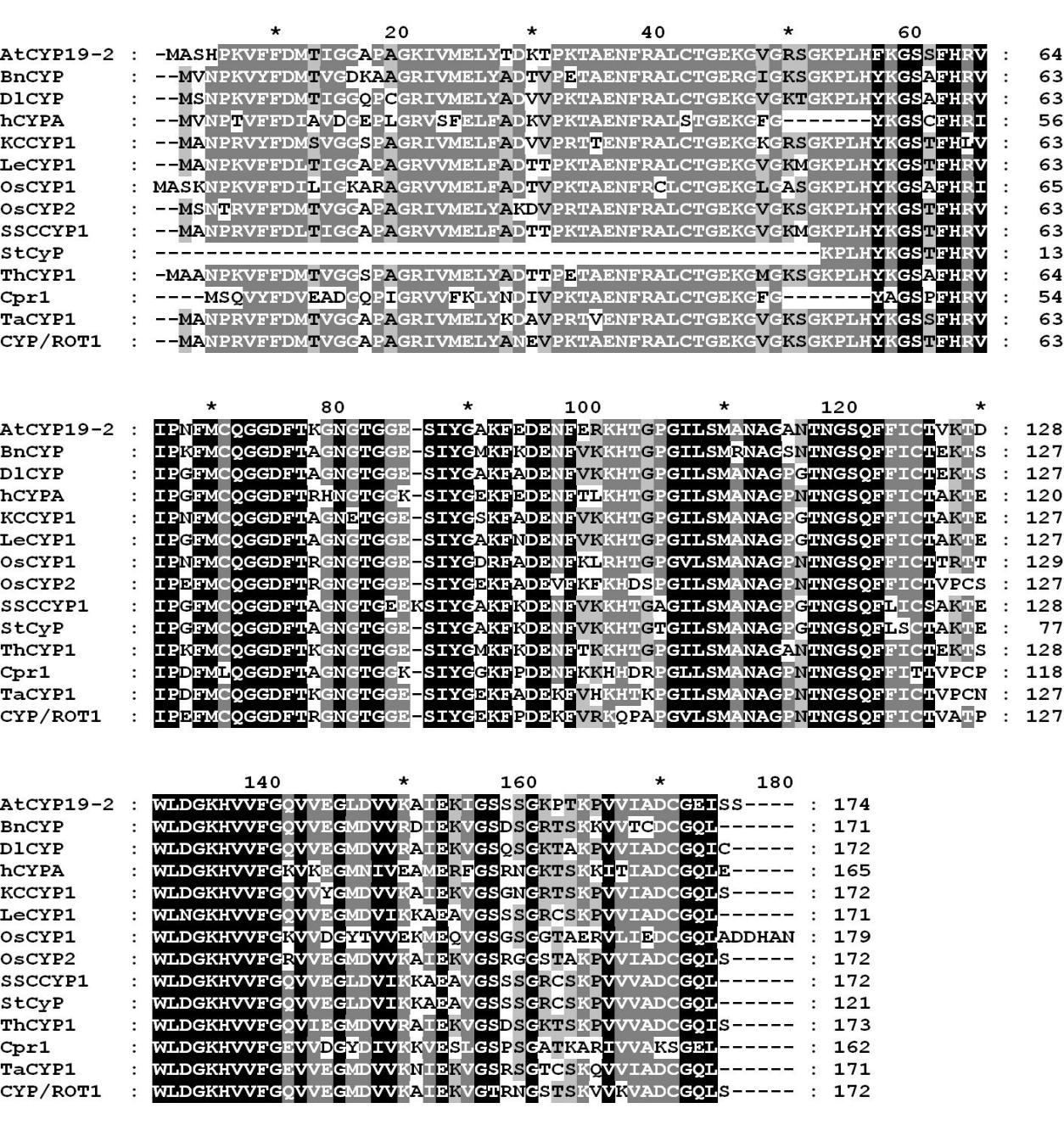
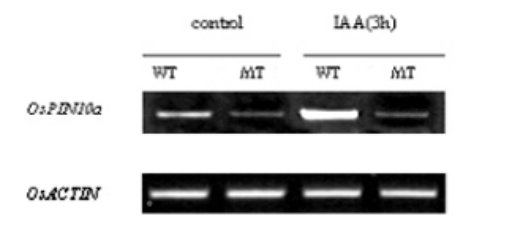


