***Journal of Experimental Botany*** **Supplementary Information**

Article title: *Aethionema arabicum*: a novel model plant to study the light control of seed germination

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The following Supplementary Information is available for this article:

**Fig. S1** Germination of dimorphic seed types in response to light.

**Fig. S2** Heatmap of all 87 genes light-regulated in *Aethionema arabicum* CYP seeds and differentially expressed in light-exposed TUR and CYP seeds based on RPKM (reads per kilobase of transcript per million mapped reads) values.

**Fig. S3** Identification of the Arabidopsis orthologue of Aethionema *AA18G00108* as *GA2ox3*. (A) Gibberellin 2-oxidase family phylogeny based on protein sequences. (B) Synteny of *GA2ox3* position in the genome of Arabidopsis and Aethionema.

**Fig. S4** Accumulation of GA forms in *Aethionema arabicum* TUR and CYP seeds under dark and light conditions.

**Fig. S5** Identification and alignments of phytochromes in *Aethionema arabicum*. (A) Phylogenetic tree of phytochromes. (B-F) Phytochrome A, B, C, D, E protein alignments of three *Aethionema arabicum* accessions.

**Fig. S6** Alignment of PIL5/PIF1 protein sequence of three *Aethionema arabicum* accessions.

**Table S1** Information about geographic origin of *Aethionema arabicum* accessions.

**Table S2** List of primers used for quantitative RT-PCR analysis.

**Table S3** List of Aethionema accession numbers used for this study.

**Dataset S1** List of differentially expressed *Aethionema arabicum* genes in TUR Dark versus TUR Light.

**Dataset S2** List of differentially expressed *Aethionema arabicum* genes in CYP Dark versus CYP Light.

**Dataset S3** List of differentially expressed *Aethionema arabicum* genes in CYP Dark versus TUR Dark.

**Dataset S4** List of differentially expressed *Aethionema arabicum* genes in CYP Light versus TUR Light.

**Dataset S5** List of common differentially expressed *Aethionema arabicum* genes in CYP Light versus TUR Light and TUR Dark versus TUR Light.

**Dataset S6** List of target genes of Arabidopsis PIL5/PIF1 and transcriptional changes of orthologues in the Aethionema experiments.

**Dataset S7** List of plant species for which protein sequences were considered for phylogenetic tree constructions.

**Supplementary Figure Legends**

**Fig. S1** Germination of dimorphic seed types in response to light. Germination of mucilaginous (M+) and non-mucilaginous (M-) seeds were tested from TUR and CYP accessions in dark or under white light (100 µmol $m^{-2}$ $s^{-1}$). Images were taken 7 days after imbibition.

**Fig. S2** Heatmap of all 87 genes light-regulated in CYP seeds and differentially expressed in light-exposed TUR and CYP seeds based on RPKM values.

**Fig. S3** Identification of the A. thaliana orthologue of Ae. arabicum AA18G00108 as GA2ox3. (**a**) Phylogenetic tree of gibberelin2-oxidases using Bayesian inference (2000000 generations, standard deviation of split frequencies 0.063371) and allows clear assignment of Ae. arabicum orthologues. Sequences of A. thaliana (ARATH) and Ae. arabicum (AETAR) are marked in green and red, respectively. For detailed assignment of five letter code see Supplemental Dataset 7. (**b**) Synteny of GA2ox3 position in the genome of A. thaliana and Ae. arabicum.

**Fig. S4** Accumulation of GA forms in *Ae. arabicum* TUR and CYP seeds under dark and light conditions.

**Fig. S5** Identification and alignments of phytochromes in *Ae. arabicum*. **(a)** Phylogenetic tree of phytochromes using Bayesian inference (1688500 generations, standard deviation of split frequencies 0.009992) and allows clear assignment of *Ae. arabicum* orthologues. Sequences of *A. thaliana* (ARATH) and *Ae. arabicum* (AETAR) are marked in green and red, respectively. For detailed assignment of five letter code see Supplemental Dataset 7. (**b-f**) Phytochrome protein alignments of three *Ae. arabicum* accessions. Germination of TUR seeds is light-insensitive while CYP and KM2397 both have light inhibited germination.

