**Table S1.** The growth period from sowing to maturation of R382 and Huazhan in 2022 and 2023.

| Year | Variety | Total duration (day) | Sow date | Initial heading date | Full heading date | Maturation date |
|---|---|---|---|---|---|---|
| | | | month-date | | | |
| 2022 | R382 | 126 | 05-31 | 08-26 | 09-02 | 10-04 |
| | Huazhan | 119 | 05-31 | 08-16 | 08-24 | 09-27 |
| | R382 | 125 | 06-07 | 09-03 | 09-10 | 10-10 |
| | Huazhan | 121 | 06-07 | 08-24 | 09-03 | 10-04 |
| | R382 | 124 | 06-14 | 09-10 | 09-16 | 10-16 |
| | Huazhan | 119 | 06-14 | 08-30 | 09-10 | 10-11 |
| 2023 | R382 | 137 | 05-25 | 08-25 | 09-01 | 10-09 |
| | Huazhan | 130 | 05-25 | 08-14 | 08-19 | 10-02 |

Note: Initial heading date, the day when 10% of the plants were heading; Full heading date, the day when 80% of the plants were heading; Maturation date, the day when 80% of grains in most panicles were yellow.

**Table S2.** Primers used in this study.

| Gene Name | Gene ID | Forward primer (5´-3´) | Reverse primer (5´-3´) |
|---|---|---|---|
| *OsCAD2* | *Os02g0187800* | CGACCAGAAGTTTGTGGTGAA | GAAGTGCTTCAGTGGGCTGTA |
| *OsCOMT* | *Os08g0157500* | TCCTCATGGAGAGCTGGTACT | AGTGGTTCTTCATGCCCTCG |
| *CCoAOMT* | *Os08g0498100* | CGTTCGACTTCGTGTTCGTC | CAGAGCGTGTTGTCGTAGCC |
| *Os4CL1* | *Os08g0245200* | TTCCACATCTACTCGCTCAAC | GCCTCAGTCATTCCATACCC |
| *Os4CL3* | *Os02g0177600* | TCATCACTCACCCGGAGATCAAG | CCGGCAAGATCATCCTTCATCGAG |
| *OsPAL6* | *Os04g0518400* | TGAACAGCATGATGAACGGCA | AAACCGGATAAGCTCTCGCTG |
| *OsBC1L4* | *Os05g0386800* | AGTTAGGATGTTGAGCGACC | CTGGGACTACCAACAAGACA |
| *OsCESA4* | *Os01g0750300* | TCTACGGTTCAGTCACAGAGG | AGCCATTTCAGACGACCA |
| *OsMYB103L* | *Os08g0151300* | CTTAGAAGATGGCCAAACAGCC | TGGCCTCCAAGTTGGATGAT |
| *OsSWN1* | *Os06g0131700* | ATCGTCGCTACACGCAGACTTG | TCCATCGTCACCTCTTGTCTCC |
| *OsMYB46* | *Os12g0515300* | TATTGGGAGGGTCACCACCAAC | ACATTCCTGCTCATGTGCTGCTG |
| *OsSUT1* | *Os03g0170900* | ATGCGTGGGTCTATACAGTGAT | CAATAACTACGACAGCCAAGCA |
| *OsActin* | *Os03g0718100* | GACTCTGGTGATGGTGTCAGC | GGCTGGAAGAGGACCTCAGG |

**Table S3**. Traits related to lodging index of R382 and Huazhan.

| Year | Variety | internode | HT (cm) | FWT (g) | BS ($mm^{-2}$) | BM (g·cm) | LI |
|---|---|---|---|---|---|---|---|
| 2022 | R382 | N1 | 107.7±1.75** | 19.23±0.43* | 1182.9±97.60* | 2352.7±112.81** | 188.7±9.38* |
| | Huazhan | | 101.2±1.57 | 16.5±0.35 | 866.4±21.53 | 1956.5±84.19 | 228.7±13.4 |
| | R382 | N2 | 100.7±1.47** | 17.1±0.32* | 924.7±71.09** | 1936.7±113.03** | 194.8±13.55* |
| | Huazhan | | 92.7±1.30 | 14.5±0.26 | 629.5±42.03 | 1573.0±82.96 | 267.2±28.41 |
| 2023 | R382 | N1 | 123.2±2.19* | 24.6±1.00** | 754.7±72.71** | 3145.7±163.79** | 225.3±20.16** |
| | Huazhan | | 113.5±1.77 | 19.1±0.99 | 475.5±43.14 | 2056.3±130.23 | 375.6±42.98 |
| | R382 | N2 | 120.2±2.56* | 22.5±0.89** | 627.9±68.35** | 2715.4±147.23** | 280.0±24.97* |
| | Huazhan | | 108.8±2.21 | 16.7±0.90 | 346.9±42.93 | 1777.5±138.48 | 419.6±70.55 |

Note: HT, height from basal node of N1 or N2 to the panicle top; FWT, fresh weight of the plant from basal node of N1 or N2 to the panicle top; BS, bending stress; BM, bending moment; LI, lodging index. Data are shown as means ± SE of 12 replicates, * $p < 0.05$; ** $p < 0.01$ (compared with Huazhan; Student's *t*-test).