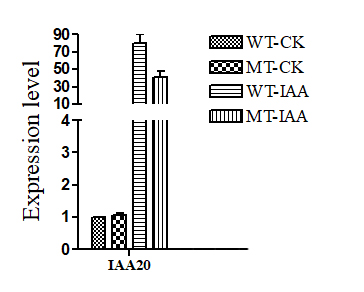
**Supplementary Figure 1:** Gravitational response of the wild-type plant ZH-11 and the *lrl3* T2 generation. (A) and (B) are 12h and 24h primary root horizontal phenotypes of two-day-old seedlings, respectively. On the left are the wild-type plant ZH-11, and on the right are *lrl3* T2 generation (arrows indicate *lrl3* mutant, and others are wild-type individuals).



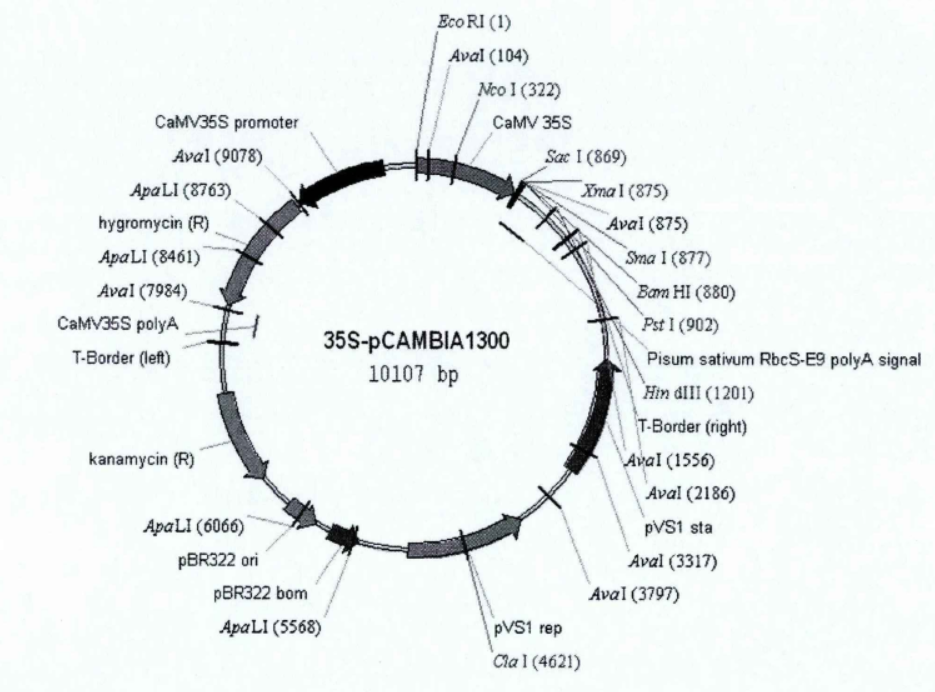
S**upplementary Figure 2:** Protein alignment between rice and other organisms with cyclophilin\_ABH\_like domain. AtCYP19-2, *A. thaliana*（gi：98960923）；BnCYP, *Brassica napus* (gi: 1345921); DlCYP, *Digitalis lanata* (gi: 1563719); hCYPA, *Human sapiens* (gi: 13543666); KCCYP1, *Kandelia candel* (gi: 37722431); LeCYP1, *Lycopersicon esculentum* (gi: 170439); OsCYP1, *Oryza sativa* (gi: 600764); OsCYP2, *Oryza sativa* (gi: 600768); Cpr1, *S. cerevisiae* (gi: 6320359); SSCCYP1, *Solanum commersonii* (gi: 1928938); StCyP, *Solanum tuberosum* (gi: 62529356); ThCYP1, *Thellungiella halophila*(gi：38708271); TaCYP1, *Triticum aestivum* (gi：13925734); CYP/ROT1, *Zea mays* (gi: 118104).