**Fig. S6** Alignment of PIL5/PIF1 protein sequence of three *Ae. arabicum* accessions. Germination of TUR seeds is light-insensitive while CYP and KM2397 both have light inhibited germination.

**Table S1 Information about geographic origin of *Aethionema arabicum* accessions**

| ID number | Species | Origin | Region | Altitude | Seed source |
|---|---|---|---|---|---|
| KM2491 | *Aethionema heterocarpum* | Israel | Golan Heights, Mt. Hermonit | 1100 m | S. Cohen |
| KM2614 | *Aethionema heterocarpum* | Turkey | Belen/Hatay | 700 m | K. Mummenhoff |
| KM2496 | *Aethionema carneum* (Banks & Sol.) Fedts | Israel | Philistine Plain | 39 m | A. Singer, Israel Plant Gene Bank 21673 |
| KM2397 | *Aethionema arabicum* Andrz. Ex DC. | Turkey | Elazığ, Harput | 1200 m | E. Schranz |
| Iran8458 | *Aethionema arabicum* Andrz. Ex DC. | Iran | Mt. Dizin, Karaj | ~2600 m | S. Mohammadin |
| Iran8456-1 | *Aethionema arabicum* Andrz. Ex DC. | Iran | Mt. Touchal, Tehran | ~2600 m | S. Mohammadin |
| Iran8456-2 | *Aethionema arabicum* Andrz. Ex DC. | Iran | Mt. Touchal, Tehran | ~2600 m | S. Mohammadin |

**Table S2 List of primers used for quantitative RT-PCR analysis**

| Name | Nucleotide sequence |
|---|---|
| AearACT2_for | AATTGAGCATGGTGTGGTCA |
| AearACT2_rev | GCTCTTCAGGAGCAATACGG |
| AearUBQ10_for | GAGGATGGCCGAACATTG |
| AearUBQ10_rev | TGCCCGTTAGGGTTTTGA |
| AearAPC2_for | TCTCCTGCAATCGAGGACTT |
| AearAPC2_rev | GCAGTGAGCAACCGGTATTT |
| AearNCED5_for | GCCGTTTGATCTTGACGCTC |
| AearNCED5_rev | ACGGAGTTTAGTTTACGGCGT |
| AearNCED6_for | GCTTCTTCAGCTCTCGACAA |
| AearNCED6_rev | GAACCGTTGGATCAGTCGGT |
| AearNCED9_for | TCCTTTTCTCCGATCAAAACCTCT |
| AearNCED9_rev | TCGAATTCGAGGATTTGGGGA |
| AearABA1_for | GGAGGAGAAGAAAGGGGAGA |
| AearABA1_rev | ATCCTTTCTTTTTCGCAGCA |
| AearABA2_for | AACATGGCGCAAGAGTCTG |
| AearABA2_rev | TGGATGAAACAAGCCTCCTT |
| AearABA3_for | TGGAAGAATTTCTTGAGGAATTTGGA |
| AearABA3_rev | TCTTGAATTCGGTGTCACGGA |

