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## Manipulation of a bHLH transcription factor to generate male sterility line in rice

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Hybrid rice is a promising strategy to increase grain yield by 15-20%. Stable male sterility line is important for pure F1 hybrid seed production. We identified a male-sterile TRIM mutant without pollen development in rice. Southern blot indicated that this mutant is single T-DNA insertion even. Heterozygous mutant is fertile and homozygous line is male sterile. Our genetic analyses confirmed that the male sterility in this mutant is controlled by a single recessive locus. Knockout mutant cannot enter meiosis, defects in tapetal programmed cell death and hypertrophy tapetal cells, consequently lead to no pollen development. To know more about the molecular function of bHLH142, we overexpressed bHLH142. Surprisingly, OE lines also showed male sterility. OE caused premature onset of tapetal PCD, defective in ROS scavenging in the anther. Altered expression of several key regulatory transcription factors such as UDT1, GAMYB, TDR1, and EAT1 were found upregulated in OE anther. Our detail molecular study demonstrated that bHLH142 and TDR1 form protein-protein interaction and co-modulate transactivation of *EAT1*. Either knockout or OE of bHLH142 both lead to defect or premature PCD, eventually all turn out to be sterile. Indicating that homeostatic and tightly control of bHLH142 expression is essential for normal pollen development. This study provides a new method to generate genic male sterility in rice and possibly in other cereal crops too. Moreover, exploitation of this novel functionality of *bHLH142* would confer a big advantage to hybrid seed production.

### Biography

Rachel Swee-Suak Ko devoted herself in functional genomic studies in rice and orchid. She identified a key bHLH transcription factor in rice that is essential in rice pollen development. She is interested to carry out detail study on the molecular mechanism underlying pollen development to improve agriculture application of male sterility line for hybrid rice yield improvement.

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