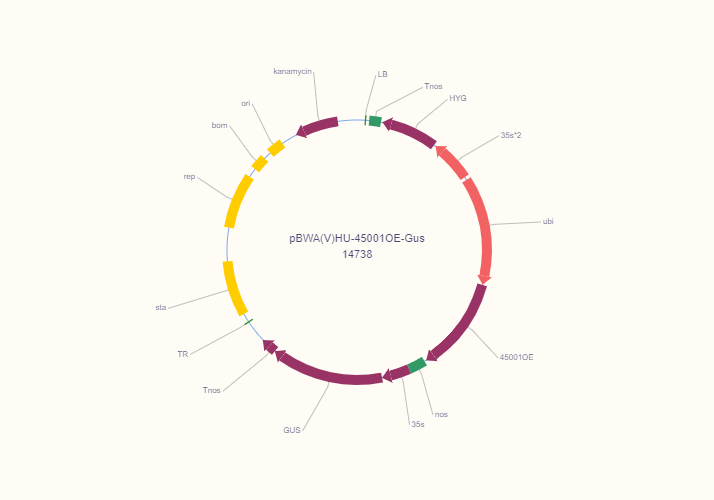
**Supplementary Figure 3:** Semi-quantitative RT-PCR of *OsPIN10a* in Kasalath and *Oscyp2-2*



**Supplementary Figure 4**: Real-time quantitative RT-PCR expression in roots of Kasalath and *Oscyp2-2.*



**Supplementary Figure 5:** The Vector of 35S-pCAMBIA1300



**Supplementary Figure 6:** The Vector of pBWA(V)HU-45001OE-Gus

**Supplementary Table 1:** Primers used in this study

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| Marker name | Marker type | Primer sequence(5'-3') | Restriction enzymes | Expected PCR lrl3 | product size(bp) Kasalath | [Functiondescription](D://Dict/8.9.6.0/resultui/html/index.html" \l "/javascript:;) |
| SIS2（M2） | STS | F:CTCTTGGGAGTCCTAACT  R:GCATGGTCCAAATGGTAT | no | 269 | 281 | gene mapping |
| RM12368 | SSR | F:GAGATAAGTGCCACGATTGATTGC  R:GGAGCCGTACGAGTAATCTCTGC | no | 152 | 162 | gene mapping |

Note: The information of molecular markers used in this study is derived from the reported research (Kang and Zhang et al., 2013).

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| Marker name | Primer sequence(5'-3') | Expected PCR zh-11 | Expected PCR lrt2 | Expected PCR lrl3 | Expected PCR F1 | [Functiondescription](D://Dict/8.9.6.0/resultui/html/index.html" \l "/javascript:;) |
| cyp2-lrt2 | F:ACGAGGGTGTTCTTCGACAT  R:GAAGGTGCTCCCCTTGTAGT | 171 | 121 | 112 | 112 and 121 | Genetic complementary verification |

|  |  |  |  |
| --- | --- | --- | --- |
| Marker name | Primer sequence(5'-3') | Product size(bp) | [Functiondescription](D://Dict/8.9.6.0/resultui/html/index.html" \l "/javascript:;) |
| *OsACTIN* | F:TCCATCTTGGCATCTCTCAGC  R:AGCCTTGGCAATCCACATCT | 60 | RT-qPCR |
| *OsCDPK7* | F:ACACCGAGATTCGTGATCTTATG  R:GTTCCTCTCGCTCCAGTTTATT | 114 | RT-qPCR |
| *OsCYP2* | F:GTGGTGGTGGTGTTAGTCTTT  R:GATCCAAGAACTCCGCCTAATC | 93 | RT-qPCR |
| *OsTPS38* | F:CTATGCCTCTCCAGATGTGTTC  R:CTGAGATGGGCAGCATTGTA | 117 | RT-qPCR |
| *OsPIN10a* | F:CGGCTCTACCACAAGGGATTG  R:TCATAGTCCAAGAAGGATGTAGTACA | 143 | RT-PCR |
| *OsIAA20* | F:CATCCTCGGCTCATACGC  R:ATCGTGCCCATCCTCTTG | 79 | RT-qPCR |