| | |
|---|---|
| AearCYP707A2_for | GCGGTTCCAACAAAGAAAAC |
| AearCYP707A2_rev | GAGTGGCGAAGAAGGAATTG |
| AearGA3ox1_for | TCTTCGTCACCTCCCTGACT |
| AearGA3ox1_rev | GATGAGCGGGAGAGTTGTGT |
| AearGA3ox2_for | CCCATCCAATACACATTCCA |
| AearGA3ox2_rev | GCCTTGGCTGAGAAAAGAAG |
| AearGA2ox2_for | TCACAGCCCGTCACTTTAGA |
| AearGA2ox2_rev | GGCTTCTGGGTCGGTTAAAT |
| AearGA2ox3_for | CGCGTCTCTCTTAACCCAAC |
| AearGA2ox3_rev | TCACATGCCTTGACCATTTG |
| AearRGA_for | GTCCTCGGCTACAAGGTCAG |
| AearRGA_rev | TGAGGGAATCCATCTTCAGG |
| AearGAI_for | TGGTGGTGCTTCTGTACCTG |
| AearGAI_rev | TCATCCATGTGACCACCATC |
| AearRGL2_for | GGACCCTGCAACAATACCAT |
| AearRGL2_rev | CCACGCCTTCAACTTCCTTA |
| AearSOM-for | CCGCGAAAATTGATATCTCC |
| AearSOM_rev | TCGATTTCGATTTCTCACCA |
| AearDAG1_for | GCAATTACTCCCCAATAACAACA |
| AearDAG1_rev | GTTTGCGTTTGCGTTTGAG |
| AearDAG2_for | GGAACAACAACAACAACAAATGA |
| AearDAG2_rev | CTACCGGAGATGGATGTGGT |
| AearJMJ20_for | ATGGGAATCGAGATTGTTGG |
| AearJMJ20_rev | CGGCTGGTTTTTATGCAAGT |
| AearJMJ22_for | GGGAATGAGCGACCTGATTA |
| AearJMJ22_rev | TCACTGCATTCCAAGCAGAC |
| AearPAR1_for | CTCTAGCAACTCCCGACACC |
| AearPAR1_rev | TCTCCAACAATCTCCGTTTTG |
| AearPAR2_for | CGTCACTTCAGCGAGTGAAA |
| AearPAR2_rev | TTCCCGGAACTATTGTCTGC |
| AearDOG1_for | CGCGTCACTAAGCGATCTAAC |
| AearDOG1_rev | GCCGCGTCTTCTTGTAGACTT |
| AearABI3_for | ATGGCGGAAACCTTCCTTAT |
| AearABI3_rev | GAGGAAGAGGAGGAGGAGGA |
| AearABI4_for | CTCAACGCAAACGCAAAGGT |
| AearABI4_rev | TCACGGATTTCAGCAACCCA |
| AearABI5_for | GAACGCCGAAGAAAACAATC |
| AearABI5_rev | TCAACCCGGTTTGGTACATT |

**Table S3 List of Aethionema accession numbers used for this study**

| Name | Accession number |
|---|---|
| *AearNCED5* | *AA54G00417* |
| *AearNCED6* | *AA78G00012* |
| *AearNCED9* | *AA31G00716* |
| *AearABA1* | *AA8G00025* |
| *AearABA2* | *AA32G01008* |
| *AearABA3* | *AA37G00095* |
| *AearCYP707A2* | *AA32G00787* |
| *AearGA3ox1* | *AA37G00176* |
| *AearGA3ox2* | *AA31G00895* |
| *AearGA2ox2* | *AA54G00411* |
| *AearGA2ox3* | *AA18G00108* |
| *AearRGA* | *AA14G00090* |
| *AearGAI* | *AA53G00639* |
| *AearRGL2* | *AA10G00264* |
| *AearPIL5* | *AA33G00286* |
| *AearSOM* | *AA7G00098* |
| *AearDAG1* | *AA61G00535* |
| *AearDAG2* | *AA21G00391* |
| *AearJMJ20* | *AA5G00018* |
| *AearJMJ22* | *AA283G00008* |
| *AearPAR1* | *AA21G00074* |
| *AearPAR2* | *AA61G00301* |
| *AearDOG1* | *AA6G00020* |
| *AearABI3* | *AA109G00007* |
| *AearABI4* | *AA29G00257* |
| *AearABI5* | *AA60G00170* |
| *AearPHYA* | *AA65G00005* |
| *AearPHYB* | *AA26G00394* |
| *AearPHYC* | *AA1057G00001* |
| *AearPHYD* | *AA18G00159* |
| *AearPHYE* | *AA57G00083* |