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Allelic variations at the *HvSNF2* and *HvBM5* loci are associated with the heading date and growth habit of barley (*Hordeum vulgare* L.) under a semi-arid climate

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Electronic Supplementary Material (ESM)

The authors are fully responsible for both the content and the formal aspects of the electronic supplementary material. No editorial adjustments were made.

Table S1. Description of the weather conditions during the three cropping seasons before the heading

	2017			2018			2019		
	February	March	April	February	March	April	February	March	April
Average temperature (°C)	9.4	11.9	15.7	8.1	12.2	15.9	7.3	10.6	13.4
Max temperature (°C)	15.8	20	23	13.6	19	23.8	14.2	18	20.7
Min temperature (°C)	4.3	5.2	8.2	3.4	6.4	9	1.9	4.5	7.4
No. of days below 10°C	1	0	0	1	1	0	7	2	1
Precipitation (mm)	25	4.3	17.5	31.7	41	36.3	75	80	47.5

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Table S2. Barley accessions genotyped using the PCR based markers

Number	Accession name	Status	Origin	Number	Accession name	Status	Origin
G1	Rihane	cultivar	Tunisia	G29	Tounsi	landrace	Tunisia
G2	Kounouz	cultivar	Tunisia	G30	Safra	landrace	Tunisia
G3	Lemsi	cultivar	Tunisia	G31	Commune A	landrace	unknown
G4	Manel	cultivar	Tunisia	G32	Cowra	landrace	unknown
G5	175	uncertain	Tunisia	G33	Cowra	landrace	unknown
G6	2528-23	landrace	Tunisia	G34	Escourgeon line 4A	uncertain	Tunisia
G7	3124-8	landrace	Tunisia	G35	Escourgeon line 14J	uncertain	Tunisia
G8	Djebali	landrace	Tunisia	G36	Rabat 071	cultivar	Tunisia
G9	Djebali	landrace	Tunisia	G37	4a	uncertain	Tunisia
G10	Djebali	landrace	Tunisia	G38	1356-33	landrace	Tunisia
G11	Djebali	landrace	Tunisia	G39	3380-35	landrace	Tunisia
G12	Frigui	landrace	Tunisia	G40	3362-81	landrace	Tunisia
G13	Frigui	landrace	Tunisia	G41	Arbi	uncertain	Tunisia
G14	Djebali	landrace	Tunisia	G42	Staf Tunisie	landrace	Tunisia
G15	1110-30	landrace	Tunisia	G43	Ariana	landrace	Tunisia
G16	Jebali	landrace	Tunisia	G44	Revil No. 1	uncertain	Tunisia
G17	Jebali	landrace	Tunisia	G45	1144-87	landrace	Tunisia
G18	Jebali	landrace	Tunisia	G46	3452-114	landrace	Tunisia
G19	Djebali	landrace	Tunisia	G47	Arbi	uncertain	Tunisia
G20	Hmira	landrace	Tunisia	G48	Jbali	landrace	Tunisia
G21	Djebali	landrace	Tunisia	G49	Dinar	landrace	Tunisia
G22	Jebali	landrace	Tunisia	G50	Besert 13	landrace	Tunisia
G23	Djebali	landrace	Tunisia	G51	186	landrace	Tunisia
G24	Frigui	landrace	Tunisia	T40	Reno	cultivar	USA
G25	Jebali	landrace	Tunisia	T45	Durez	landrace	Turkey
G26	Jebali	landrace	Tunisia	T47	Hanover	cultivar	USA
G27	Djebali	landrace	Tunisia	T111	Siha	landrace	Turkey
G28	Jebali	landrace	Tunisia	T183	Mona	cultivar	Sweden

T40, T45 and T47 are the winter accessions used as a positive control for the winter growth habit and T183 is a spring cultivar

Table S3. List of the primers used to detect the allelic variation in the *HvBM5* and *HvSNF2* genes

