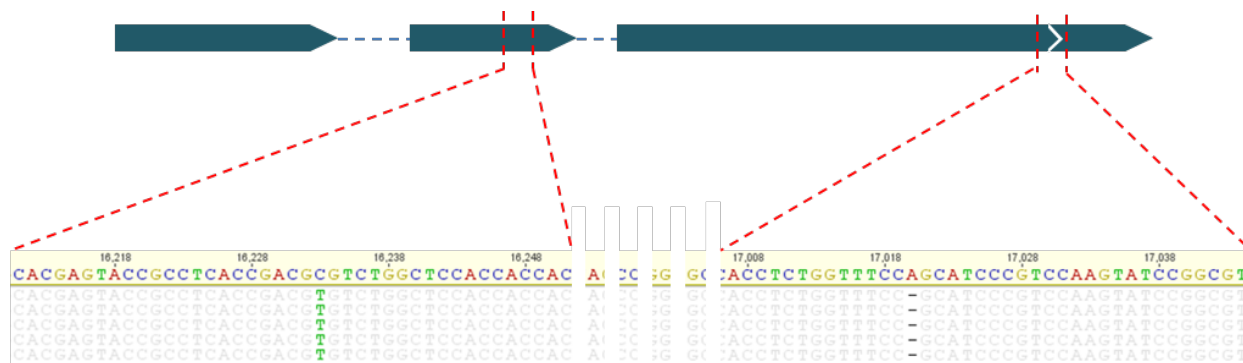


## Supplementary Information



(A)

### SNP1 (6AS:4397602\_16233)

GAGAAGCTCGGCGTCAAGAAGGCGCTCGTCTTCTACCGCGGGAAGCCGCCAAGGGCCTCAAACCAACTG  
 GATCATGCACGAGTACCGCCTCACCACG[C/T]GTCTGGCTCCACCACCACCAGCCGGCCGCCGCCTGTG  
 ACCGGCGGGAGCCGGGCTGCAGCCTCTCTGAGGGTACGTACACGTGTCGATCGCACGGTA

SNP1\_A1: GAAGGTGACCAAGTTCATGCTTACCGCCTCACCACGCT

SNP1\_A2: GAAGGTTCGGAGTCAACGGATTACCGCCTCACCACGCT

SNP1\_C1: TGTACGTACCCTCAGAGAGGCT

### SNP2 (6AS:4397602\_17020)

CATTTATGAATCCTCTCCCCGTGCAAGACGGGACGTACCATCAACACCATGTCATCCTCGGCGCCCCACTGGC  
 GCCAGAGGCTACCACAGGCGGCGCCACCTCTGGTTTCC[A/G]CATCCCGTCCAAGTATCCGGCGTGAAGTGA  
 ATCCCTGAGCAAATGATATGAACACCACATACGCGCATGCACGCATGCATAACTTTTGCAAGTGTAGCCAGT  
 AGTTGTTGCAGTTCGTGGTAGTCGCTTTCAG

SNP1\_A1: GAAGGTGACAAGTTCATGCTGGCGCCACCTCTGGTTTCCA

SNP1\_A2: GAAGGTTCGGAGTCAACGGATTGCGCCACCTCTGGTTTCCG

SNP1\_C1: GATTCCAGTTCACGCCGATACTT

(B)

<i>NAM-A1</i>	<i>SNP (90 K)</i>	<i>LD (r<sup>2</sup>)</i>	<i>Chr</i>	<i>Position</i>
SNP1	Ra_c28284_223	0.963	6A	74.24
	Tdurum_contig51717_1463	0.963	6A	74.24
	Tdurum_contig51717_1582	0.963	6A	74.24
	BS00010811_51	0.927	6A	74.24
	BS00010441_51	0.819	6A	74.24
SNP2	Kukri_c9595_242	0.781	6A	74.24
	w SNP_ Ex_ rep_ c67878_66584488	0.768	6A	74.24
	BS00084846_51	0.764	6A	74.24
	w SNP_ Ex_ c35465_43610634	0.764	6A	74.24
	Kukri_c22893_1651	0.755	6A	74.24

(C)

**Figure S1.** SNP detection in *NAM-A1*. (A) Gene model Traes\_6AS\_6F89CC969.1 generated by MIPS (<http://pgsb.helmholtz-muenchen.de/plant/wheat/iwgc/index.jsp>) and visualisation of SNP; (B) SNPs context sequences and KASPar primers. In SNP2 the deletion has been transformed in A/G to facilitate scoring; (C) Linkage disequilibrium

between SNPs on *NAM-A1* and iSelect 90K SNPs. Position refers to Wang *et al.* 2014 genetic map.

