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**Supplementary Fig. 1.** Chromosomal distribution of the SWI/SNF subunit genes in soybean. The soybean genome encodes 39 SWI/SNF complex subunits, which are mapped to different chromosomes as shown in the figure with black lines indicating their position. The scale bars on the left and the numbers below each chromosome indicate the sizes of the chromosomes.

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**Supplementary Fig. 2.** Expression levels based on qRT-PCR analyses of *GmLFR1* and *GmLFR2* genes in *GmLFR1*-OE and EV-control transgenic plants under mock and drought conditions.

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**Supplementary Fig. 3.** The RNA level analysis of GmLFR1 in Col-0, *lfr-2* and *35S:GmLFR1-GFP/lfr-2* transgenic plants.

|  |
| --- |
| **Supplementary Table 1. TPM values for soybean SWI/SNF subunit genes in different tissues.** |

|  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Gene Name | Cotyled-on | Leaves | Flower | Pod | Seed | Shoot | Root | Root meristem-atic zone | Root elongation zone | Root differentiati-on zone |
| GmSYD1 | 16.91  | 17.21  | 29.74  | 15.34  | 4.51  | 14.94  | 13.75  | 17.27  | 11.63  | 16.80  |
| GmSYD2 | 14.32  | 15.42  | 25.65  | 13.64  | 4.53  | 13.43  | 14.15  | 19.58  | 13.97  | 17.61  |
| GmBRM1 | 20.16  | 15.63  | 22.77  | 11.80  | 4.70  | 10.61  | 10.95  | 14.68  | 8.78  | 8.84  |
| GmBRM2 | 10.47  | 11.60  | 14.69  | 7.46  | 3.50  | 6.81  | 9.14  | 8.31  | 6.72  | 8.69  |
| GmBRM3 | 9.68  | 11.15  | 16.10  | 9.98  | 5.84  | 9.31  | 10.93  | 8.54  | 8.91  | 11.08  |
| GmBRM4 | 16.93  | 15.81  | 22.89  | 14.02  | 6.34  | 14.03  | 17.63  | 16.69  | 14.90  | 16.71  |
| GmMINU1 | 4.68  | 6.18  | 7.22  | 4.37  | 1.68  | 5.41  | 5.97  | 8.80  | 6.07  | 5.16  |
| GmMINU2 | 2.18  | 4.75  | 5.44  | 4.57  | 1.83  | 3.16  | 7.59  | 9.03  | 5.77  | 4.51  |
| GmMINU3 | 26.23  | 25.05  | 30.07  | 19.54  | 10.30  | 21.86  | 20.97  | 33.04  | 27.26  | 30.14  |
| GmLFR1 | 11.60  | 14.95  | 13.63  | 11.39  | 7.84  | 9.36  | 10.60  | 24.45  | 16.02  | 15.05  |
| GmLFR2 | 10.93  | 13.15  | 15.33  | 11.65  | 8.75  | 8.16  | 11.34  | 19.89  | 16.07  | 14.15  |
| GmARP4A | 7.03  | 17.09  | 14.43  | 13.33  | 6.38  | 7.21  | 11.47  | 29.06  | 16.73  | 15.77  |
| GmARP4B | 7.34  | 22.21  | 19.61  | 16.93  | 7.76  | 9.97  | 14.09  | 39.86  | 18.56  | 13.71  |
| GmARP4C | 2.75  | 8.78  | 10.02  | 10.01  | 7.06  | 6.06  | 10.92  | 30.66  | 16.95  | 12.46  |