Markers names	Primers Sequences	Tm (°C)	PCR fragment size (bp)	References
HvBM5.84F HvBM5.85F	5'-TGAGGGTATGAGTGGCGCTAG-3' 5'-TCTCATAGGTTCTAGACAAAGCATAG-3'	63	~437	Koti et al. (2006)
HvBM5A-intronI-F3b HvBM5A-intronI-R3b	5'-CTTGCATGTGTTGTTCGGTCT-3' 5'-GCTGGGACAAGACTCTACGG-3'	60	344/830	Cockram et al. (2009)
ZCCTH.14F ZCCTH.19R	5'-CAAGGAATATCAAGTACATATCTGC-3' 5'-CCGTATTTATTGAGTTGGTGGTG-3'	61	600	Szucs et al. (2007)
ZCCTb.8F ZCCTb.11R	5'-GCATCAATGCACCCTACCTCTT-3' 5'-GGAAAACAATGGTGAGAGTAGTACAG-3'	62	600	Szucs et al. (2007)
ZCCT. HcF ZCCT. HcR	5'-CACCATCGCATGATGCAC-3' 5'-TCATATGGCGAAGCTGGAG-3'	57	200	Yan et al. (2006)
HvSNF2.01F HvSNF2.04R	5'-CCTGAAGCGAGTATCCATATGC-3' 5'-GCTGCATTATAGAGAAACAACAACG-3'	62	543/623/700	von Zitzewitz et al. (2005)

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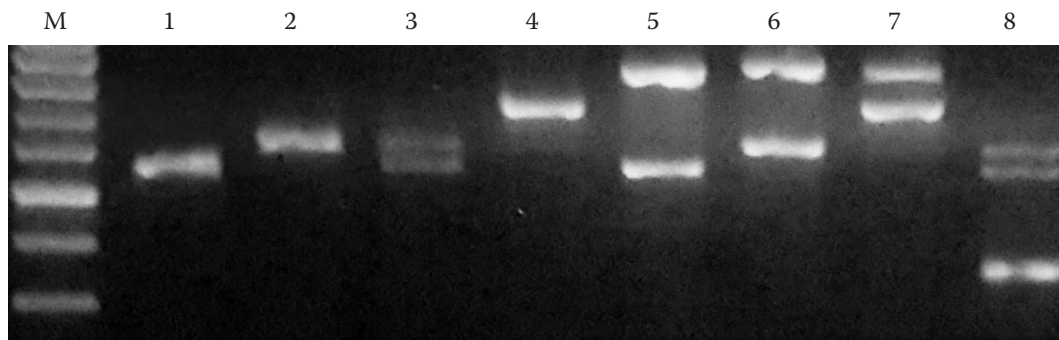


Figure S1. Different allelic combination patterns of the *HvSNF2* and *HvBM5* genes.

M – size marker (100bp); 1 – *HvSNF2* allele 543 bp; 2 – *HvSNF2* 623 bp; 3 – *HvSNF2* alleles 543 623 bp; 4 – *HvSNF2* 700 bp; 5 – combination of *HvBM5* / *HvSNF2* alleles 830/543 bp; 6 – combination of 830/623 bp alleles; 7 – combination of 830 bp/700 bp alleles and 8 – alleles *HvBM5* 344 bp and *HvSNF2* 543/623 bp

REFERENCES

- Cockram J., Norris C., O'Sullivan D.M. (2009): PCR-based markers diagnostic for spring and winter seasonal growth habit in barley. *Crop Science*, 49: 403–410.
- Kóti K., Karsai I., Szűcs P., Horváth C., Mészáros K., Kiss G.B., Bedő Z., Hayes P.M. (2006): Validation of the two-gene epistatic model for vernalization response in a winter spring barley cross. *Euphytica*, 152: 17–24.
- Szucs P., Skinner J.S., Karsai I., Cuesta-Marcos A., Haggard K.G., Corey A.E., Chen T.H., Hayes P.M. (2007): Validation of the *Vrn-H2/Vrn-H1* epistatic model in barley reveals that intron length variation in *Vrn-H1* may account for a continuum of vernalization sensitivity. *Molecular Genetics and Genomics*, 277: 249–261.
- von Zitzewitz J., Szucs P., Dubcovsky J., Yan L., Francia E., Pecchioni N., Casas A., Chen T.H., Hayes P.M., Skinner J.S. (2005): Molecular and structural characterization of barley vernalization genes. *Plant Molecular Biology*, 59: 449–467.
- Yan L., Fu D., Li C., Blechl A., Tranquilli G., Bonafede M., Sanchez A., Valarik M., Yasuda S., Dubcovsky J. (2006): The wheat and barley vernalization gene *Vrn3* is an orthologue of FT. *Proceedings of the National Academy of Sciences*, 103: 19581–19586.