

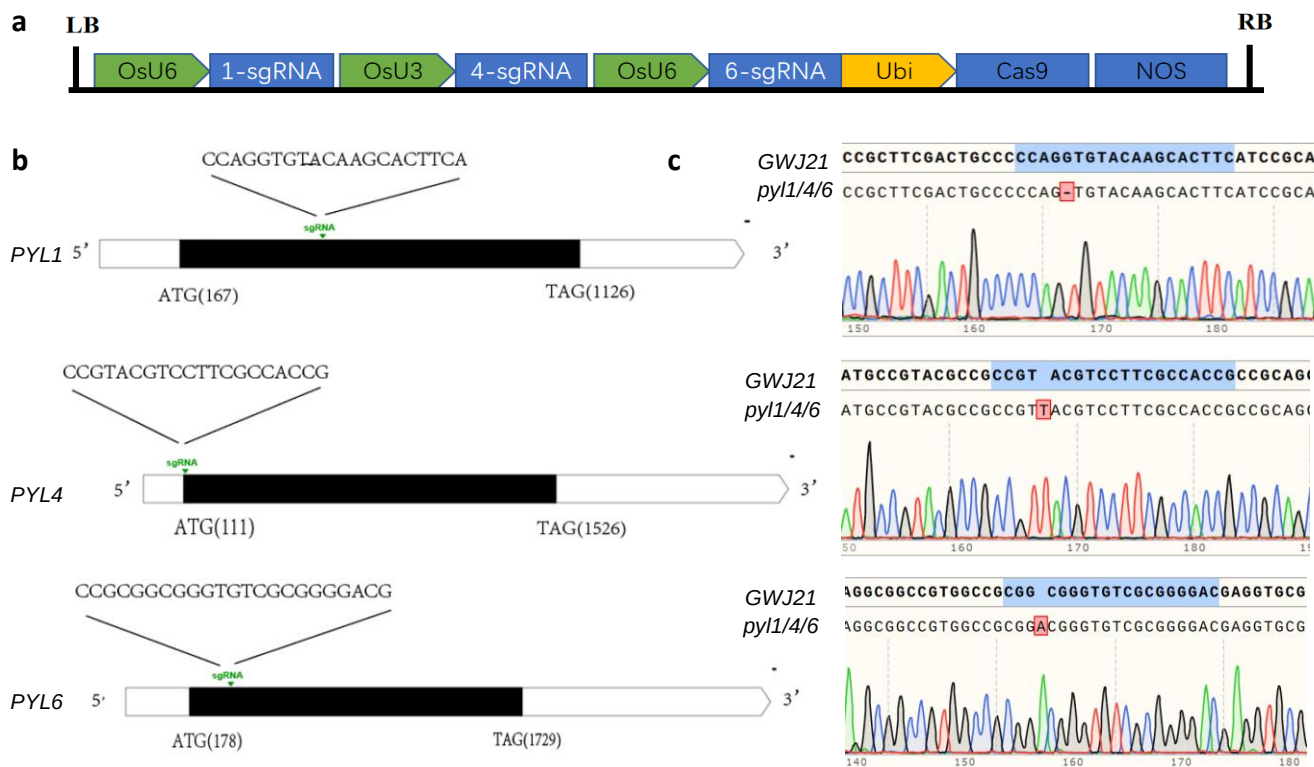


Fig. S1 Construction of the *pyl1/4/6* mutant in the background of GWJ21 using CRISPR/Cas9. **(a)** Schematic diagram of CRISPR/Cas9 vector designed for editing *PYL1/4/6* genes. **(b)** Target sites for the editing of *PYL1/4/6* genes. **(c)** Mutation types observed in *pyl1/4/6* mutant.

