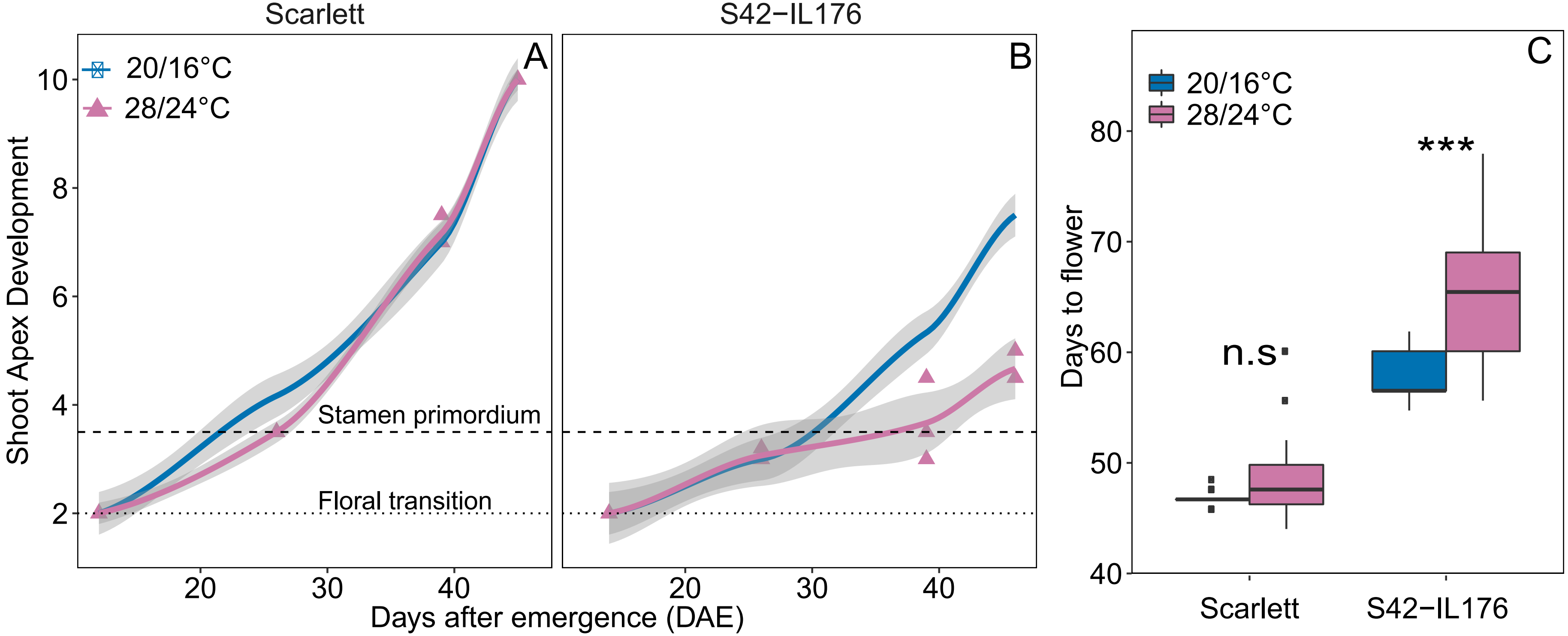
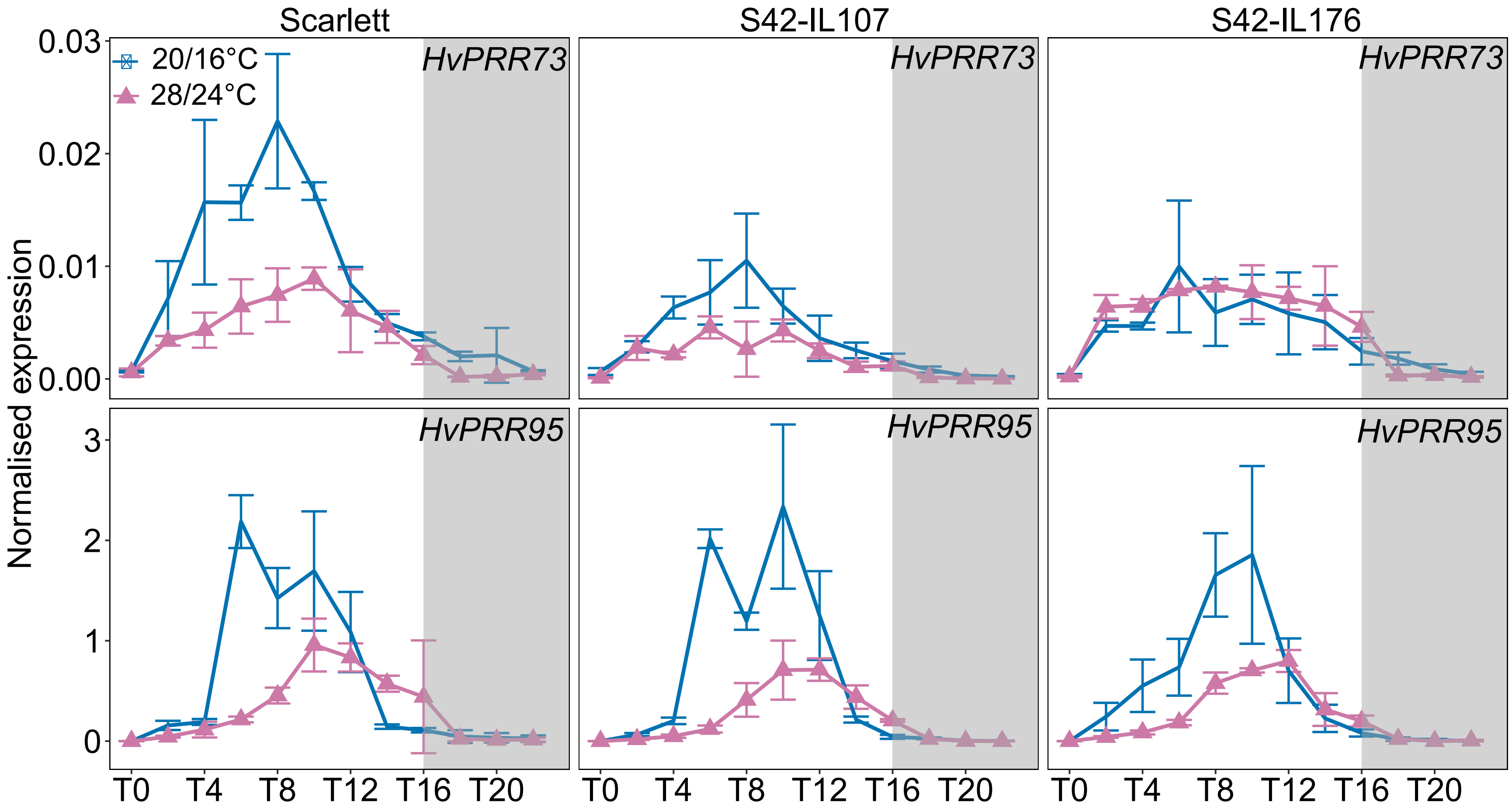