ATGAGGTCCATGGGCAGCTCCGACTCATCCTCCGGCTCGGCGCAAAAAGCAGCGCGGCAT  
 CAGCATGAGCCGCCCTCCGCGGCAGCGGGGCTCGGCGCCGGAGCTCCCACCGGGCTTC  
CGGTTCACCCGACGGACGAGGAGCTGGTCGTGCACTACCTCAAGAAGAAGGCCGCAAG  
GTGCCGCTCCCCGTACCATCATCGCCGAGGTGGATCTCTACAAGTTCGACCCATGGGAG  
CTCCCCGAGAAGGCGACCTTCGGGGAGCAGGAGTGGTACTTCTTCAGCCCGCGCGACCCG  
AAGTACCCCAACGGCGCGCGGCCGAACCGGGCGGCGACGTCGGGCTACTGGAAGGCCACC  
GGCACGGACAAACCTATCCTGGCCTCGGGGACGGGGTGCGGCCTGGTCCGGGAGAAGCTC  
GGCGTCAAGAAGGCGCTCGTCTTCTACCGCGGGAAGCCGCCAAGGGCCTCAAAACCAAC  
TGGATCATGCACGAGTACCGCCTCACCGACG**[A/C]**GTCTGGTCCACCACCACCAGCCGGCCG  
CCGCCGCTGTGACCGGCGGGAGCCGGGCTGCAGCCTCTCTGAGGTTGGACGACTGGGTG  
CTGTGCCGCATCTACAAGAAGATCAACAAGGCCGCGGCCGGAGATCAGCAGAGGAGCACG  
 GAGTGCGAGGACTCCGTGGAGGACGCGGTCACCGCGTACCCGCTCTATGCCACGGCGGGC  
 ATGGCCGGTGCAGGTGCGCATGGCAGCAACTACGCTTACCTTCACTGCTCCATCATCAG  
 GACAGCCATTTCTGGAGGGCCTGTTACAGCAGACGACGCCGGCCTCTCGGCGGGCGCC  
 ACCTCGCTGAGCCACCTGGCCGCGGCGGCGAGGGCGAGCCCGGCTCCGACCAACAGTTT  
 CTCGCCCCGTCGTCTTCAACCCCGTTCAACTGGCTCGATGCGTCACCCGCCGGCATCCTG  
 CCACAGGCAAGGAATTTCCCTGGGTTTAAACAGGAGCAGAAACGTCGGCAATATGTGCTG  
 TCATCGACGGCCGACATGGCTGGCGCGGCCGCAATGCGGTGAACGCCATGTCCGCATTT  
 ATGAATCCTCTCCCCGTGCAAGACGGGACGTACCATCAACACCATGTCATCCTCGGCGCC  
 CCACTGGCGCCAGAGGCTACCACAGGCGGCCACCTCTGGTTTCC**[A/-]**GCATCCCGTCCAA  
 GTATCCGGCGTGAACCTGGAATCCCTGA

(A)

