Supplementary figures and tables

Long shot of a greenhouse

Description automatically generatedLong shot of a greenhouse

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(a)

(b)

Fig. S1. Experimental upland fields used for (a) control and (b) drought treatments of the Otomemochi × Yumenohatamochi population at Nishitokyo, Japan.



Fig. S2. Maximum and minimum daily air temperature and daily rainfall. Timing of transplanting, drought imposition, rewatering, and periods of 50% flowering for genotypes in control and drought treatments are indicated.

Table S1. Summary of phenotyping experiments with the Otomemochi × Yumenohatamochi population (OY).

|  |  |  |
| --- | --- | --- |
| Experiment | Experiment 1 (2011) | Experiment 2 (2012) |
| Number of lines | 97 recombinant inbred lines (RILs) | |
| Experimental design | 11 × 11 Latin square | |
| Replications | 3 | |
| Dates of sowing / transplanting | 28 April / 23 May | 24 April / 25 May |
| Plant density | 20 cm × 20 cm hill space (1 plant per hill) | |
| Fertilizer management | Basal (13 May): 6 g/m2 N, 8 g/m2 P2O5, 9 g/m2 K2O, Ca2O4Si Supplementary\*: 2 g/m2 N | |
| Drought period | 5 July – 3 September (68–128 DAS\*\*) (60 days; very severe) | 19 July – 2 September (79–124 DAS\*\*) (45 days; severe) |
| Flowering period (control / drought) | 31 July – 24 August /  1 August – 25 September | 23 July – 20 August /  28 July – 23 August |
| Last harvest date (control / drought | 27 September / 22 October | 4 October / 4 November |

\*3 July 2011 (Experiment 1) and 5 July 2012 (Experiment 2); \*\* days after sowing

Table S2. Putative QTLs for drought response index (DRI) and production traits for the Otomemochi × Yumenohatamochi (OY) population*.* Experiment 1: 22 main-effect QTLs (control, 6; drought, 16). Experiment 2: 16 QTLs (control, 4; drought 12). Combined analysis: 12 QTLs (control, 4; drought, 8).

