Supplementary Material

Molecular characterisation of *PAL* gene family reveals their role in abiotic stress response in lucerne (*Medicago sativa*)

Yating Feng[A,B], *Qiaoli Huang*[B], *Rui Zhang*[A,B], *Junyi Li*[A,B], *Kai Luo*[A,B,*], *and Yinhua Chen*[A,C,*]

[A]Key Laboratory of Sustainable Utilization of Tropical Biological Resources of Hainan Province, Haikou 570228, P.R. China.

[B]School of Tropical Crops, Hainan University, Haikou 570228, P.R. China.

[C]School of Life and Pharmaceutical Sciences, Hainan University, Haikou 570228, P.R. China.

[*]Correspondence to: Kai Luo Key Laboratory of Sustainable Utilization of Tropical Biological Resources of Hainan Province, Haikou 570228, P.R. China Email: luok@hainanu.edu.cn and Yinhua Chen Key Laboratory of Sustainable Utilization of Tropical Biological Resources of Hainan Province, Haikou 570228, P.R. China Email: yhchen@hainanu.edu.cn
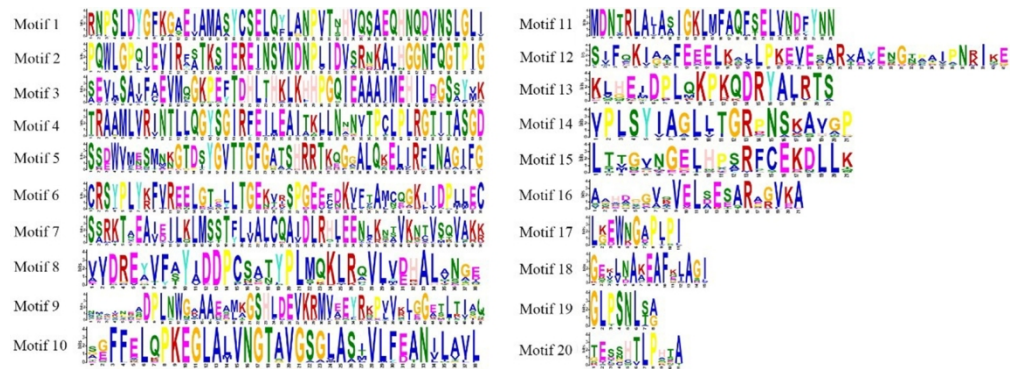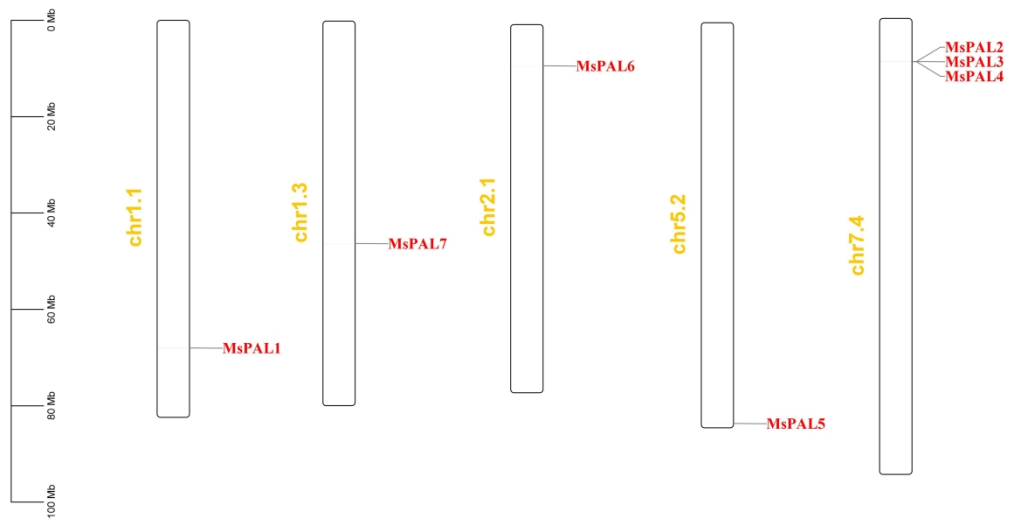
Figure S1. Sequences of 20 conserved motifs.