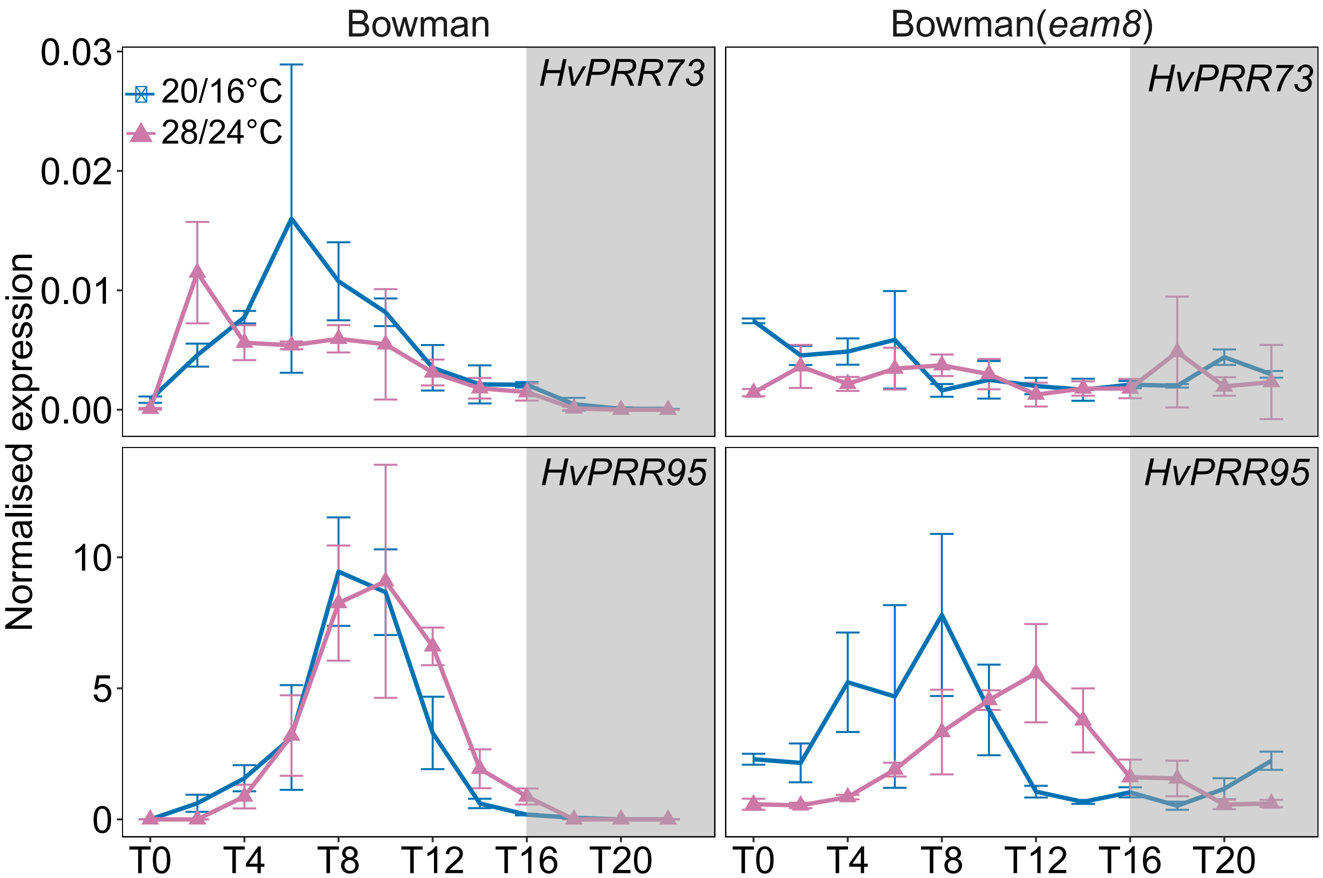


