

Category	: International Rice Research Conference
Select Theme	: Genetic improvement
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Keyword 1	: Genome editing
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Title of Entry	: Dwarf and male sterile rice: a new breeding tool developed by RNA interference
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Abstract : RNAi is a powerful tool for genetic improvement of crops by silencing specific genes. However, RNAi-mediated dual-traits suppression has not yet been reported. The plant height and male sterility are the most important traits for genetic improvement of rice. In order to regulate plant height and male sterility of rice synergistically, we adopted RNAi strategy to suppress expressions of endogenous genes OsGA20ox2 (GenBank: AF465255) and OsEAT1 (LOC_Os04g510701). Fragments of the genes were joined for the hairpin structure of the RNAi vector pTCK-EGGE that was used for Agrobacterium-mediated transformation of the japonica rice variety Zhongzuo0201 (Z0201) to develop dwarf and male sterile (DMS) rice. The pTCK-EGGE induced DMS rice plants exhibited complete male sterility and plant height about 40-60% of that of the wild-type (WT, non-transgenic Z0201) plants. The progenies of the DMS rice were clearly distinguishable from the WT in T0, T1, T2 and T3 populations and inherited following the Mendelian ratio (1:1). The qRT-PCR analysis showed that expressions of the endogenous target genes were significantly suppressed in

DMS rice, indicated that the RNAi vector pTCK-EGGE could synergistically silence expression of the two endogenous genes in DMS rice from generation to generation. Except for the targeted traits (plant height and fertility), other yield relevant traits of the DMS rice were not significantly different from those of the WT. As expected, the progeny population of a DMS rice plant pollinated by the WT plants consists of 50% of DMS rice plants and 50% of tall and male fertile (TMF) plants which harbors no T-DNA (transgenes) and therefore elite lines from the TMF plants can be commercialized without biosafety concerns of GM crops. Since it is very easy to identify the DMS rice based on the shorter plant height, crossing between DMS rice and any other normal rice plants can be easily done without emasculation. DMS rice will provide a favorable tool for rice recurrent selection, or a genetic tool for highly efficient pyramiding of multiple genes in rice breeding.

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