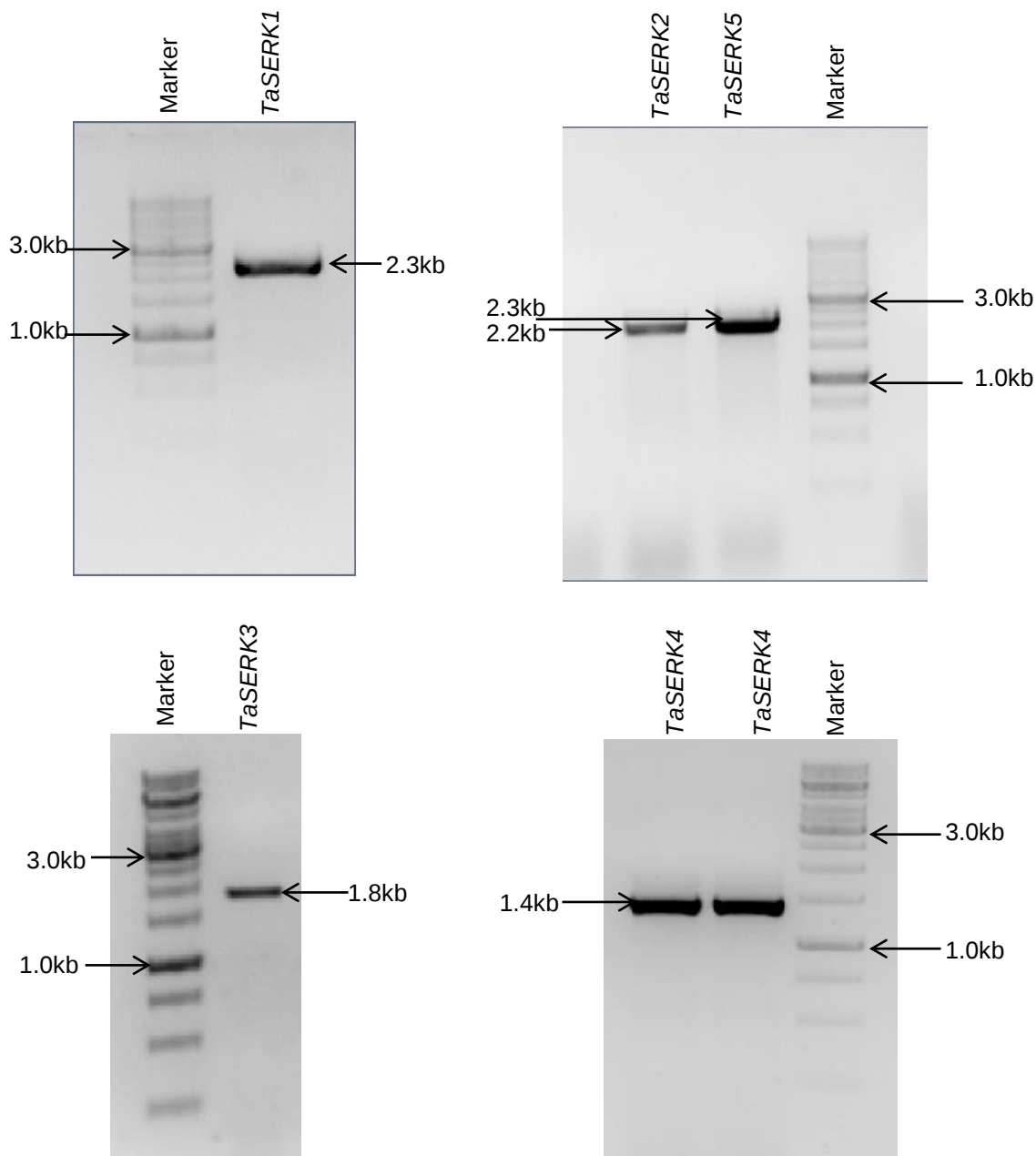
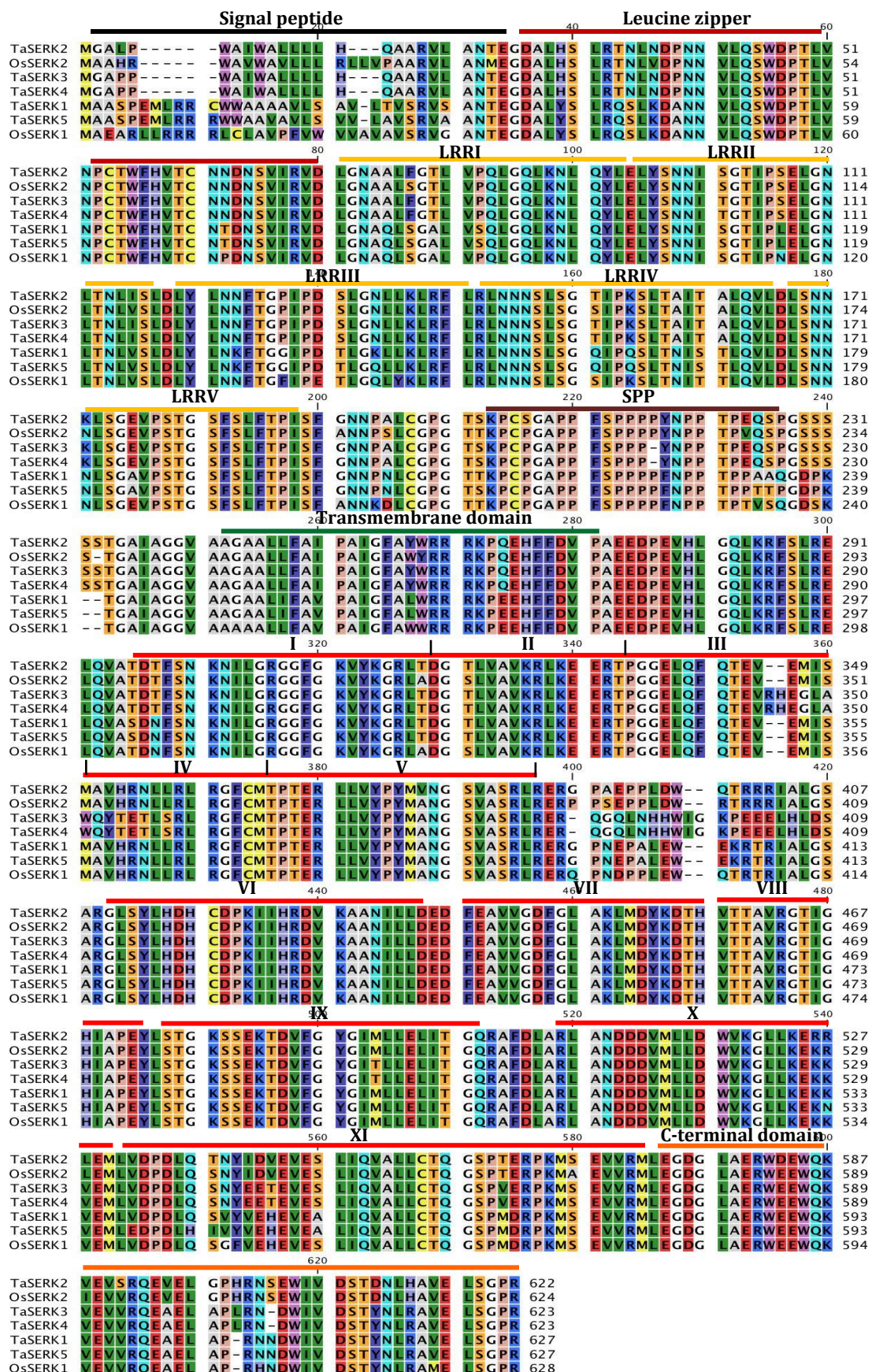