| GmARP7A | 0.00  | 4.01  | 2.94  | 2.82  | 2.10  | 1.20  | 2.91  | 11.73  | 4.98  | 3.39  |
| GmARP7B | 10.74  | 16.65  | 22.45  | 20.07  | 16.07  | 9.14  | 13.17  | 34.54  | 19.28  | 21.75  |
| GmARP7C | 1.78  | 7.97  | 6.91  | 4.37  | 2.92  | 1.80  | 6.99  | 15.47  | 5.32  | 4.21  |
| GmARP7D | 50.31  | 23.06  | 20.96  | 18.58  | 10.80  | 16.07  | 9.10  | 11.26  | 10.11  | 13.37  |
| GmSNF5 | 13.19  | 17.74  | 17.18  | 14.74  | 9.87  | 11.93  | 13.38  | 39.66  | 25.65  | 19.03  |
| GmSWI3A1 | 10.58  | 14.26  | 11.57  | 11.43  | 5.72  | 9.82  | 11.03  | 24.22  | 14.36  | 11.13  |
| GmSWI3A2 | 2.69  | 5.39  | 4.66  | 3.34  | 2.31  | 2.26  | 4.32  | 11.31  | 4.67  | 4.81  |
| GmSWI3B1 | 12.48  | 12.73  | 11.69  | 9.72  | 5.85  | 8.85  | 13.09  | 15.43  | 10.85  | 9.31  |
| GmSWI3B2 | 4.10  | 6.88  | 8.08  | 7.92  | 5.83  | 5.71  | 8.20  | 20.71  | 11.70  | 10.35  |
| GmSWI3C1 | 10.13  | 17.00  | 24.62  | 16.46  | 7.40  | 9.61  | 9.78  | 15.94  | 10.51  | 10.60  |
| GmSWI3C2 | 13.13  | 20.73  | 19.26  | 14.82  | 7.16  | 13.68  | 11.46  | 15.75  | 12.84  | 11.89  |
| GmSWI3C3 | 17.30  | 14.02  | 22.77  | 14.02  | 8.77  | 12.08  | 22.38  | 12.06  | 13.62  | 16.08  |
| GmSWI3C4 | 14.34  | 16.59  | 18.76  | 13.67  | 6.20  | 10.23  | 10.47  | 15.13  | 11.18  | 12.45  |
| GmSWI3D1 | 5.06  | 7.56  | 10.41  | 6.58  | 3.14  | 5.63  | 8.65  | 15.25  | 10.96  | 10.07  |
| GmSWI3D2 | 6.36  | 8.08  | 11.30  | 6.37  | 2.13  | 6.55  | 9.02  | 12.96  | 10.09  | 9.53  |
| GmSWP73A | 12.91  | 11.69  | 14.48  | 11.61  | 3.63  | 9.70  | 14.87  | 19.31  | 14.98  | 15.71  |
| GmSWP73B | 8.21  | 10.62  | 9.99  | 8.72  | 2.33  | 8.84  | 8.31  | 17.34  | 12.07  | 11.80  |
| GmBRIP1 | 9.49  | 11.03  | 13.80  | 9.07  | 7.68  | 6.39  | 6.94  | 8.81  | 6.34  | 6.48  |
| GmBRIP2 | 4.97  | 9.58  | 11.85  | 7.94  | 6.06  | 7.19  | 7.90  | 7.74  | 5.79  | 6.52  |
| GmBRD1 | 1.36  | 2.24  | 6.27  | 2.32  | 1.25  | 1.43  | 6.26  | 5.04  | 4.43  | 4.07  |
| GmBRD2 | 6.84  | 6.85  | 9.22  | 6.71  | 3.08  | 3.12  | 5.18  | 7.23  | 5.61  | 4.93  |
| GmBRD13A | 11.78  | 10.58  | 19.22  | 11.53  | 4.86  | 9.09  | 11.57  | 10.10  | 8.07  | 11.88  |
| GmBRD13B | 11.67  | 9.41  | 17.01  | 8.99  | 3.56  | 8.45  | 10.10  | 8.55  | 8.05  | 10.12  |
| GmBRD13C | 20.80  | 13.09  | 23.98  | 17.54  | 7.15  | 12.90  | 12.85  | 10.86  | 11.27  | 13.87  |
| GmBRD13D | 14.42  | 9.65  | 12.17  | 9.53  | 3.49  | 10.07  | 10.11  | 8.24  | 10.96  | 11.87  |

