Figure S1. Expression patterns of rice OsCCRs in response to drought stress. (a) A simplified schematic representation of lignin biosynthesis through the phenylpropanoid pathway. (b) Phylogenetic tree created using the neighbor-joining method in CLC sequence viewer using full-length amino acid sequences of the rice OsCCR proteins. Bootstrap support (100 repetitions) is shown for each node. (c) OsCCRs expression patterns in the rice roots of two-week-old seedlings. OsUbi1 expression was used as an internal control. Relative expression level was calculated by OsCCR1 expression level. (d) OsCCRs expression patterns of rice roots in response to drought stress. Two-week-old seedlings were exposed to air-drying (drought) for the indicated time points. OsUbi1 expression was used as an internal control. Relative expression level was calculated by OsCCR1 expression level at 0h.
Figure S2. Protein levels in PGD1::OsNAC4-MYC transgenic plants. (a) Protein and transcript levels in OsNAC5 transgenic plants. Levels of MYC-OsNAC5 (nMYC) and OsNAC5-MYC (cMYC) fusion protein in PGD1::MYC-OsNAC5 plants and PGD1::OsNAC5-MYC as determined by immunoblot analysis using α-MYC antibody. Fifteen µg of total soluble protein was separated by SDS-PAGE in duplicates. The protein loading is shown by CBB (Coomassie Brilliant Blue) staining in the lower panel. The NT (non-transgenic plants. (b) Fragmented chromatin of NT and PGD1::OsNAC5-MYC #3 plants for chromatin immunoprecipitation analysis.
Figure S3. Vectors used in this study. (a) Vector list used in the experiments including chromatin immunoprecipitation, subcellular localization, enzyme activity analysis, and binary vectors for generating the transgenic plants. (b) Guide RNA and PAM sequence location in OsCCR10 coding sequence.
Figure S4. Lignin contents of NT plants (Dongjin) under drought conditions. Lignin contents in 2-month-old NT plants. Data bars represent the mean ±SD of three biological replicates (n = 3), each with two technical replicates. Asterisks indicate significant differences compared with plants before drought treatment (0 day) (*P < 0.05, one-way ANOVA).
Table S1 List of primers used in this study.

| Oligo name          | 5’ to 3’ sequence                      | Purpose                      |
|---------------------|----------------------------------------|------------------------------|
| OwCCR10_F           | ATGCATGTGGGAGACATTGAGATGTTTA          | qRT-PCR                      |
| OwCCR10_R           | AGCGTCATGGATGATGTTTAAGAAGACG          | qRT-PCR                      |
| OwCCR2_F            | GTGCACCAACATGACAGAAGACG               | qRT-PCR                      |
| OwCCR2_R            | ACCCGGCTGGGAGACATTGAGATGTTTA          | qRT-PCR                      |
| OwCCR3_F            | GAATTCTGCATGGGAGACATTGAGATGTTTA      | qRT-PCR                      |
| OwCCR3_R            | ACCCGGCTGGGAGACATTGAGATGTTTA          | qRT-PCR                      |
| OwCCR4_F            | ACCCGGCTGGGAGACATTGAGATGTTTA          | qRT-PCR                      |
| OwCCR4_R            | ACCCGGCTGGGAGACATTGAGATGTTTA          | qRT-PCR                      |
| OwCCR5_F            | TACCGGCTGGGAGACATTGAGATGTTTA          | qRT-PCR                      |
| OwCCR5_R            | TACCGGCTGGGAGACATTGAGATGTTTA          | qRT-PCR                      |
| OwCCR6_F            | AGCGTCATGGGAGACATTGAGATGTTTA          | qRT-PCR                      |
| OwCCR6_R            | AGCGTCATGGGAGACATTGAGATGTTTA          | qRT-PCR                      |
| OwCCR7_F            | GCGTTCATGGGAGACATTGAGATGTTTA          | qRT-PCR                      |
| OwCCR7_R            | GCGTTCATGGGAGACATTGAGATGTTTA          | qRT-PCR                      |
| OwCCR8_F            | TACCGGCTGGGAGACATTGAGATGTTTA          | qRT-PCR                      |
| OwCCR8_R            | TACCGGCTGGGAGACATTGAGATGTTTA          | qRT-PCR                      |
| OwCCR9_F            | ACGCGTCATGGGAGACATTGAGATGTTTA         | qRT-PCR                      |
| OwCCR9_R            | ACGCGTCATGGGAGACATTGAGATGTTTA         | qRT-PCR                      |
| OwCCR10_F           | TACCGGCTGGGAGACATTGAGATGTTTA          | qRT-PCR                      |
| OwCCR10_R           | TACCGGCTGGGAGACATTGAGATGTTTA          | qRT-PCR                      |
| OwCCR11_F           | TACCGGCTGGGAGACATTGAGATGTTTA          | qRT-PCR                      |
| OwCCR11_R           | TACCGGCTGGGAGACATTGAGATGTTTA          | qRT-PCR                      |