Ectopic expression of *Triticum aestivum* *SERK* genes (TaSERKs) control plant growth and development in *Arabidopsis*

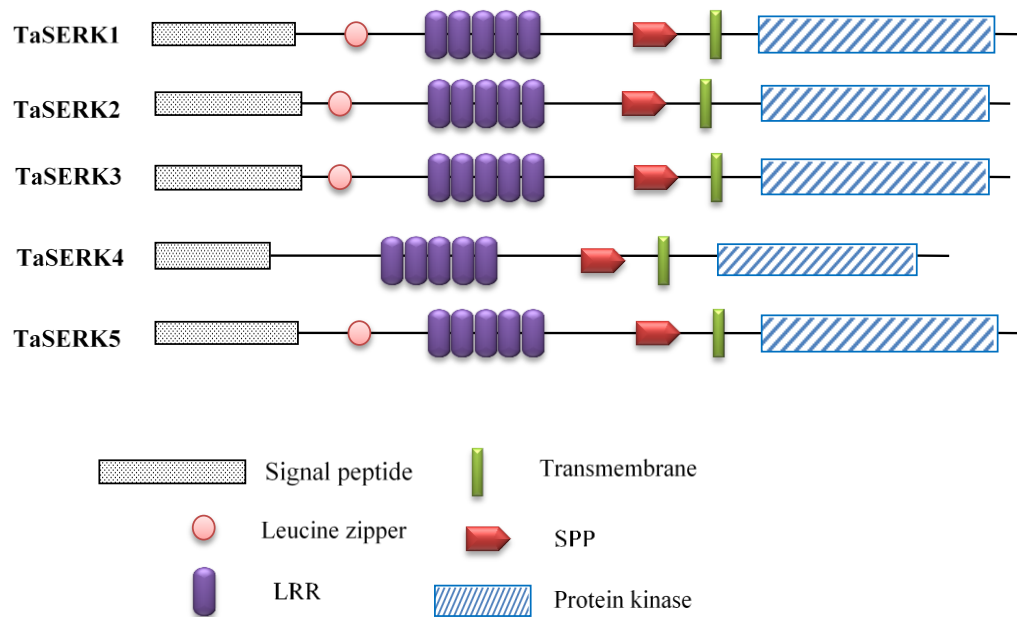
Akanksha Singh and Paramjit Khurana*



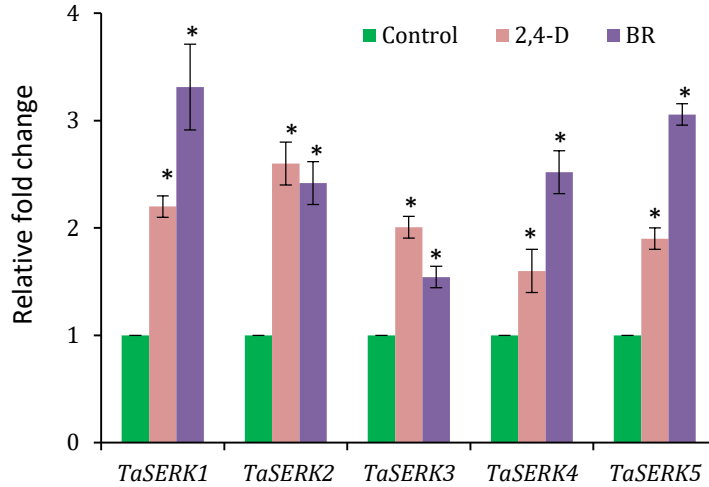
Supplementary Fig. S1. Amplified PCR product of TaSERKs from *T. aestivum*. Purified PCR product of *TaSERK1* (2.3kb), *TaSERK2* (2.2 kb), *TaSERK3* (1.8kb), *TaSERK4* (1.4kb) and *TaSERK5* (2.3kb) amplified from cDNA which was isolated from embryogenic calli of wheat (*T. aestivum*).