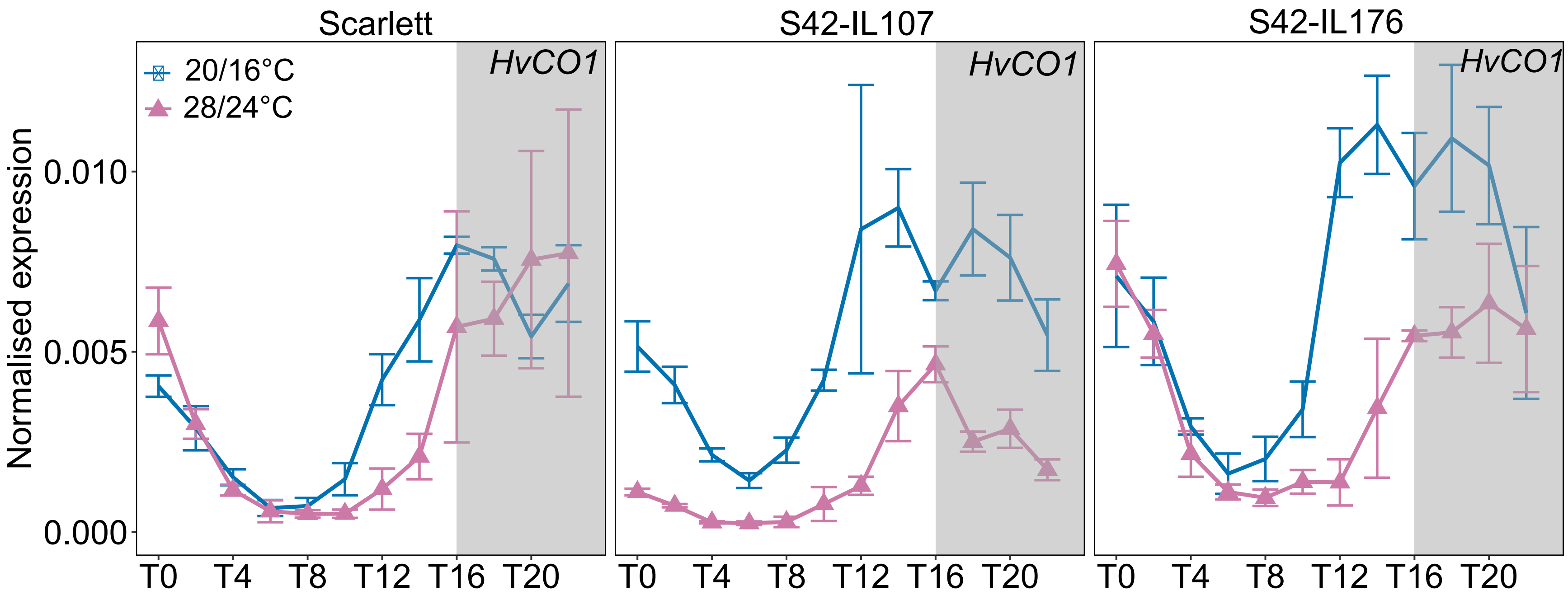
Supplementary Figure 1: *HvVRN1* affects reproductive development in response to ambient temperature after floral transition. Development of the main shoot apex (MSA) was scored under control (blue) and high ambient (pink) temperatures every ten days according to the Waddington scale (Waddington et al., 1983). MSA development was not affected under high compared to control temperatures in Scarlett (A) and delayed inflorescence development in the derived introgression line S42-IL176 (*Hvvrn1*) (B). Plants were grown at control temperature (blue, 20/16°C, day/night) and transferred to high temperature (pink, 28/24°C, day/night) at floral transition (W2.0). 3-4 plants per genotype were dissected at each time point in each treatment under long days (16h light/8h night). Statistical differences were calculated using a polynomial regression model at a 95% confidence interval (Loess smooth line). (C) Days to flowering of the MSA under control (blue, 20/16°C, day/night) and high ambient temperatures (pink, 28/24°C, day/night) in the spring barley variety Scarlett and the derived introgression line S42-IL176 (*Hvvrn1*). Flowering time was recorded for 6-8 plants per genotype and treatment. Statistical differences were calculated by an ANOVA and a posthoc Tukeys HSD pairwise comparison test: *P <0.05, **P <0.01, ***P <0.001, n.s=non-significant.