MRSMSGSSDSSSGSAQKAARHQHEPPPPRQRGSAPELPPGFRFHPTDEELVVHYLKKKAAK  
VPLPVTIIAEVDLYKFDPWELPEKATFGEQEWYFFSPRDRKYPNGARPNRAATSGYWKAT  
GTDKPILASGTGCLVREKLGVKKALVFYRGKPPKGLKTNWIMHEYRLTD**[A/V]**SGSTTTSRP  
PPPVTGGSRAAASRLRDDWVLCRIYKKIINKAAAGDQQRSTECEDSVEDAVTAYPLYATAG  
 MAGAGAHGSNYASPSLLHHQDSHFLEGLFTADDAGLSAGATSLSHLAAAARASPATKQF  
 LAPSSSTPFNWLDASPAGILPQARNFPGFNRSRNVGNMSLSSTADMAGAAGNAVNSAF  
 MNPLPVQDGTYHQHHVILGAPLAPEATTGGATSGF**[QHPVQVSGVNWNP or RIPSKYPA]**

(B)

**Figure S2.** Prediction of NAM-A1 protein sequence: (A) *NAM-A1* coding DNA sequence (CDS); (B) NAM-A1 protein sequence. Prediction made using FGGENESH 2.6 (Solovyev V, Kosarev P, Seledsov I, Vorobyev D. Automatic annotation of eukaryotic genes, pseudogenes and promoters, Genome Biol. 2006,7, Suppl 1: P. 10.1-10.12). Highlighted, use in 3D conformation; Underlined, NAC domain; black and bold, putative DNA binding site; red, variation.

## SNP1

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NAM-A1b      YRGKPPKGLKTNWIMHEYRLTDASG--STTTSRPPPP--VTGGSRAAASL
NAM-A1d      YRGKPPKGLKTNWIMHEYRLTDVSG--STTTSRPPPP--VTGGSRAAASL
NAM-A1c      YRGKPPKGLKTNWIMHEYRLTDVSG--STTTSRPPPP--VTGGSRAAASL
NAM-A1a      YRGKPPKGLKTNWIMHEYRLTDASG--STTTSRPPPP--VTGGSRAAASL
TaNAM-D1_AIZ97667.1 YRGKPPKGLKTNWIMHEYRLTDASG--STTTSRPPPPPVTTGGSRAAASL
AeNAM-D1_ABI94354.1 YRGKPPKGLKTNWIMHEYRLTDASG--STTTSRPPPPPVTTGGSRAAASL
TtNAM-B1_AOSPJ4.1 YRGKPPKGLKTNWIMHEYRLTDASG--STTATNRPPP--VTGGSRAAASL
TiNAM-B1_AGH32788.1 YRGKPPKGLKTNWIMHEYRLTDASG--STTATNRPPP--VTGGSRAAASL
ttNAM-A2_AIW49540.1 YRGKPPKGLKTNWIMHEYRLTDASS--SATTSRPPPVTT---GGSRAASL
TaNAM-D2_AIZ97668.1 YRGKPPKGLKTNWIMHEYRLTDASS--SATTSRPPPVTT---GVSRAASL
TtNAM-B2_AOSPJ6.1 YRGKPPKGLKTNWIMHEYRLTDASS--SATTSRPPPVTT---GGSRAASL
HvNAM-2_AOSPJ9.1 YRGKPPKGLKTNWIMHEYRLTDASS--SAATSRPPPVTT---GGSRAASL
HvNAM-B1_ACL31422.1 YRGKPPKGLKTNWIMHEYRLTDASA--GSTTTSRPPP--VTGGSRAPASL
HvNAM-1_AOSPJ8.1 YRGKPPKGLKTNWIMHEYRLTDASA--GSTTTSRPPP--VTGGSRAPASL
Os07g37920_ONAC010_Q8H4S4.1 YRGKPPKGLKTNWIMHEYRLTDTSSSAAAVATRRRPPPIITGSKGAVSL
AtNAM_ANAC018_Q9ZNU2.1 YSGKPPKGVKSDWIMHEYRLTD-NKP---THICDFGNK-----KNSL
ATNAC2_AEE75684.1 YSGKPPKGVKSDWIMHEYRLTD-NKPNRPPPGCDFGNK-----KNSL
AtNAC025_Q8GY42.1 YGGKPPKGIKTDWIMHEYRLTDGNLSTAAPDLTTTR-----KNSL
SNAC1_AIX03023.1 YAGKAPRGVKTWIMHEYRLDAGRAAAGAK-----KGSLSL
ANAC_ANAC018_Q9C932.1 YIGKAPKGTKTNWIMHEYRLIEFSR-----RNGST