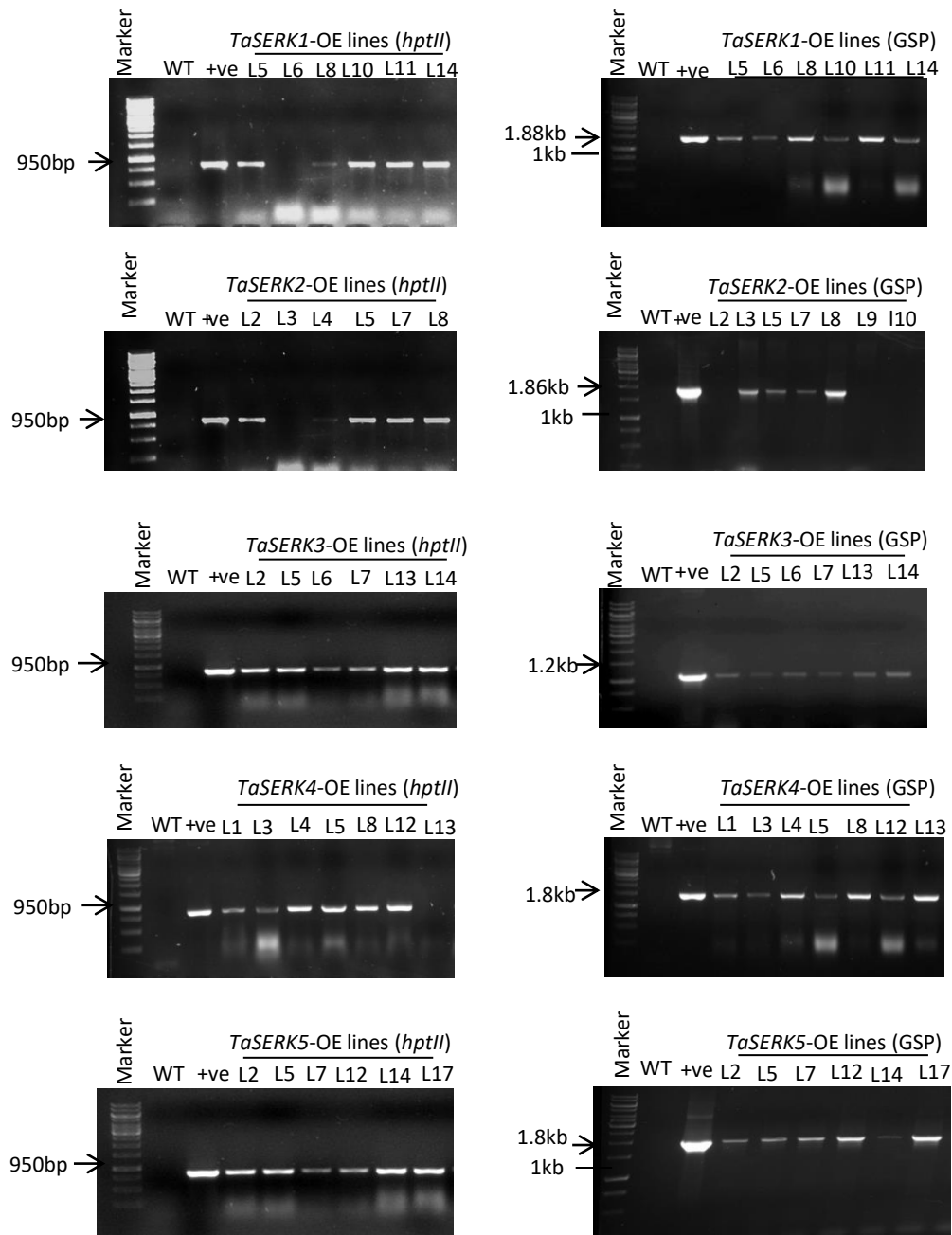
Supplementary Fig. S2. Multiple sequence alignment of TaSERK1, 2, 3, 4 and 5 with OsSERK1, 2. The different domains are labelled and shown by coloured lines.