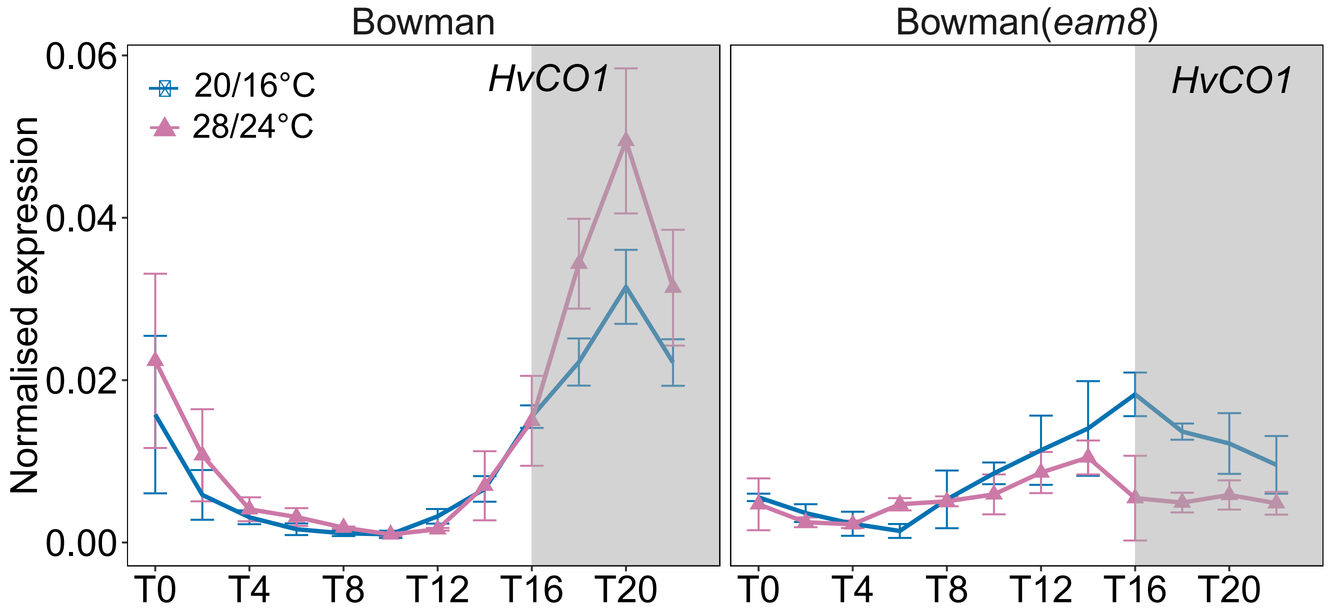
Supplementary Figure 2: Diurnal expression of circadian clock genes *HvPRR73* and *HvPRR95* in Scarlett, S42-IL107, and S42-IL176 under control and high ambient temperatures. Gene expression was assayed every two hours for 24 hours under control (blue, 20/16°C, day/night) and high ambient (pink, 28/24°C, day/night) temperatures under long days (16h light/8h night). Grey boxes indicate nights. Error bars indicate ±SD of three biological replicates.



