BioSpectrum
the business of Bio & Health Sciences
ASIA EDITION

Research shows way to engineer high-yield crops

05 March 2013 | News | By BioSpectrum Bureau

Singapore: New research has uncovered a mechanism that regulates the reproduction of plants, providing a possible tool for engineering higher yielding crops.

In a study published in *Science*, researchers from Monash University and collaborators in Japan and the US identified for the first time a particular gene that regulates the transition between stages of the life cycle in land plants.

Professor John Bowman of the Monash School of Biological Sciences said plants, in contrast to animals, take different forms in alternating generations - one with one set of genes and one with two sets. "In animals, the bodies we think of are our diploid bodies - where each cell has two sets of DNA. The haploid phase of our life cycle consists of only eggs if we are female and sperm if we are male. In contrast, plants have large complex bodies in both haploid and diploid generations," said Prof Bowman.

These two plant bodies often have such different characteristics that until the mid-1800s, when better microscopes allowed further research, they were sometimes thought to be separate species.

Prof Bowman and Dr Keiko Sakakibara, formerly of the Monash School of Biological Sciences and now at Hiroshima University, removed a gene, known as KNOX2 from moss. They found that this caused the diploid generation to develop as if it was a haploid, a phenomenon termed apospory. The equivalent mutations in humans would be if our entire bodies were transformed into either eggs or sperm.

"Our study provides insights into how land plants evolved two complex generations, strongly supporting one theory put forward at the beginning of last century proposing that the complex diploid body was a novel evolutionary invention," Prof Bowman said.

While Prof Bowman's laboratory in the School of Biological Sciences is focused on basic research exploring the evolution and development of land plants, he said there were possible applications for the results as mutations in the gene cause the plant

to skip a generation.

One goal in agriculture is apomixis, where a plant produces seeds clonally by skipping the haploid generation and thereby maintaining the characteristics, such as a high yielding hybrid, of the mother plant. Apomixis would mean crops with desirable qualities could be produced more easily and cheaply.

"Gaining a better understanding of the molecular basis of plant reproduction and the regulations of the alternation of generations could provide tools to engineer apomixis â€“ a breakthrough that would be highly beneficial, especially in developing countries," Prof Bowman said.