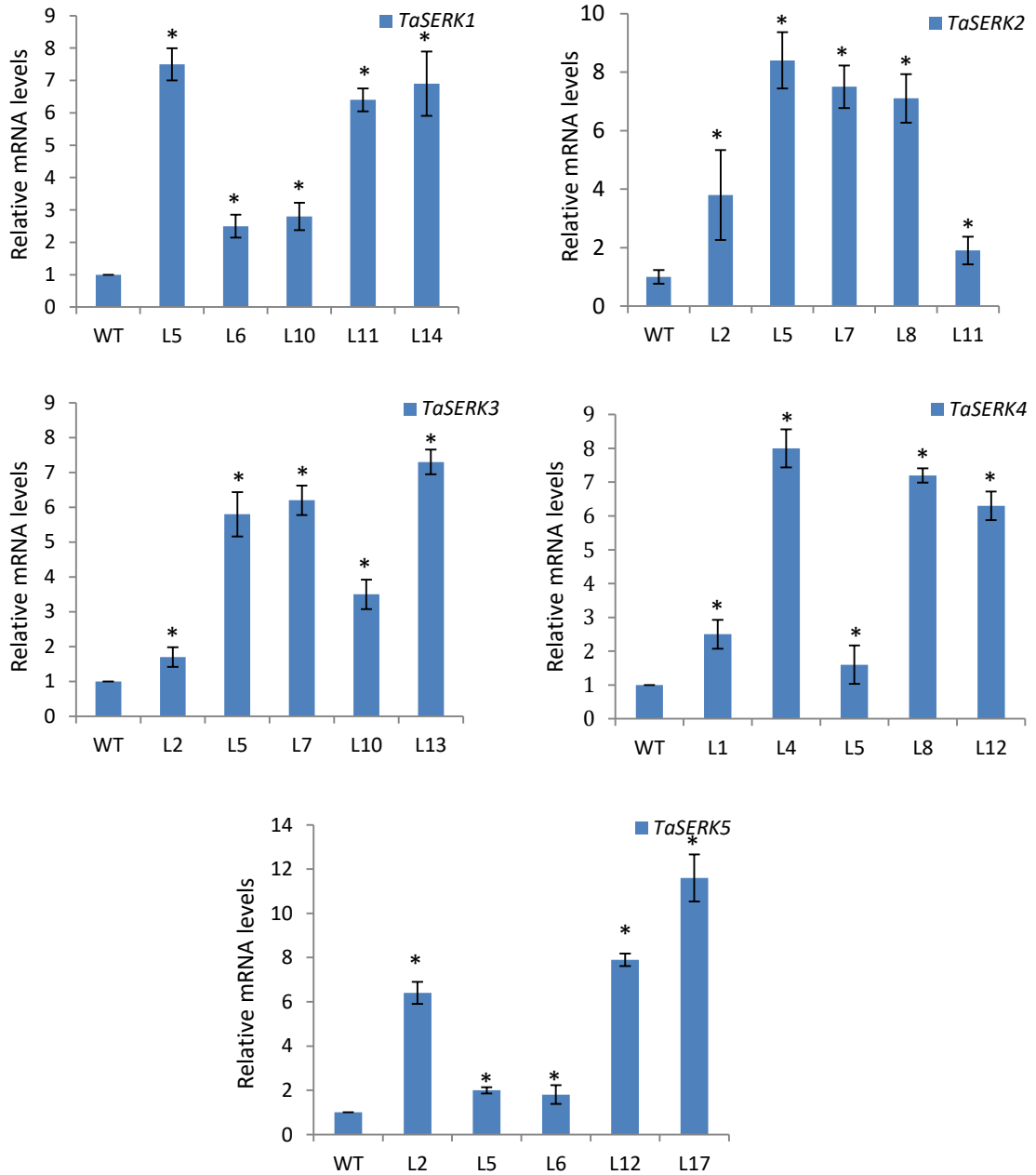
Supplementary Fig. S3. Domain analysis of TaSERKs.



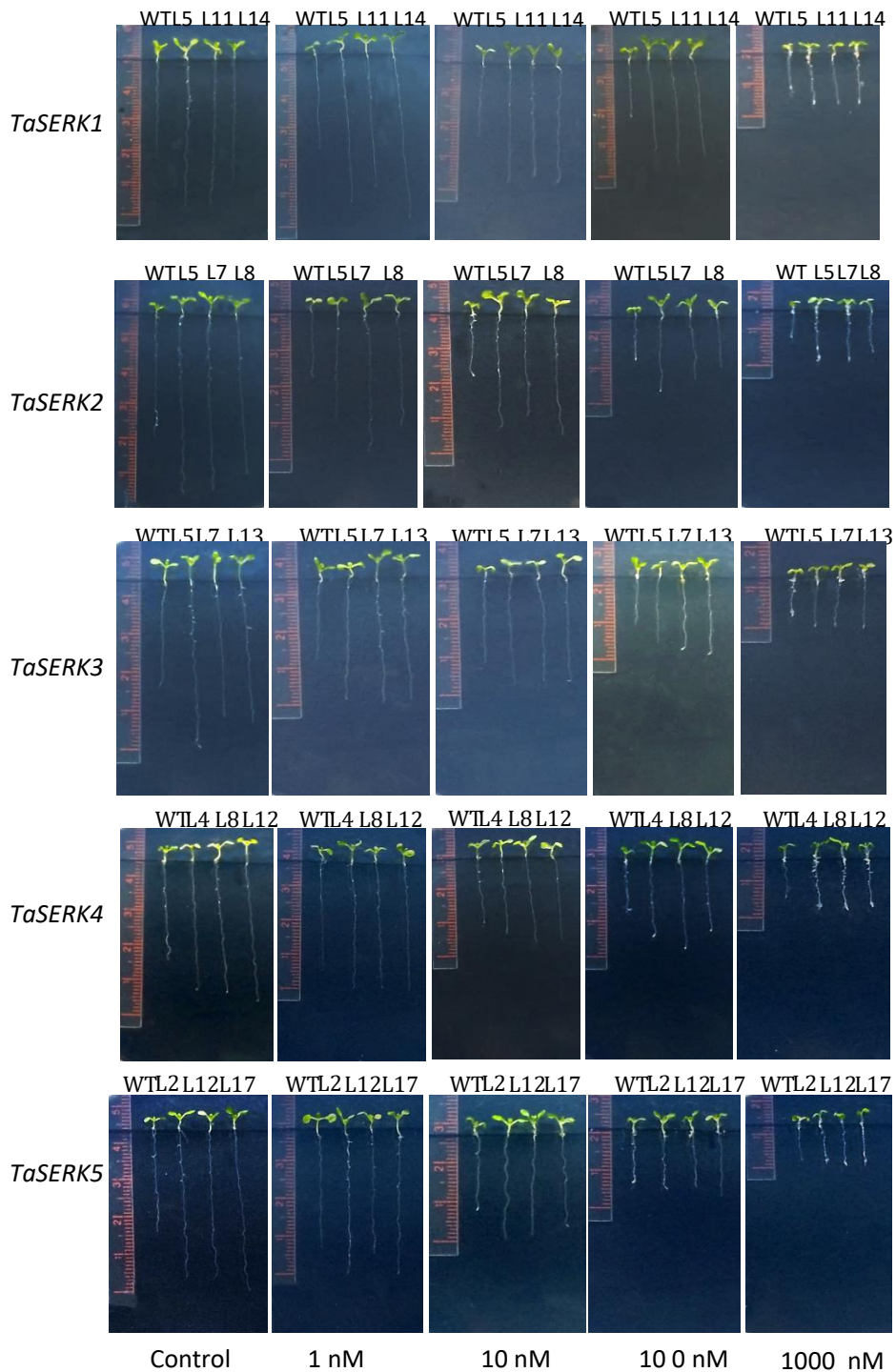
Supplementary Fig. S4. Expression analysis of five *TaSERKs* in control, 2,4-D and epibrassinolide treated leaf bases of 13-day-old wheat seedlings. The relative mRNA levels were normalised with respect to the housekeeping gene, *ACTIN*. The error bars represent mean $\pm$ SD of two biological replicates, each analyzed with three technical replicates. The asterisks above the bars indicate statistically significant differences at $*p \leq 0.05$.