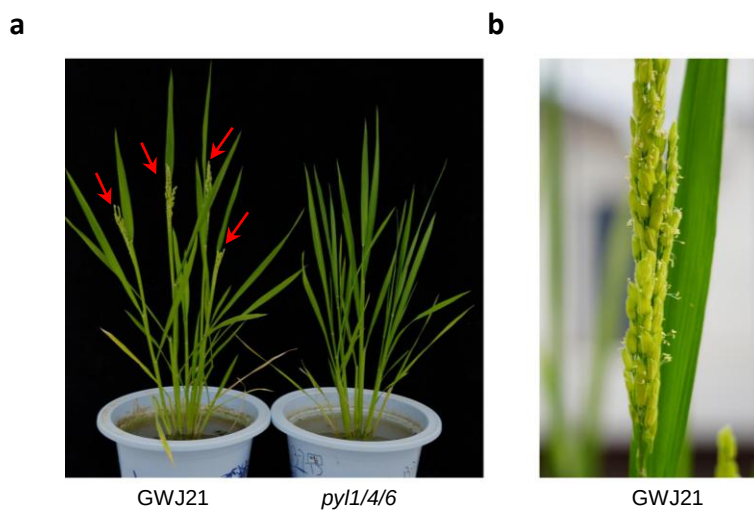


Fig. S2 The *pyl1/4/6* mutant exhibited a delayed heading date in comparison to GWJ21. GWJ21 and *pyl1/4/6* plants were grown in pots under the outdoor conditions of Sanya for 45 days. Red arrows indicate the flowers.

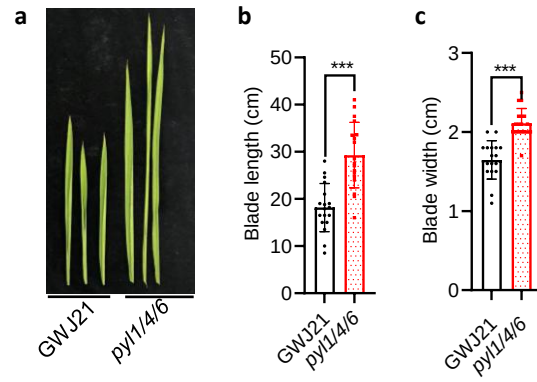


Fig. S3 The *pyl1/4/6* mutant has larger blades. **(a)** Blades from 60 days old plants grown in the field of Sanya. **(b)** Blade length, $n=20$. **(c)** Blade width, $n=20$. Values are means $\pm$ SD, and asterisks represent significance of Student's *t*-test between GWJ21 and *pyl1/4/6*, *** $P < 0.001$.