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## SNP2

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NAM-A1b      NPLPVQDGTYHQHHVILGAPLAPEATTGGATSGFRIPSKYPA-----
NAM-A1d      NPLPVQDGTYHQHHVILGAPLAPEATTGGATSGFRIPSKYPA-----
NAM-A1c      NPLPVQDGTYHQHHVILGAPLAPEATTGGATSGFQHPVQVSGVNWNP-
NAM-A1a      NPLPVQDGTYHQHHVILGAPLAPEATTGGATSGFQHPVQVSGVNWNP-
TaNAM-D1_AIZ97667.1 NPLPVQDGTYHQHHVILGAPLAPEATAGAATSGFQHHAVQISGVNWNP
AeNAM-D1_ABI94354.1 NPLPVQDGTYHQHHVILGAPLAPEATAGAATSGFQHHAVQISGVNWNP
TtNAM-B1_AOSPJ4.1 TYLTPVQDGTYHQHHVILGAPLVPEAAA--ATSGFQHPVQISGVNWNP-
TiNAM-B1_AGH32788.1 TYLRVQDGTYHQHHVILGAPLVPEAAA--ATSGFQHPVQISGVNWNP-
ttNAM-A2_AIW49540.1 NHLPVQDGTYHQHHVILGTPLAPEATA-AATSAFQHPVQISGVNWNP-
TaNAM-D2_AIZ97668.1 SHLPVQDGTYHQHHVILGAPLAPEATA-AATSAFQHPVQISGVNWNP-
TtNAM-B2_AOSPJ6.1 NHLPMQDGTYHQHHVILGAPLAPEATA-AATSAFQHPVQISGVNWNP-
HvNAM-2_AOSPJ9.1 NHLPVQDGTYHQHHVILGAPLAPEATG-AAASAFQHPVQISGVNWNP-
HvNAM-B1_ACL31422.1 MYLPVQDGTYHQHHVILG-APLAPEAIAGAATSGFQHHVQISGVNWNP-
HvNAM-1_AOSPJ8.1 MYLPVQDGTYHQHHVILG-APLAPEAIAGAATSGFQHHVQISGVNWNP-
Os07g37920_ONAC010_Q8H4S4.1 NPLGVQGATYHQHQAIMGASLPSESAAAAACNFQHPFQLSRVNWDS-
AtNAM_ANAC018_Q9ZNU2.1 -----DCSTSMATPLMQNQG-----GIYQLPGLNWYS-
ATNAC2_AEE75684.1 ---GDCSNMSSMMEETPLMQQGGVLDGDLFRTTTSYQLPGLNWYS
AtNAC025_Q8GY42.1 ---PQSSGFHANGVMDTSSSLADHG-----VLRQAFQLPNMNWHS-
SNAC1_AIX03023.1 -----MYSGLDMLPPGDDFYSSLFASPRVKGTTPRAGAGMGMPF
ANAC_ANAC018_Q9C932.1 -YLKTEEEVESSHGFNNSGELAQKGYG---VDSFGYSGQVGGFGFM--

```

**Figure S3.** Protein sequence alignment using ClustalW for the two regions where polymorphisms in *NAM-A1* were found.

**Table S1.** Chi<sup>2</sup> test for the observed haplotypes frequencies from the two SNP frequencies for both collections together. Frequencies of each SNP in two collections of bread wheat genotypes (CC = 367-core collection, Elite = 334-elite collection), observed and theoretical number of lines for each haplotype in both collection and Chi<sup>2</sup> test.

		Frequency		
		CC	Elite	Total
SNP1	C	0.253	0.085	0.170
	T	0.747	0.915	0.830
SNP2	A	0.765	0.276	0.524
	Del	0.235	0.724	0.476