**Supplementary Table 2. TPM values for soybean SWI/SNF subunit genes under drought treatment.**

|  |  |  |
| --- | --- | --- |
| Gene Name | Control condition | Drought stressed for 15 days |
| GmSYD1 | 15.2811  | 23.8315  |
| GmSYD2 | 12.4851  | 18.2577  |
| GmBRM1 | 12.0032  | 18.9825  |
| GmBRM2 | 8.8898  | 15.1245  |
| GmBRM3 | 6.6571  | 9.6154  |
| GmBRM4 | 10.6538  | 12.4059  |
| GmMINU1 | 5.9440  | 9.6685  |
| GmMINU2 | 3.2019  | 5.3697  |
| GmMINU3 | 28.0698  | 39.8486  |
| GmLFR1 | 14.8021  | 19.1176  |
| GmLFR2 | 14.5854  | 19.1513  |
| GmARP4A | 14.0306  | 18.3133  |
| GmARP4B | 13.0012  | 17.6909  |
| GmARP4C | 3.4553  | 5.3232  |
| GmARP7A | 0.6543  | 1.4924  |
| GmARP7B | 20.2647  | 30.8942  |
| GmARP7C | 3.4030  | 4.5838  |
| GmARP7D | 24.0417  | 27.7840  |
| GmSNF5 | 13.3053  | 24.6480  |
| GmSWI3A1 | 13.1737  | 16.0717  |
| GmSWI3A2 | 3.6760  | 4.7722  |
| GmSWI3B1 | 7.1057  | 8.6043  |
| GmSWI3B2 | 7.1793  | 7.3336  |
| GmSWI3C1 | 16.2378  | 18.4954  |
| GmSWI3C2 | 17.0763  | 13.7575  |
| GmSWI3C3 | 10.1267  | 19.6392  |
| GmSWI3C4 | 17.5021  | 20.2367  |
| GmSWI3D1 | 7.4518  | 9.3764  |
| GmSWI3D2 | 8.4791  | 10.0196  |
| GmSWP73A | 7.8320  | 9.9203  |
| GmSWP73B | 18.6643  | 17.0646  |
| GmBRIP1 | 4.8687  | 7.8776  |
| GmBRIP2 | 5.0095  | 7.5548  |
| GmBRD1 | 1.4619  | 2.1452  |
| GmBRD2 | 8.6307  | 12.3899  |
| GmBRD13A | 7.0038  | 9.5937  |
| GmBRD13B | 6.6656  | 9.8663  |
| GmBRD13C | 7.6141  | 11.8641  |
| GmBRD13D | 6.9763  | 11.6121  |