Supplementary Figure 3: Diurnal expression of circadian clock genes *HvPRR73* and *HvPRR95* in Bowman and Bowman(*eam8*) under control and high ambient temperatures Gene expression was assayed every two hours for 24 hours under control (blue, 20/16°C, day/night) and high ambient (pink, 28/24°C, day/night) temperatures under long days (16h light/8h night). Grey boxes indicate nights. Error bars indicate ±SD of three biological replicates.



Supplementary Figure 4: High ambient temperature downregulates the expression of flowering time gene *HvCO1* in Scarlett, S42-IL107, and S42-IL176. Diurnal expression of *HvCO1* was assayed every two hours for 24 hours under control (blue, 20/16°C, day/night) and high ambient (pink, 28/24°C, day/night) temperatures under long days (16h light/8h night). Grey boxes indicate nights. Error bars indicate ±SD of three biological replicates.



Supplementary Figure 5: Effect of high ambient temperature on diurnal expression of flowering time gene *HvCO1* in Bowman and Bowman(*eam8*). Diurnal expression of *HvCO1* was assayed every two hours for 24 hours under control (blue, 20/16°C, day/night) and high ambient (pink, 28/24°C, day/night) temperatures under long days (16h light/8h night). Grey boxes indicate nights. Error bars indicate ±SD of three biological replicates.

Supplementary Table 1: A) Two-factorial ANOVA, F values and significances (**p<0.01, *** p<0.001, ns = non-significant) and B) Least square means for heading date, floret and seed number for each genotype (P = Parental genotype, Scarlett or Bowman, V = Introgression line for *HvELF3*, *PPD-H1* or *HvVRN1*) by environment combination (C = Control, H= High ambient temperatures). Small letters indicate significant differences (p<0.05).