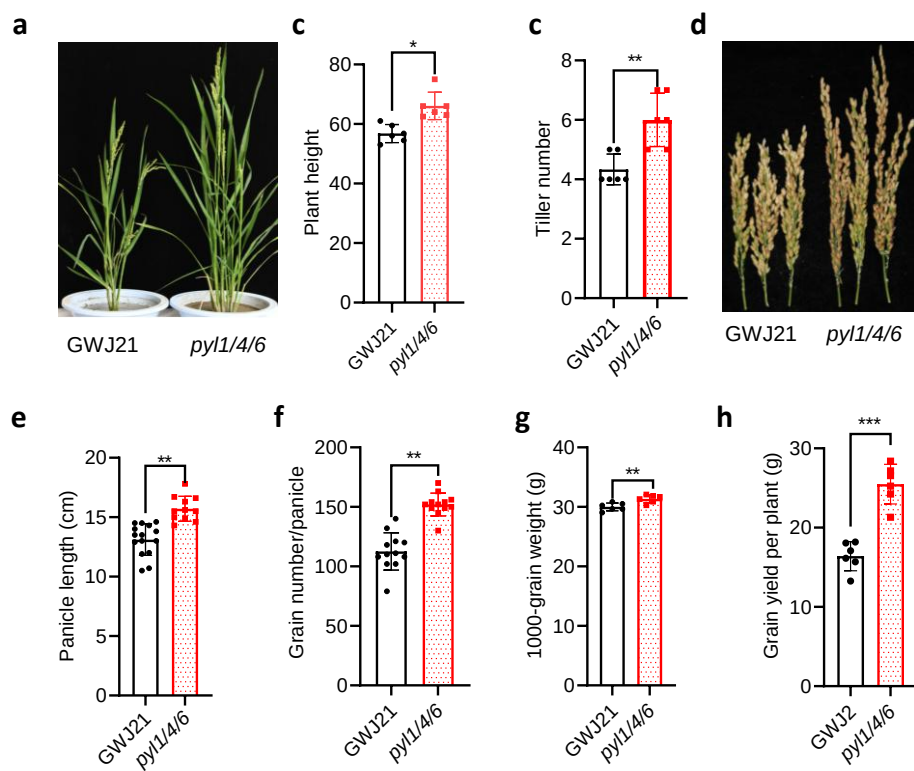


Fig. S4 Reproductive traits of GWJ21 and *pyl1/4/6* grown in pots. Plants at 60 days **(a)**, plant height **(b)**, and tiller number **(c)**, $n=6$. Panicle phenotype **(d)** and panicle length **(e)**, $n=16$. **(f)** Grain number per panicle, $n=12$. **(g)** 1000-grain weight, $n=6$. Values are means $\pm$ SD, and asterisks represent significance of Student's t -test between GWJ21 and *pyl1/4/6*, * $P<0.05$, ** $P<0.01$, *** $P<0.001$.

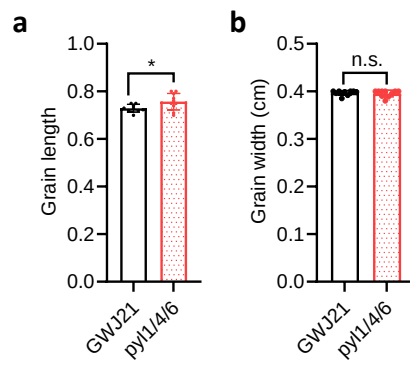


Fig. S5 Grain length and width from plants grown in the field of Sanya. Data represent measurements from 10 plants. Values are means $\pm$ SD, and asterisks represent significance of Student's *t*-test, $*P < 0.05$, n.s. represents no significant difference.