| OwCCR12_F           | TACCGGCTGGGAGACATTGAGATGTTTA          | qRT-PCR                      |
| OwCCR12_R           | TACCGGCTGGGAGACATTGAGATGTTTA          | qRT-PCR                      |
| OwCCR13_F           | TACCGGCTGGGAGACATTGAGATGTTTA          | qRT-PCR                      |
| OwCCR13_R           | TACCGGCTGGGAGACATTGAGATGTTTA          | qRT-PCR                      |
| OwCCR14_F           | TACCGGCTGGGAGACATTGAGATGTTTA          | qRT-PCR                      |
| OwCCR14_R           | TACCGGCTGGGAGACATTGAGATGTTTA          | qRT-PCR                      |
| OwCCR15_F           | TACCGGCTGGGAGACATTGAGATGTTTA          | qRT-PCR                      |
| OwCCR15_R           | TACCGGCTGGGAGACATTGAGATGTTTA          | qRT-PCR                      |
| OwCCR16_F           | TACCGGCTGGGAGACATTGAGATGTTTA          | qRT-PCR                      |
| OwCCR16_R           | TACCGGCTGGGAGACATTGAGATGTTTA          | qRT-PCR                      |
| OwCCR17_F           | TACCGGCTGGGAGACATTGAGATGTTTA          | qRT-PCR                      |
| OwCCR17_R           | TACCGGCTGGGAGACATTGAGATGTTTA          | qRT-PCR                      |
| OwCCR18_F           | TACCGGCTGGGAGACATTGAGATGTTTA          | qRT-PCR                      |
| OwCCR18_R           | TACCGGCTGGGAGACATTGAGATGTTTA          | qRT-PCR                      |
| OwCCR19_F           | TACCGGCTGGGAGACATTGAGATGTTTA          | qRT-PCR                      |
| OwCCR19_R           | TACCGGCTGGGAGACATTGAGATGTTTA          | qRT-PCR                      |
| OwCCR20_F           | TACCGGCTGGGAGACATTGAGATGTTTA          | qRT-PCR                      |
| OwCCR20_R           | TACCGGCTGGGAGACATTGAGATGTTTA          | qRT-PCR                      |
| OwCCR21_F           | TACCGGCTGGGAGACATTGAGATGTTTA          | qRT-PCR                      |
| OwCCR21_R           | TACCGGCTGGGAGACATTGAGATGTTTA          | qRT-PCR                      |
| OwCCR22_F           | TACCGGCTGGGAGACATTGAGATGTTTA          | qRT-PCR                      |
| OwCCR22_R           | TACCGGCTGGGAGACATTGAGATGTTTA          | qRT-PCR                      |
| OwCCR23_F           | TACCGGCTGGGAGACATTGAGATGTTTA          | qRT-PCR                      |
| OwCCR23_R           | TACCGGCTGGGAGACATTGAGATGTTTA          | qRT-PCR                      |
| OwCCR24_F           | TACCGGCTGGGAGACATTGAGATGTTTA          | qRT-PCR                      |
| OwCCR24_R           | TACCGGCTGGGAGACATTGAGATGTTTA          | qRT-PCR                      |
| OwCCR25_F           | TACCGGCTGGGAGACATTGAGATGTTTA          | qRT-PCR                      |
| OwCCR25_R           | TACCGGCTGGGAGACATTGAGATGTTTA          | qRT-PCR                      |
Table S2. *GOS2::OsCCR10* and *RCc3::OsCCR10* agronomic traits transgenic rice plants under normal and drought conditions. (Asterisks indicate significant differences compared with NT (*P < 0.05, **P < 0.01; Student’s t-test))

| Normal condition | Culm length (cm) | Panicle length (cm) | No.of panicles (/hill) | No.of total spikelets (/hill) | No.of spikelets (/panicle) | Filling rate (%) | Total grain weight (g) | 1000 GW (g) |
|------------------|-----------------|---------------------|------------------------|-------------------------------|---------------------------|-----------------|------------------------|-------------|
| NT (Dongjin)     | 78.71           | 20.14               | 12.57                  | 1093.21                       | 89.25                     | 88.80           | 22.35                  | 23.06       |
| *GOS2::OsCCR10-8* | 76.29           | 19.00*              | 11.71                  | 864.14                        | 71.93*                    | 79.04*          | 15.66*                 | 22.87       |
| *P val*          | 0.314           | 0.044               | 0.547                  | 0.137                         | 0.026                     | 0.037           | 0.045                  | 0.744       |
| *GOS2::OsCCR10-9* | 79.00           | 20.29               | 12.14                  | 988.14                        | 84.03                     | 75.69**         | 15.98                  | 21.22       |
| *P val*          | 0.782           | 0.826               | 0.815                  | 0.516                         | 0.646                     | 0.005           | 0.063                  | 0.070       |
| *GOS2::OsCCR10-13* | 79.00           | 19.43               | 11.14                  | 1205.43                       | 106.04*                   | 81.45           | 22.62                  | 22.82       |