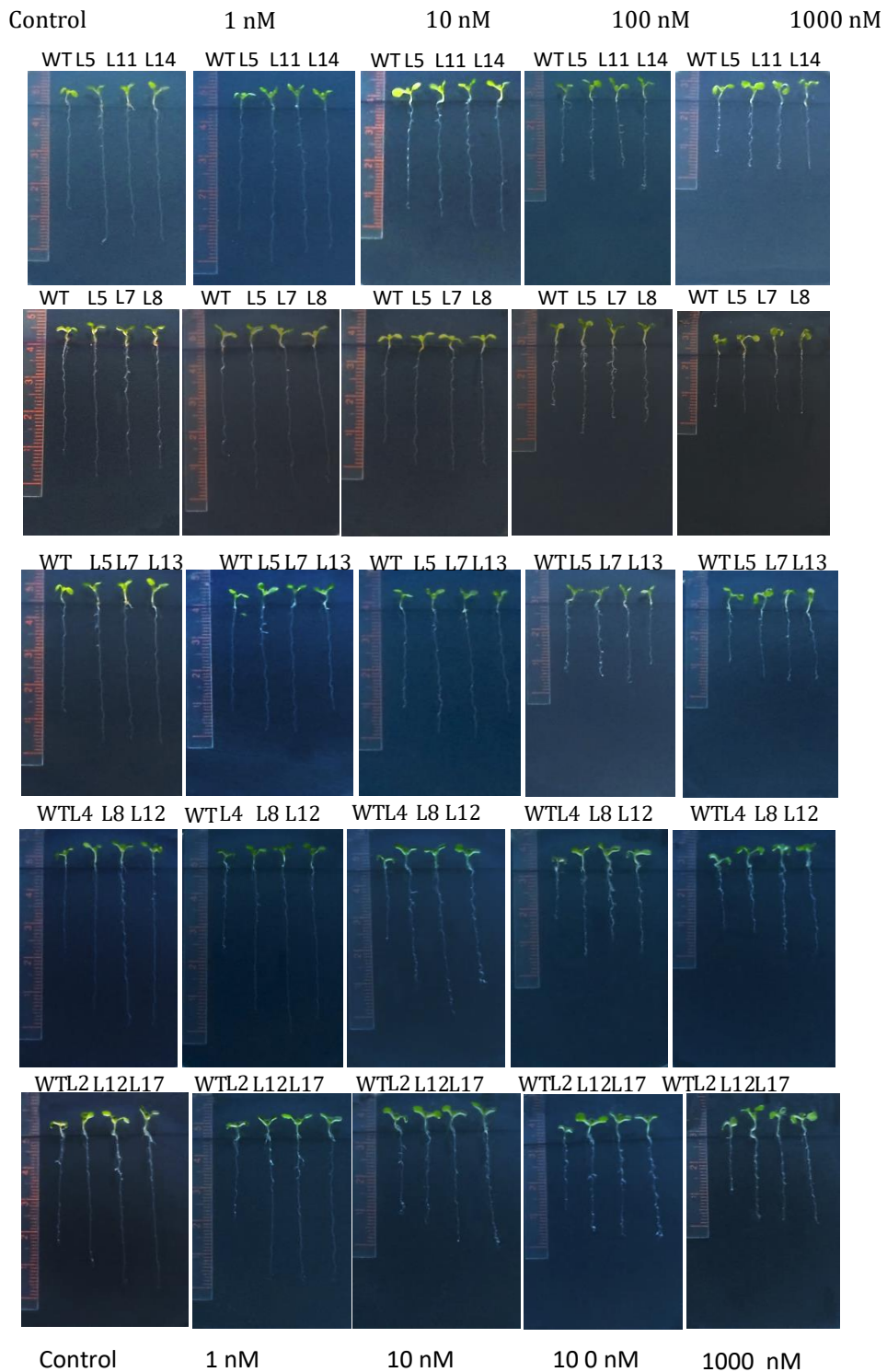
Supplementary Fig. S5. Confirmation of *TaSERK1,2,3,4* and 5 transgenics. Confirmation of putative transformants of *TaSERK*-OE transgenics (*TaSERK1,2,3,4* and 5) in *Arabidopsis* through PCR using *hptII* and *TaSERKs* gene specific primers.