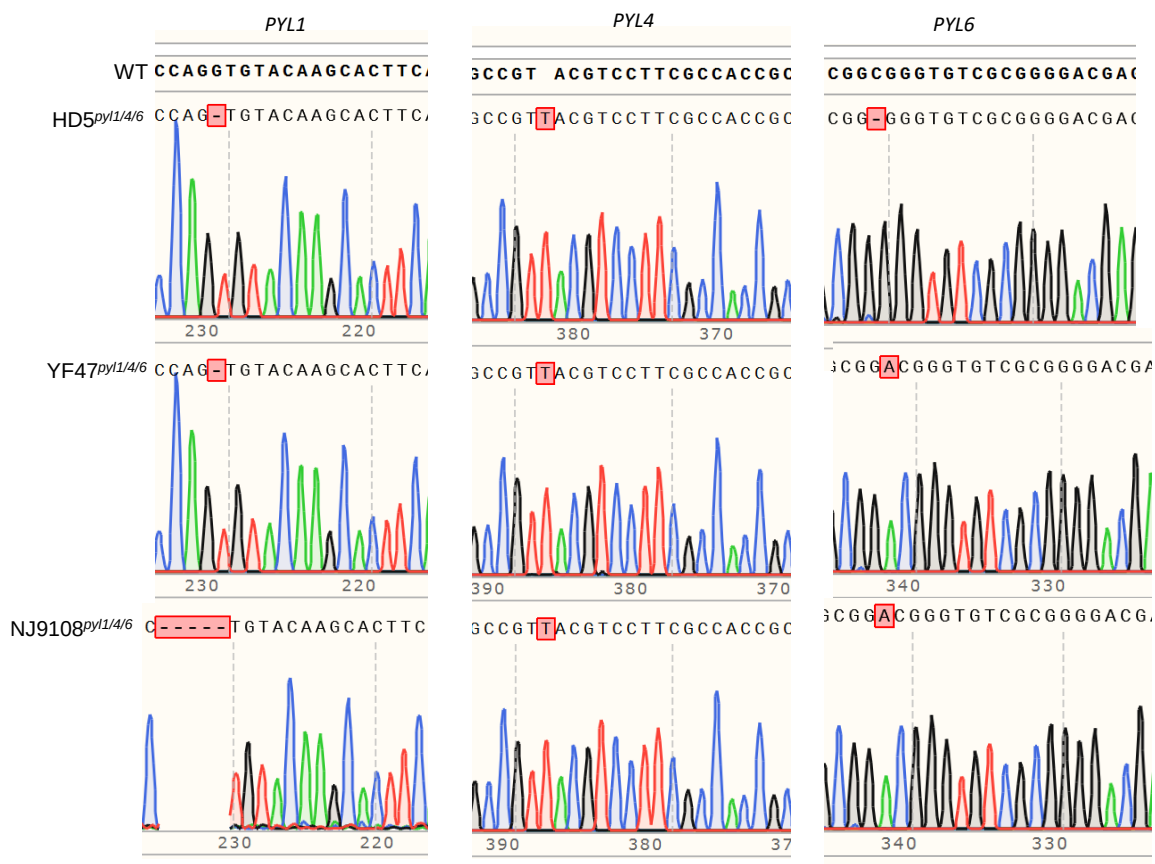


Fig. S6 Mutation types of the *pyl1/4/6* mutants in the background of japonica varieties using CRISPR/Cas9. *Huaidao 5* (HD5), *Yanfeng 47* (YF47) and *Nanjing 9108* (NJ9108).

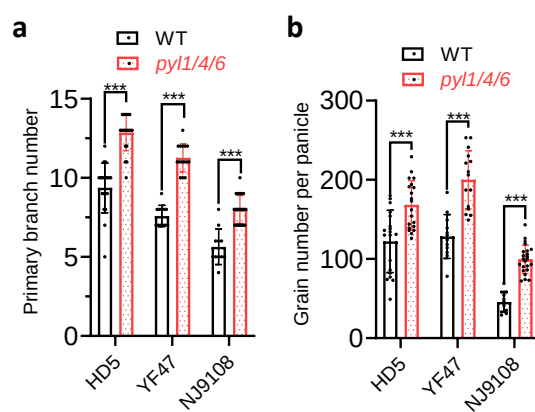


Fig. S7 Agronomic traits of WT and *pyl1/4/6* panicles in *japonica* varieties. **(a)** Primary branch number; **(b)** Total grain number per panicle. Data represent measurements from 20 panicles. Values are means $\pm$ SD, and asterisks represent significance of Student's *t*-test, * $P < 0.05$, ** $P < 0.01$, *** $P < 0.001$.