| *P val*          | 0.751           | 0.185               | 0.313                  | 0.528                         | 0.030                     | 0.059           | 0.943                  | 0.691       |
| *RCc3::OsCCR10-2* | 78.00           | 20.00               | 11.00                  | 1049.00                       | 99.55                     | 88.43           | 22.38                  | 23.78       |
| *P val*          | 0.579           | 0.829               | 0.418                  | 0.773                         | 0.295                     | 0.891           | 0.995                  | 0.348       |
| *RCc3::OsCCR10-16* | 77.71           | 19.00               | 12.57                  | 1280.71                       | 102.06                    | 73.46*          | 20.11                  | 23.89       |
| *P val*          | 0.608           | 0.063               | 1.000                  | 0.115                         | 0.090                     | 0.048           | 0.390                  | 0.306       |
| *RCc3::OsCCR10-27* | 78.17           | 20.50               | 10.83                  | 1280.67                       | 118.09*                   | 87.32           | 27.90                  | 24.81*      |
| *P val*          | 0.769           | 0.631               | 0.173                  | 0.247                         | 0.021                     | 0.449           | 0.162                  | 0.021       |
| Drought condition | Culm length (cm) | Panicle length (cm) | No. of panicles (hill) | No. of total spikelets (hill) | No. of spikelets (panicle) | Filling rate (%) | Total grain weight (g) | 1000 GW (g) |
|-------------------|------------------|---------------------|------------------------|-------------------------------|----------------------------|------------------|------------------------|-------------|
| NT (Dongjin)      | 69.74            | 16.76               | 19.00                  | 1335.53                       | 72.26                      | 40.44            | 11.14                  | 21.08       |
| GOS2::OsCCR10-8   | 64.33            | 17.03               | 14.50*                 | 827.50**                      | 57.39                      | 43.19*           | 8.71                   | 27.37       |
| P val             | 0.061            | 0.815               | 0.036                  | 0.007                         | 0.059                      | 0.023            | 0.276                  | 0.392       |
| GOS2::OsCCR10-9   | 67.33            | 18.75*              | 15.43                  | 987.57                        | 62.50                      | 47.93*           | 9.91                   | 21.69       |
| P val             | 0.370            | 0.025               | 0.126                  | 0.098                         | 0.187                      | 0.045            | 0.553                  | 0.394       |
| GOS2::OsCCR10-13  | 67.10            | 18.40*              | 16.40                  | 1232.60                       | 82.94                      | 39.94            | 10.41                  | 19.89       |
| P val             | 0.573            | 0.031               | 0.485                  | 0.589                         | 0.392                      | 0.930            | 0.799                  | 0.357       |
| RCc3::OsCCR10-2   | 71.67            | 16.25               | 20.17                  | 1379.17                       | 70.21                      | 46.40*           | 13.75*                 | 21.88       |
| P val             | 0.549            | 0.731               | 0.514                  | 0.760                         | 0.808                      | 0.027            | 0.037                  | 0.257       |
| RCc3::OsCCR10-16  | 65.90            | 17.30               | 17.80                  | 1435.60*                      | 81.82**                    | 50.23**          | 15.39*                 | 21.95       |
| P val             | 0.231            | 0.444               | 0.460                  | 0.018                         | 0.009                      | 0.034            | 0.023                  | 0.159       |
| RCc3::OsCCR10-27  | 70.08            | 19.17**             | 17.67                  | 1340.67                       | 74.67*                     | 67.64**          | 19.89**                | 22.08       |
| P val             | 0.873            | 0.009               | 0.448                  | 0.982                         | 0.048                      | 0.000            | 0.010                  | 0.140       |