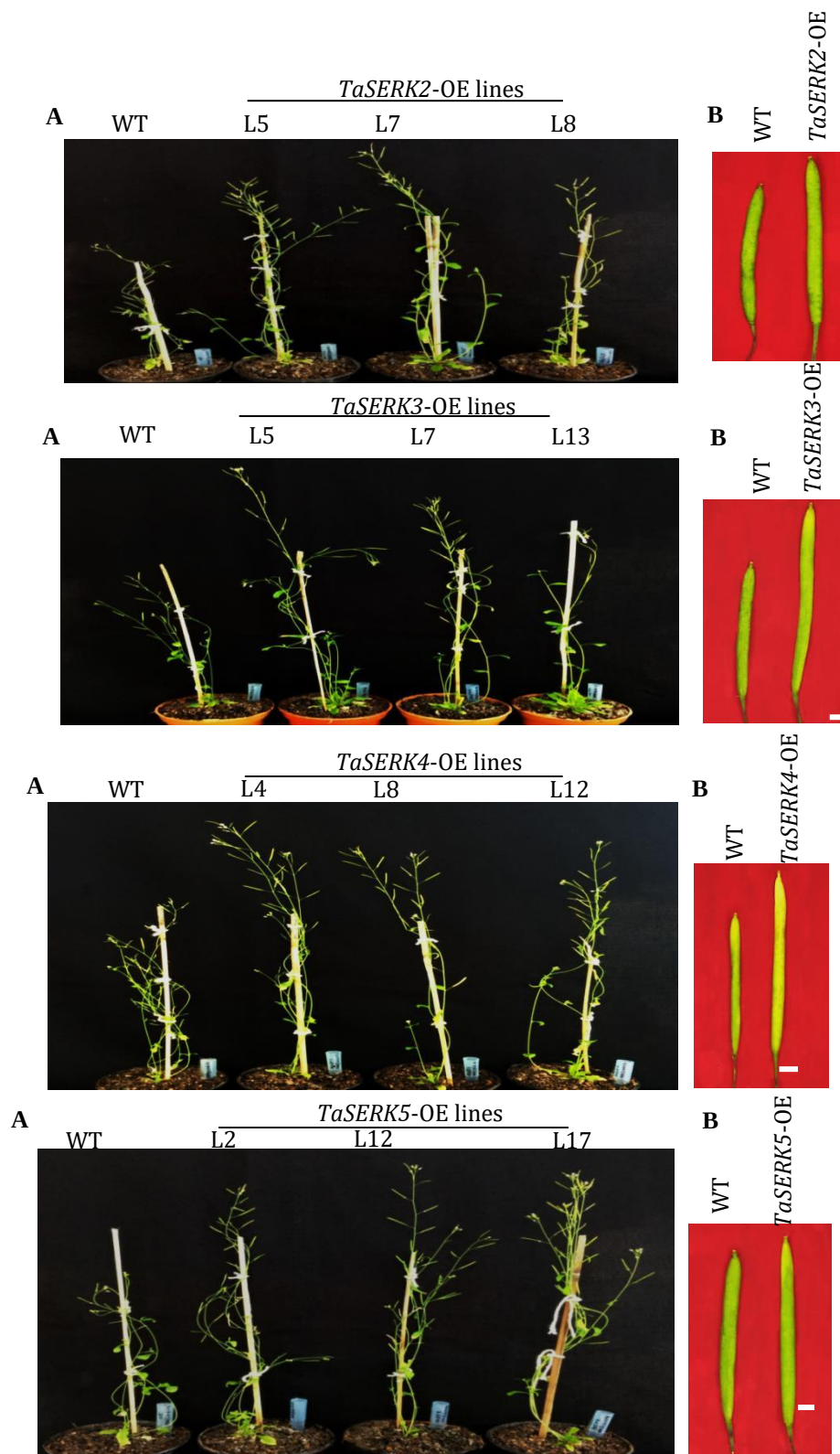
Supplementary Fig. S6. Overexpression of all five *TaSERKs* in *Arabidopsis* transgenic plants. Quantitative PCR analysis of WT and transgenic *Arabidopsis* plants, representing the transcript level of *TaSERK1*, 2, 3, 4 and 5 relative to the WT. The expression of *ACTIN* gene was used as an internal control. The Data showed are mean $\pm$ SE from two biological replicates. The asterisks above the bars indicate statistically significant differences at $*p \leq 0.05$.