|  |  |
| --- | --- |
| **Supplementary Table 3. List of primers used in this study.** |  |
| Primer Name | Primer sequences(5'-3') | Purpose |
| GmARP4A-Q-FP | GCTGGTTATGCTGGTGAAGA | For qRT-PCR |
| GmARP4A-Q-RP | GGTCTCTACGGTACCCCAAGG |
| GmARP4B-Q-FP | GAAGATGCTCCCAAGGCTGTG |
| GmARP4B-Q-RP | CCAAGGACTGGGATCCTACATACAA |
| GmARP4C-Q-FP | ACAGAAAGCTACAAACTCTACTC |
| GmARP4C-Q-RP | TCTGCAAAACTCTCCATACCAGGG |
| GmARP7A-Q-FP | AACTTGACATTCGATGACATTGCTG |
| GmARP7A-Q-RP | ACCCTCAATCACTGGTGCAATAT |
| GmARP7B-Q-FP | TTCACTGGCTGACAATGTCACC |
| GmARP7B-Q-FP | GCCTGAGATACGTCCCACAG |
| GmARP7C-Q-FP | CCGGCAGTCGATGACGTTG |
| GmARP7C-Q-FP | ACCCTCAATCACTGGTGCAATAT |
| GmARP7D-Q-FP | ACTGATCCACTTTGTACCCCTAAGG |
| GmARP7D-Q-RP | GTGGATTGGACTTGCCAAGTTCTATT |
| GmBRIP1-Q-FP | AGCAACAACTTCTGCTACAACAACAG |
| GmBRIP1-Q-RP | GGGAGCGGGATTGGGGCTA |
| GmBRIP2-Q-FP | GCAGCAACAACAACAACAACAACA |
| GmBRIP2-Q-RP | GCGGGATTGAGGTTAGGGTTAGG |
| GmBRM1-Q-FP | ACTACAGGAGGAGATGACACGATAT |
| GmBRM1-Q-RP | TGGGTCGTCCCCTTTTTCTTTCA |
| GmBRM2-Q-FP | CTCCATGCACAACAAAGACCTACT |
| GmBRM2-Q-RP | GTGCTATTTGTTGTCCTTGCTCCA |
| GmBRM3-Q-FP | AGTTCAGGTGCAAGGCACAC |
| GmBRM3-Q-RP | ACTCATTTCTAACAGGAGTTCTGCC |
| GmBRM4-Q-FP | TTTGCAACCCACACCTCCTGT |
| GmBRM4-Q-RP | CTAACTCATTTCTGCCAATTCCATG |
| GmSNF5-Q-FP | ACTCCGATTTCGGGTTTCTACAGA |
| GmSNF5-Q-RP | GGAGGGAGCTTCAAGTCTTTAACAG |
| GmSWI3A1-Q-FP | GCGGATTCAGATTCGGAACTGGA |
| GmSWI3A1-Q-RP | CCTTCTGGAGGGCTCTTCTCTG |
| GmSWI3A2-Q-FP | CCGAATTCGTTGAAGCCTATGTTGT |
| GmSWI3A2-Q-RP | ATCCTGTGTACATCGGTAATGTCCA |
| GmSWI3B1-Q-FP | AACCTCTCCCTTCCACCACC |
| GmSWI3B1-Q-RP | CCACGAGAACCACCGAGAGT |
| GmSWI3B2-Q-FP | ACCGAACCTCTCCCTTCCTCC |
| GmSWI3B2-Q-RP | TGACGCACCTCGCATTCGTC |
| GmSWI3C1-Q-FP | CCGGTTCTCGAAAACGTGTCT |
| GmSWI3C1-Q-RP | AAGAAATGCGGCACCACTTGC |
| GmSWI3C2-Q-FP | CCGATCACGAAGAACGAGAAA |
| GmSWI3C2-Q-RP | TCCCACAGTTCCAAGACGTGC |
| GmSWI3C3-Q-FP | GTTGCTCAAATGGGGATTCTGCA |
| GmSWI3C3-Q-RP | CCCGGAATTATTCCTTGACAATGCA |
| GmSWI3C4-Q-FP | CTGGGAGCACGGCACATAT |
| GmSWI3C4-Q-RP | GGATAGGCCTGCTTTGGCA |
| GmSWI3D1-Q-FP | GGTTCCTCCTCCGCACCCT |
| GmSWI3D1-Q-RP | CCTTTTTGAGCTGCTCAGCCA |
| GmSWI3D2-Q-FP | ATTCACCTGGCACCGAGCT |
| GmSWI3D2-Q-RP | CGGCTGTCCCTTGACTTCTAAAGC |
| GmSWP73A-Q-FP | GTGTGTCGTCGCCGTCGAT |
| GmSWP73A-Q-RP | TCCATCGGTCTCAAAGGCGAG |
| GmSWP73B-Q-FP | GGGTGTCGTCACCGTTGATTTC |
| GmSWP73B-Q-RP | TCCACTGGTCTCAATGGGGAG |
| GmSYD1-Q-1F | GAAAACCTGCCATGCCTTTCAAG |
| GmSYD1-Q-1R | TGTAGTTTCTTCGGTGCTAGACCA |
| GmSYD2-Q-FP | TGGAGGCTGCTAAGTTTCTGCA |
| GmSYD2-Q-RP | ATAATCAGGCGCTCCACCAC |
| GmLFR1-Q-F | CTCCTTTGCCGATCAGAACAATA |
| GmLFR1-Q-R | CGCCAATCATCTATAACTTGAAGGA |
| GmLFR2-Q-F | AGAAGCCCAACTAAGACC |
| GmLFR2-Q-R | AGAGCAGCGTAAGTGTATT |
| GmMINU1-Q-1F | ATGGAGAATGAGCGCCAC |
| GmMINU1-Q-1R | ACTCACATCAGACCGAACCTT |
| GmMINU2-Q-1F | ATGGAGAAGGAGAATGAGCTCC |
| GmMINU2-Q-1R | TGCCTGTCAGGATATGCACACTT |
| GmMINU3-Q-1F | ATGGAGCAAGCAGTGTCACTGA |
| GmMINU3-Q-1R | ATACAGCGGACGACGCAA |
| GmBRD1-Q-FP | GCGACACAATTCAACCAACGTTGTT |
| GmBRD1-Q-RP | TGCGAACCATGTTGTTTACTGTC |
| GmBRD2-Q-FP | TCCCACAACAACAAGAACAAGACCA |
| GmBRD2-Q-RP | TCCCTGCGAACCATGTTTACTG |
| GmBRD13A-Q-FP | CGGGAAGAAGAAGAAAACGAAAC |
| GmBRD13A-Q-RP | AATTGCTCTAAGGTGGTATAAGATCCA |
| GmBRD13B-Q-FP | ACAAGTAATGCTCCTGCAGTAGAGT |
| GmBRD13B-Q-RP | GATGTACTTTCAGGTGATGAACCAG |
| GmBRD13C-Q-FP | CGAGACTGCAACGAACCACAC |
| GmBRD13C-Q-RP | AGCTCCTGAAACAGAAACATTAACAG |
| GmBRD13D-Q-FP | CGCATCGCAGCCTGATTCTC |
| GmBRD13D-Q-RP | ACCGGAGCTCCTGAAACAG |
| GmLFR1-pUBI-FP | CCTACTAGTGGATCCGGTACCATGCTGAAGAGAGAGCAAGGC | Constructs to pUBI |
| GmLFR1-pUBI-RP | GTCCTTATAGTCCATGGTACCCATACCCCATATGCCACGAGC |
| GmLFR1-p1300-FP | GAGAACACGGGGGACTCTAGAATGCTGAAGAGAGAGCAAG | Constructs to pCAMBIA1300 |
| GmLFR1-p1300-RP | GCACCGTATACCCCATACCCTAGGTACCACTCGTTCCCG |