Figure S2. Location of PAL family gene on chromosome in alfalfa.

Table S1.   The qRT-PCR primers for *MsPAL* genes.

Gene name	Forward primer (5′–3′)	Reverse primer (5′–3′)
MsPAL1	GCAACTCATAGTACCGGCGT	TGAAGGGCACCACCTTGTTT
MsPAL2	TGAGGTGAAGCGTATGGTGG	CGTAACTGTCCGTGCCTTTG
MsPAL3	GGCAATGAAAGGCAGTCACC	AAATCGTCAGTGTCTCGCCA
MsPAL4	GGCAATGAAAGGCAGTCACC	AAATCGTCAGTGTCTCGCCA
MsPAL5	TGCCTTCGTCAGCAACAAGA	GATCACCGGAAGCGGTAACT
MsPAL6	ATGGACTTAAAGGCGGCGAG	TGCTGTTCGGCACTTTGAAC
MsPAL7	TGTTAGGGTGGAGCTTTCGG	TCCGGTGAGATGTAGCACCA
Actin1	CTAGGATCCAAAATGGCCGATGGTGAGG	GAAACTCACCACCACGAACCAG

Table S2. Collinearity relationship of alfalfa *PAL* genes to the other three species.

Synteny sequence1	Chromosome	Synteny sequence2	Chromosome	Ka	Ks	Ka/Ks	Types of selection
MsPAL7	Chr1.3	*AtPAL1*	Chr2	0.133	2.285	0.058	Purify
MsPAL2	Chr7.4	*Glyma.03G181600*	Gm03	0.057	0.799	0.071	Purify
MsPAL2	Chr7.4	*Glyma.10G058200*	Gm10	0.075	1.217	0.062	Purify
MsPAL2	Chr7.4	*Glyma.13G145000*	Gm13	0.078	1.287	0.061	Purify
MsPAL2	Chr7.4	*Glyma.19G182300*	Gm19	0.056	0.841	0.067	Purify
MsPAL5	Chr5.2	*Glyma.02G309300*	Gm02	0.071	0.549	0.130	Purify
MsPAL7	Chr1.3	*Glyma.03G181600*	Gm03	0.064	1.157	0.056	Purify
MsPAL7	Chr1.3	*Glyma.10G058200*	Gm10	0.058	1.079	0.054	Purify
MsPAL7	Chr1.3	*Glyma.13G145000*	Gm13	0.059	1.164	0.051	Purify
MsPAL7	Chr1.3	*Glyma.19G182300*	Gm19	0.065	1.208	0.053	Purify
MsPAL1	Chr1.1	*Glyma.20G180800*	Gm20	0.080	0.894	0.090	Purify
MsPAL2	Chr7.4	*MtPAL1*	Chr1	0.014	0.191	0.074	Purify
MsPAL2	Chr7.4	*MtPAL3*	Chr2	0.068	1.085	0.063	Purify
MsPAL2	Chr7.4	*MtPAL5*	Chr7	0.173	1.728	0.100	Purify
MsPAL5	Chr5.2	*MtPAL4*	Chr5	0.018	0.141	0.130	Purify
MsPAL7	Chr1.3	*MtPAL1*	Chr1	0.069	1.120	0.062	Purify
MsPAL7	Chr1.3	*MtPAL3*	Chr2	0.002	0.122	0.020	Purify
MsPAL7	Chr1.3	*MtPAL5*	Chr7	0.184	1.528	0.120	Purify
MsPAL6	Chr2.1	*MtPAL1*	Chr1	0.162	1.558	0.104	Purify
MsPAL6	Chr2.1	*MtPAL3*	Chr2	0.163	1.560	0.105	Purify
MsPAL6	Chr2.1	*MtPAL5*	Chr7	0.020	0.102	0.192	Purify