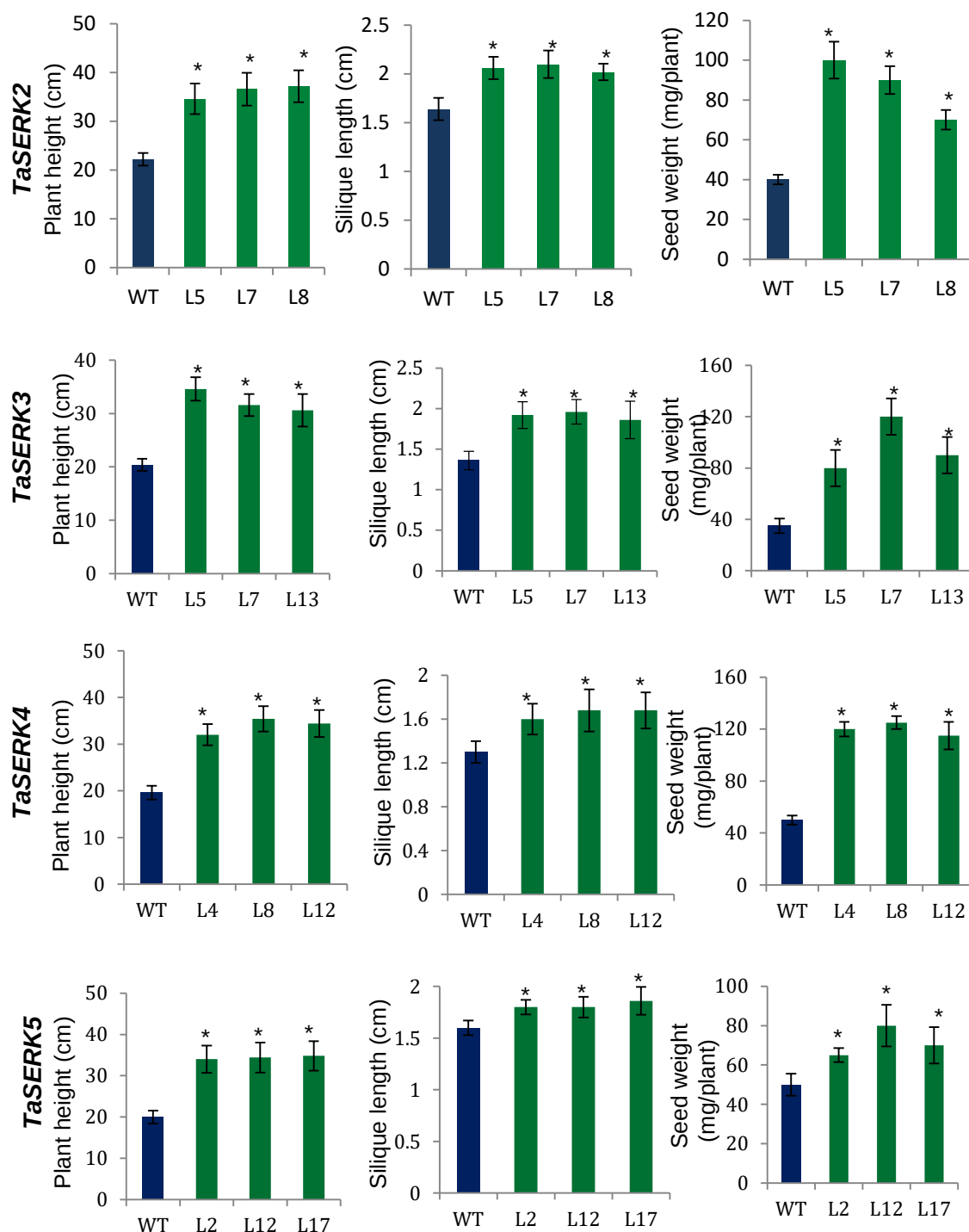
Supplementary Fig. S7. Root growth elongation assay of *TaSERK1*, 2, 3, 4 and 5 OE plants under 2,4-D treatment. 7-d-old seedlings of WT and *TaSERKs*-OE were grown on half-strength MS medium in the presence or absence of the indicated concentration of 2,4-D (nM) after germination.



Supplementary Fig. S8. Root growth elongation assay of *TaSERK1*, 2, 3, 4 and 5 OE plants under epi-BL treatment. 7-d-old seedlings of WT and *TaSERKs*-OE were grown on half-strength MS medium in the presence or absence of the indicated concentration of epi-BL (nM) after germination.



Supplementary Fig. S9. Phenotype of *TaSERKs* OE transgenic lines in *Arabidopsis thaliana*. **A.** *TaSERK2*, 3, 4 and 5 OE transgenic lines showed increase in plant height as compared to the Col-0 WT grown under 16 h light and 8 h dark culture condition at the same time. **B.** Two month old *TaSERKs*-OE lines had slight increased siliques than WT.



Supplementary Fig. S10. Morphometric comparison of TaSERK2, 3, 4 and 5 overexpression transgenic lines in *Arabidopsis thaliana*. Graphical representation of plant height, silique length and seed weight per individual plant (N=10). Data represents mean $\pm$ SE. The asterisks ($p \leq 0.05$) indicate statistically significant differences between WT and transgenic lines.

Supplementary Table S1. Morphological comparison between *TaSERK1*, 2, 3, 4 and 5 OE and WT *Arabidopsis* plants.

Morphological features of <i>TaSERK1</i>	WT	L5	L11	L14
Leaf length ^a (cm)	1.65 ± 0.18	1.72 ± 0.11	1.7 ± 0.11	1.74 ± 0.11
Leaf width ^a (cm)	0.56 ± 0.01	0.57 ± 0.02	0.58 ± 0.01	0.57 ± 0.03
Rosette leaf no. ^b	10.8 ± 0.83	6.8 ± 0.84	7.2 ± 0.84	7.8 ± 1.30
Silique number	16 ± 3.08	36.4 ± 4.66	31.8 ± 5.31	33.8 ± 3.70
Seed length	0.35 ± 0.02	0.5 ± 0.01	0.44 ± 0.03	0.50 ± 0.03
Seed width	0.24 ± 0.03	0.29 ± 0.02	0.35 ± 0.04	0.31 ± 0.05

Morphological features of <i>TaSERK2</i>	WT	L5	L7	L8
Leaf length ^a (cm)	1.6 ± 0.07	1.69 ± 0.05	1.7 ± 0.10	1.7 ± 0.08
Leaf width ^a (cm)	0.48 ± 0.01	0.68 ± 0.05	0.64 ± 0.01	0.54 ± 0.04
Rosette leaf no. ^b	10.2 ± 0.83	8.4 ± 1.14	7.4 ± 0.83	7.4 ± 0.54
Silique number	19.6 ± 2.30	28.8 ± 2.86	36.6 ± 5.07	44.6 ± 4.61
Seed length	0.30 ± 0.02	0.49 ± 0.03	0.54 ± 0.02	0.51 ± 0.04
Seed width	0.23 ± 0.02	0.31 ± 0.05	0.32 ± 0.04	0.35 ± 0.04