| **Experiment** | **Chr no.** | **Trait** | **Marker interval a** | **Position b** | **LOD c** | ***R*2 d** | ***A* e** |
| --- | --- | --- | --- | --- | --- | --- | --- |
| Experiment 1 | 1 | Total dry weight D | RM8147–RM6039 | 50.8 | 2.6 | 10.4 | 2.14 |
|  | 2 | DRI | RM3703–RM6911 | 37.4 | 5.9 | 19.9 | 2.24 |
|  |  | Grain dry weight after rewatering D | RM3703–RM6911 | 37.4 | 5.7 | 19.2 | 0.47 |
|  |  | Grain dry weight D | RM3703–RM6911 | 37.4 | 5.8 | 19.3 | 0.39 |
|  |  | Harvest index D | RM3703–RM6379 | 37.4 | 2.8 | 8.5 | 0.01 |
|  |  | Leaf rolling D | RM6933–RM3857 | 120.7 | 3.6 | 14.6 | −0.88 |
|  |  | Plant height C | RM6911–RM6933 | 97.8 | 2.6 | 24.1 | −4.00 |
|  | 3 | 50% flowering C | ~RM4853 | 0.0 | 3.1 | 10.6 | −2.14 |
|  |  | Grain dry weight before rewatering D | RM1332–RM3029 | 25.0 | 5.4 | 18.2 | 0.25 |
|  |  | Harvest index D | RM1332–RM3029 | 21.0 | 3.5 | 22.2 | 0.02 |
|  |  | Harvest index D | RM3029–RM3872 | 34.0 | 3.3 | 11.1 | 0.02 |
|  |  | Plant height reduction D | RM1332–RM3872 | 25.0 | 2.8 | 8.2 | −2.37 |
|  | 4 | Flowering delay D | RM3288–RM5503 | 91.6 | 2.7 | 18.8 | 4.99 |
|  | 5 | Grain dry weight C | ~RM2010–RM4501 | 8.5 | 3.0 | 35.5 | −3.52 |
|  |  | Harvest index D | RM4501–RM3476 | 96.5 | 3.2 | 11.5 | −0.02 |
|  |  | Plant height C | ~RM2010 | 1.5 | 4.5 | 20.9 | −3.77 |
|  |  | Plant height reduction D | ~RM2010 | 1.5 | 8.6 | 35.9 | −4.74 |
|  | 6 | Root dry weight C | RM2615–RM7023 | 46.0 | 2.5 | 11.8 | −0.39 |
|  | 7 | Plant height D | ~RM5711 | 10.5 | 3.3 | 14.0 | 2.32 |
|  |  | Total dry weight D | RM1353–RM6767 | 50.8 | 2.7 | 10.6 | 2.15 |
|  | 11 | 50% flowering C | RM536–RM206 | 68.6 | 2.9 | 9.4 | −1.98 |
|  | 12 | Leaf rolling D | ~RM247 | 8.0 | 4.0 | 46.4 | 1.65 |
| Experiment 2 | 1 | Harvest index D | RM5919–RM1297 | 111.6 | 2.8 | 9.2 | −0.03 |
|  |  | Leaf rolling D | RM3475–RM6696 | 117.1 | 3.9 | 11.8 | 0.48 |
|  | 2 | Leaf rolling D | RM6379–RM3857 | 122.7 | 2.9 | 12.0 | −0.48 |
|  | 3 | 50% flowering C | ~RM4853 | 1.5 | 3.4 | 14.5 | −2.44 |
|  |  | Grain dry weight D | RM1332–RM3029 | 24.5 | 2.8 | 9.8 | 1.09 |
|  |  | Plant height C | RM6676–RM3525 | 97.1 | 2.5 | 12.7 | 3.41 |
|  | 4 | Leaf rolling D | RM1388–RM5503 | 91.1 | 3.7 | 18.7 | −0.59 |
|  | 5 | 50% flowering D | ~RM2010–RM4501 | 10.0 | 3.4 | 36.1 | −4.01 |
|  | 6 | DRI | RM8120–RM7023 | 31.0 | 3.6 | 12.4 | −0.90 |
|  |  | Grain dry weight D | RM8120–RM7023 | 31.0 | 3.7 | 12.2 | −1.16 |
|  |  | Grain dry weight D | RM6734–RM5509 | 105.8 | 2.5 | 8.3 | 0.96 |
|  |  | Harvest index D | RM6734–RM5814 | 105.8 | 2.5 | 8.3 | 0.03 |
|  | 7 | Plant height reduction D | RM5508–RM1362 | 104.8 | 2.6 | 9.9 | 4.24 |
|  | 10 | Grain dry weight C | RM216–RM467 | 34.3 | 3.7 | 16.7 | 2.42 |
|  |  | Total dry weight C | RM216–RM467 | 35.3 | 3.9 | 14.8 | 4.82 |
|  | 11 | Plant height D | RM287–RM209 | 68.6 | 4.5 | 16.3 | −4.38 |
| Experiments 1 and 2 (combined) | 2 | DRI | RM3703–RM6379 | 40.4 | 5.1 | 26.3 | 1.42 |
|  | DRI | RM6733–RM3850 | 151.5 | 3.3 | 10.3 | −0.87 |
|  |  | Leaf rolling D | RM6379–RM6933 | 119.2 | 6.5 | 22.2 | −0.67 |
|  | 3 | 50% flowering C | ~RM4853 | 1.0 | 3.3 | 12.8 | −2.25 |
|  |  | 50% flowering D | ~RM4853 | 0.0 | 2.7 | 8.8 | −2.53 |
|  |  | Grain dry weight D | RM1332–RM3029 | 24.5 | 3.8 | 13.3 | 0.67 |
|  |  | Harvest index D | RM1332–RM3029 | 25.0 | 4.1 | 13.0 | 0.02 |
|  | 5 | 50% flowering C | ~RM2010–RM4501 | 16.5 | 3.6 | 40.7 | −3.89 |
|  |  | 50% flowering D | ~RM2010 | 1.0 | 2.5 | 9.6 | −2.62 |
|  | 6 | Grain dry weight D | RM8120–RM7023 | 31.0 | 2.6 | 8.5 | −0.52 |
|  | 7 | Grain dry weight C | RM5508–RM1362 | 103.8 | 2.5 | 10.4 | 1.62 |
|  | 11 | 50% flowering C | RM536–RM206 | 68.6 | 3.2 | 10.3 | −1.96 |

D: QTL found under drought.

C: QTL found in the control.

~: chromosome short arm tip.

aMarkers flanking the region of 1-LOD confidence interval.

bPosition of LOD peak in centimorgans from the short arm of the chromosome.

cPeak LOD score obtained from composite interval mapping.

dPercentage of phenotypic variance explained by the given QTL.

ePositive (negative) value indicates a positive (negative) effect of Yumenohatamochi (Otomemochi) allele on the trait.

