean that sugarcane might grow sugar much more efficiently and sustainably or it might be used to grow something as fantastic as biodegradable plastics or other novel products.

Officially, Priya is working on sugarcane genetics. She is trying to get a system up and running that transforms the genome of chloroplasts (the photosynthetic organelle of the plant). Chloroplasts can multiply quickly, so are useful as a tool to express specific plant proteins. It is a platform technology. Priya's team is interested in systems that can maximise the efficiency of the transformed plant to produce more of the product of the introduced gene. For example, if scientists wanted to make plastic in plants and the way to introduce the gene for plastic production into sugarcane chloroplasts was established; then the fact that chloroplasts multiply quickly, would allow efficient plastic production in the plants.

Having said this, no one to date has found such a system and harvested the transformed chloroplasts in sugarcane.



#### Cutting edge research

The fact that this work is highly experimental gives Priya the freedom to test a lot of ideas. She gets a buzz when her hypotheses hold true. She feels the technology has a good chance of helping sugarcane farmers once it is proven. Within the strict regulatory guidelines, it may be possible to produce plants with all sorts of add on benefits such as better water use in drought resistant sugarcane, more efficient and higher sugar content sugarcane and possibly bio-plastics or bio-fuels.



She enjoys her work and stresses that research is a great career for a married woman with a family. The main personal benefits she sees are that it keeps her brain active and keeps her organised. Having been through various stages of life with her family and career, she feels confident that a woman with family returning to research is always very employable because, almost by definition, she has to be dedicated to the research to want to manage the juggle.

### Early career

Priya grew up in India, in Pune on the west coast. She was interested in science so studied for her Bachelor of Science at Delhi University; her Masters in Agricultural Science at the Delhi-based Indian Agricultural Research Institute, then was offered a scholarship to do a PhD in plant physiology and biochemistry at the University of Adelaide. She met her husband there and moved to Brisbane where

they had three children. Her research career was interrupted for about 10 years while she looked after family. Then in 1993 she successfully applied for a re-entry post doctoral fellowship at the University of Queensland and worked part time in UQ's biochemistry department for two years. This suited her perfectly and she was grateful for the fellowship. Biotechnology was a relatively new field, so it was exciting and interesting to be one of the pioneers. Her research has looked at systems for introducing genes into food crops. Her first success was a system to introduce new genes into barley.

In 1995 she joined BSES Limited (formerly the Bureau of Sugar Experimental Stations) in Brisbane full time and successfully introduced genes for resistance to sugarcane mosaic virus. After stints in the UK and Melbourne for her husband's work, she started with the CRC SIIB in 2004.



Level 5, John Hines Building  
The University of Queensland  
St Lucia, Queensland 4072

telephone +61 7 3365 7502  
facsimile +61 7 3365 4773

email [innovate@crcsugar.com](mailto:innovate@crcsugar.com)  
website [www.crcsugar.com](http://www.crcsugar.com)