Morphological features of <i>TaSERK3</i>	WT	L5	L7	L13
Leaf length ^a (cm)	1.52 ± 0.08	1.74 ± 0.11	1.78 ± 0.13	1.72 ± 0.11
Leaf width ^a (cm)	0.52 ± 0.04	0.74 ± 0.05	0.7 ± 0.07	0.72 ± 0.08
Rosette leaf no. ^b	11.6 ± 1.51	9 ± 0.70	9.2 ± 0.83	10 ± 1.58
Silique number	20.6 ± 1.92	34.6 ± 4.15	35.6 ± 3.84	31.8 ± 5.31
Seed length	0.41 ± 0.01	0.55 ± 0.02	0.50 ± 0.03	0.47 ± 0.05
Seed width	0.28 ± 0.03	0.36 ± 0.04	0.31 ± 0.04	0.32 ± 0.03

Morphological features of <i>TaSERK4</i>	WT	L4	L8	L12
Leaf length ^a (cm)	1.38 ± 0.08	1.6 ± 0.07	1.56 ± 0.11	1.62 ± 0.08
Leaf width ^a (cm)	0.48 ± 0.02	0.58 ± 0.01	0.56 ± 0.02	0.6 ± 0.03
Rosette leaf no. ^b	11.4 ± 1.67	8.8 ± 1.48	8.8 ± 0.83	8.6 ± 1.14
Silique number	23.6 ± 3.36	35.0 ± 4.30	44.2 ± 5.17	38.8 ± 2.58
Seed length	0.38 ± 0.03	0.47 ± 0.02	0.52 ± 0.06	0.45 ± 0.04
Seed width	0.26 ± 0.04	0.34 ± 0.03	0.31 ± 0.05	0.30 ± 0.02

Morphological features of <i>TaSERK5</i>	WT	L2	L12	L17
Leaf length ^a (cm)	1.5 ± 0.12	1.64 ± 0.18	1.58 ± 0.13	1.68 ± 0.13
Leaf width ^a (cm)	0.56 ± 0.01	0.62 ± 0.02	0.64 ± 0.01	0.6 ± 0.01
Rosette leaf no. ^b	10.6 ± 1.14	8.6 ± 1.14	8.6 ± 1.14	8.4 ± 1.51
Silique number	20.2 ± 1.30	32.0 ± 2.54	40.6 ± 3.04	41.2 ± 4.76
Seed length	0.40 ± 0.04	0.45 ± 0.04	0.50 ± 0.03	0.47 ± 0.06
Seed width	0.31 ± 0.02	0.33 ± 0.02	0.31 ± 0.04	0.32 ± 0.05

Supplementary Table S2. List of primers used in the experiment

Gene	Primer ID	Sequence (5'- 3')
<i>TaSERK1</i>	TOPO-Fwd	CACCATGGCTGCGTCGCCGGAGATG
	TOPO-Rev	TCCTGTTACCTCGGGCCGGACAGCTC
	Fwd (Real Time)	CACCGCCTCCATTCAATCC
	Rev (Real Time)	CTCCGGTTTTAGGGTCACCTT
<i>TaSERK2</i>	TOPO-Fwd	CACCATGGGGGCGCTGCCGTGG
	TOPO-Rev	CAGCCACCATCACCTTGGCCCTGATAG
	Fwd (Real Time)	AAGTGTTGCATCACGTCTAAGAG
	Rev (Real Time)	GGCAGAACCCAATGCAATTC
<i>TaSERK3</i>	TOPO-Fwd	CACCTGCTGTGGGATCTAGGGC
	TOPO-Rev	AGGCTGAATGACTGATCAAATGGTG
	Fwd (Real Time)	TTCGGCACGAGGGATTAGC
	Rev (Real Time)	CATTGGCCATGTATGGATAGACTAGT
<i>TaSERK4</i>	TOPO-Fwd	CACCATGTCGGGTCAAATTCCTAA
	TOPO-Rev	CCTATGCCAGGACGTTGGTCAT
	Fwd (Real Time)	GACTCTCTTACTTGCACGATCACTGT
	Rev (Real Time)	TCCTCGTCCAAAAGAATATTTGC
<i>TaSERK5</i>	TOPO-Fwd	CACCATGGCTGCGTCGCCGGAGAT
	TOPO-Rev	TCCTGTTACCTCGGGCCGGACAGCT
	Fwd (Real Time)	ATCACTGGACAGAGGGCATTG
	Rev (Real Time)	CCCAGTCAAGCAGCATGACA
<i>AtLEC2</i>	Fwd (Real Time)	GAGCAAGCTTGGGTTTCGATAA
	Rev (Real Time)	GTCTCTATCTCACGGTACCGGTAA
<i>AtWUS</i>	Fwd (Real Time)	GGCTCGTGAGCGTCAGAAG
	Rev (Real Time)	AACCGAGTTGGGTGATGAAGA
<i>AtBBM</i>	Fwd (Real Time)	AGTGACGAGTTCGCGTTTGG
	Rev (Real Time)	AGACATGTGTATGTGTGAACGTATGAC
<i>AtAGL-15</i>	Fwd (Real Time)	CCACTATGTTCCATCCTACATCAAA
	Rev (Real Time)	GGTGTTCTGGAGGCTGCATT