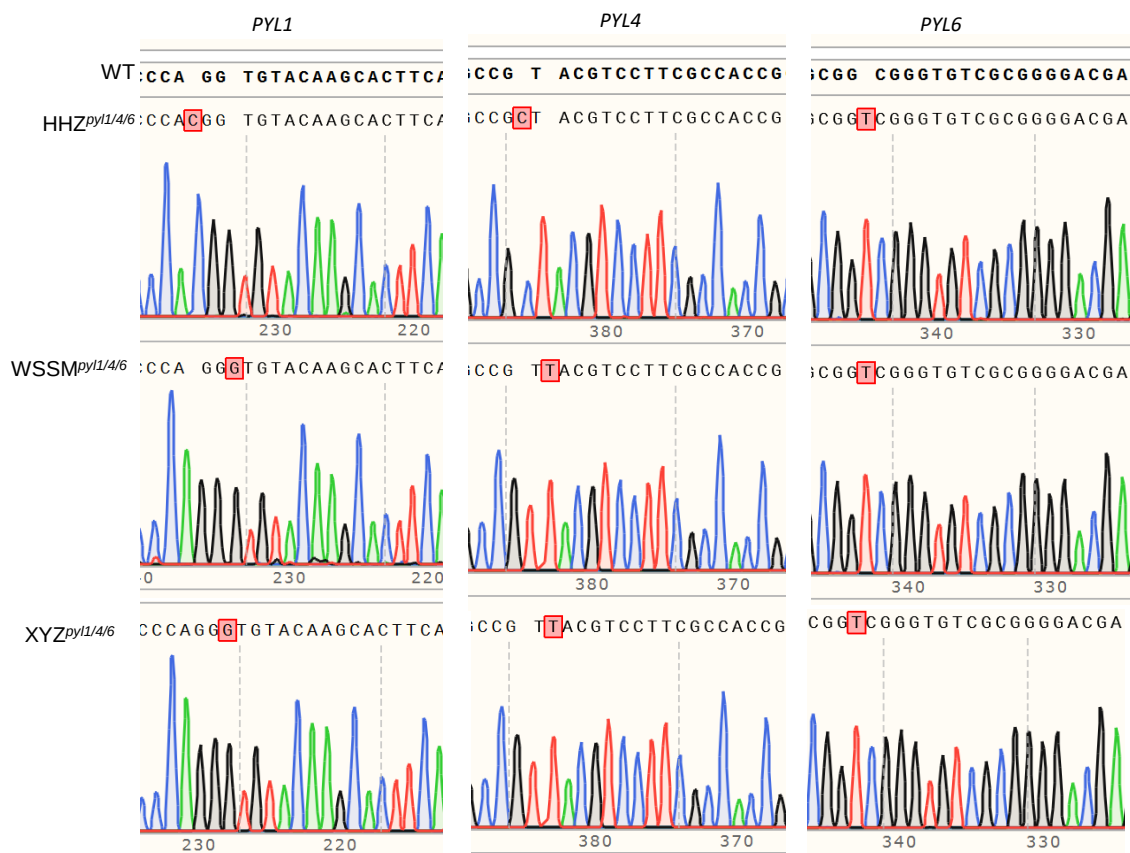


Fig. S8 Mutation types of the *pyl1/4/6* mutants in the background of *indica* cultivars. *Huanghua Zhan* (HHZ), *Wushan Simiao* (WSSM), *Xiangya Zhan* (XYZ).

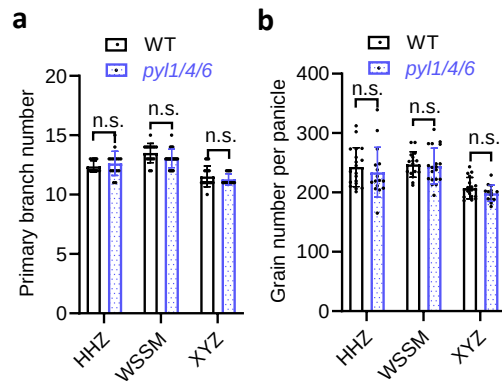


Fig. S9 Agronomic traits of WT and *pyl1/4/6* panicles in *indica* varieties. **(a)** Primary branch number; **(b)** Total grain number per panicle. Data represent measurements from 20 panicles. Values are means $\pm$ SD, and asterisks represent significance of Student's *t*-test, n.s. represents no significant difference.