A

Factor	Heading	Floret number	Seed number
	F Value	F Value	F Value
HvELF3			
Temperature	44***	27***	10**
HvELF3	1102***	310***	15***
*HvELF3**Temp	178***	22***	15***
Ppd-H1			
Temperature	50***	35***	53***
PPD-H1	2098***	117***	12***
*PPD-H1**Temperature	189***	10***	19***
HvVRN1			
Temperature	6995***	732***	363***
HvVRN1	6131***	236***	23***
*HvVRN1**Temp	4617***	235***	1 ns

B

Factor	P/C	P/H	V/C	V/H
HvELF3				
Heading	40^{a}	51^{c}	29.8^{b}	26^{d}
Floret number	21^{a}	17c	13^{b}	13^{b}
Seed number	9^{a}	3^{b}	9^{a}	9^{a}
PPD-H1				
Heading	42^{a}	52^{b}	26^{c}	23^{d}
Floret number	26^{a}	19^{c}	16^{b}	14^{b}
Seed number	15^{a}	4^{c}	14^{ab}	11^{b}
HvVRN1				
Heading	46^{a}	56^{c}	52^{b}	$>106^{d}$
Floret number	30^{a}	22^{b}	30^{a}	0^{c}
Seed number	23^{a}	5^{c}	19^{b}	0^{d}

Supplementary Table 2: List of q-PCR primers used in this study.

Gene ID	**Gene name**	**Forward primer sequence**	**Reverse primer sequence**	**Source**
AY145451	*HvACTIN*	CGT GTT GGA TTC TGG TGA TG	AGC CAC ATA TGC GAG CTT CT	Campoli et al.2012a
AJ249143	*HvBM3*	GCC GTC ACC AGC ACA AGC AA	CCC CAT TCA CCC TGT AGC AAA GA	Digel et al. 2015
AJ249146	*HvBM8*	CCA CAG CAG CCG ACA CCT A	TGC CTT TGG GGG AGA AGA CG	Digel et al. 2015
JN603242	*HvCCA1*	CCT GGA ATT GGA GAT GGA GA	TGA GCA TGG CTT CTG ATT TG	Campoli et al.2012b
AF490468	*HvCO1*	CTG CTG GGG CTA GTG CTT AC	CCT TGT TGC ATA ACG TGT GG	Campoli et al.2012a
DQ100327	*HvFT1*	GGT AGA CCC AGA TGC TCC AA	TCG TAG CAC ATC ACC TCC TG	Campoli et al.2012a
AK362208	*HvGAPDH*	GTG AGG CTG GTG CTG ATT ACG	AGT GGT GCA GCT AGC ATT TGA GAC	unpublished
AY740524	*HvGI*	TCA GTT AGA GCT CCT GGA AGT	GGT AGT TTG GGC TTT GGA TG	Campoli et al.2012b
Hv.20312	*HvLUX1*	AAT TCA GTC CAC GGA TGC TC	CTT CAC TTC AGC TCC CCT TG	Campoli et al.2012
HM130525	*HvOS2*	CAA TGC TGA TGA CTC AGA TGC T	CGCTATTTCGTTGCGCCAAT	Green up et al. 2010
JN603243	*HvPRR1*	GAG CAT AGC ATG GCA CTT CA	TGT CTT TCC TCG GAA ATT GG	Campoli et al.2012b
AK361360	*HvPRR59*	GAA ATT CCG CAT GAA AAG GA	TTC CGC ATC TTC TGT TGT TG	Campoli et al.2012b
AK376549	*HvPRR73*	GCG CCG TAG AGA ATC AGA AC	CAT GTC GGG TAC AGT CAT CG	Campoli et al.2012b
AK252005	*HvPRR95*	CAG AAC TCC AGT GTC GCA AA	TGC TGT TGC CAG AGT TGT TC	Campoli et al.2012b
Y09741	*HvßTUBLIN*	GTG CAT GGT TCT TGA CAA CG	GCA TGT GAC TCC ACT CAT GG	unpublished
AY750995	*HvVRN1*	CTG AAG GCG AAG GTT GAG AC	TTC TCC TCC TGC AGT GAC CT	Campoli et al.2012a
AY970701	*PPD-H1*	GAT GGA TTC AAA GGC AAG GA	GAA CAA TTG GCT CCT CCA AA	Campoli et al.2012a