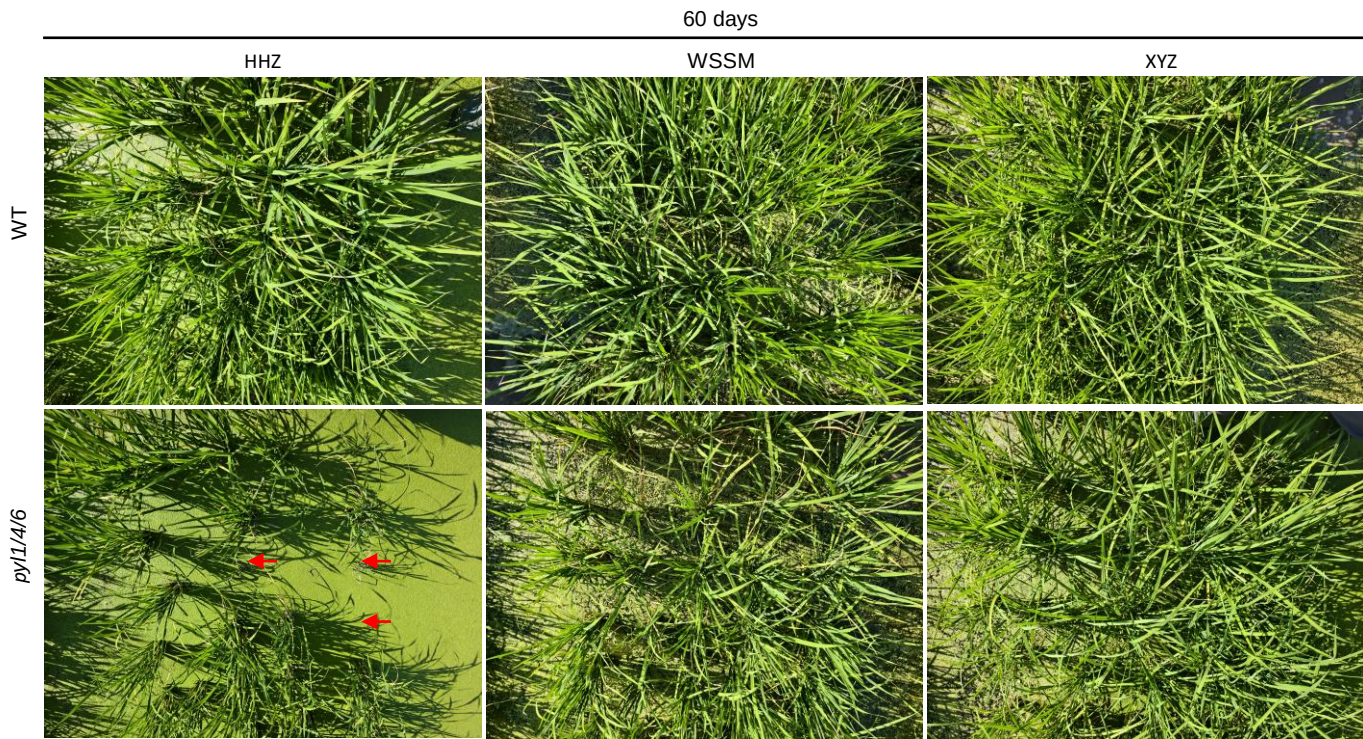


Fig. S10 Overview of *indica* wild-type plants and their *pyl1/4/6* mutants grown in field of Sanya for 60 days under tropical summer conditions (July). The *pyl1/4/6* mutants display poor viability, with smaller plants or even plant lethality (red arrows).

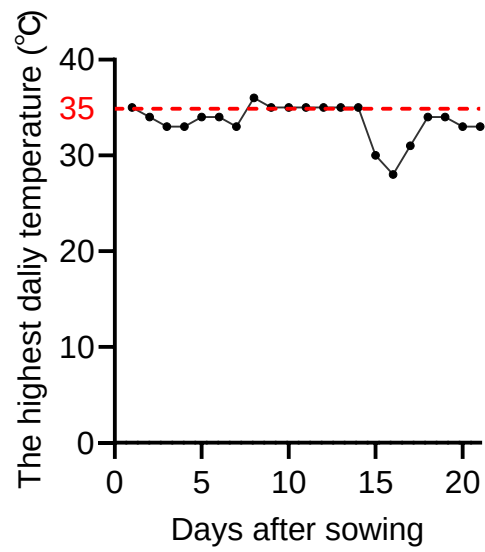


Fig. S11 The highest daily temperature during the heat wave assay of seedlings. Red line indicate the threshold (35°C) of heat waves.