**Table S1. Cont.**

<b>Observed</b>	<b>C</b>	<b>T</b>
A	113	238
Del	1	318

<b>Theoretical</b>	<b>C</b>	<b>T</b>
A	60	291
Del	54	265

<b>Khi<sup>2</sup></b>	<b>C</b>	<b>T</b>
A	47.5	9.7
Del	52.3	10.7
Total		120.3
Proba	$5.4604 \times 10^{-28}$	

**Table S2.** List of the 334 European elite varieties used in this study. Varieties are or were commercialized. Thus, maintainers may provide seeds.

<b>ACCOR</b>	<b>BIANCOR</b>	<b>FLAMENKO</b>	<b>MENESTREL</b>	<b>SAMURAI</b>
ACCROC	BISCAY	FLAUBERT	MERCATO	SANKARA
ACIENDA	BOISSEAU	FLUOR	MESSAGER	SATURNUS
ACIENTO	BOKARO	FOLKLOR	MESSIDOR	SCENARIO
ACOUSTIC	BOLOGNA	FORBAN	MH09-17	SCIPION
ADAGIO	BOREGAR	FORBLANC	MINOTOR	SCOR
ADEQUAT	BOSTON	FRELON	MIROIR	SEBASTO
ADHOC	BOTTICELLI	FRONTANA	MOSKITO	SELEKT
AEROBIC	BRIGADIER	GALACTIC	MUSIK	SEYRAC
AGRESTIS	BUENNO	GALIBIER	NIRVANA	SHANGO
AGUILA	CABELLO	GALLANT	NOGAL	SIGNAL
ALCAZAR	CALISTO	GALOPAIN	NUAGE	SIRTAKI
ALCEDO	CAMP_REMY	GALPINO	NUCLEO	SISLEY
ALCHEMY	CAMPARI	GALVANO	OAKLEY	SOBBEL
ALDRIC	CAMPERO	GARANTUS	OCTET	SOCCER
ALEZAN	CAMPREMY	GARCIA	ODYSSEE	SOGOOD
ALFA	CAPHORN	GLADIATOR	ORATORIO	SOISSONS
ALIGATOR	CAPNOR	GLASGOW	ORCAS	SOKAL
ALIXAN	CAPO	GONCOURT	OREGRAIN	SOLEDAD
ALIZEO	CARIBOU	GRAINDOR	ORNICAR	SOLEHIO
ALLEZY	CARNAVAL	GRETHEL	ORPIC	SOLLARIO
ALLISTER	CATALAN	GUADALUPE	ORQUAL	SOLUTION
ALTAMIRA	CCB_INGENIO	GUARNI	ORVANTIS	SOPHYTRA
ALTIGO	CCBINGENIO	GULLIVER	OXEBO	SORRIAL
ALTRIA	CELESTIN	HARDI	PACTOLE	SPECTRO
AMADOR	CELLULE	HATTRICK	PAINDOR	SPONSOR
AMBELLO	CENTENAIRE	HAUSSMANN	PAJERO	SWEET
AMBITION	CEZANNE	HEKTO	PAKITO	SWINGGY
AMERIGO	CHAGALL	HEREWARD	PALADAIN	SYALTEO

Table S2. *Cont.*

<b>ACCOR</b>	<b>BIANCOR</b>	<b>FLAMENKO</b>	<b>MENESTREL</b>	<b>SAMURAI</b>
AMUNDSEN	CHARGER	HISSEO	PALEDOR	SYEPSON
ANDALOU	CHEVALIER	HYPERION	PAPAGENO	SYMATTIS
ANDINO	CHNARA	ICARDA1	PARADOR	SYMOISSON
ANTILLE	CIGALO	ICARDA2	PAROLI	SYTOLBIAC
ANTONIUS	CLAIRE	ICARDA3	PEPIDOR	TALDOR
APACHE	COMODOR	ICARDA4	PERFECTOR	TAMARO
APRILIO	COMPIL	ICARDA5	PERICLES	TAPIDOR
ARACK	COPERNICO	ICARDA6	PHARE	TEXEL
ARAMIS	CORDIALE	ILLICO	PIERROT	TIAGO
AREZZO	CORVUS	INCISIF	PIKO	TIFOSO
ARINA	COURTOT	INNOV	PIRENEO	TIMING
ARISTOTE	CRAKLIN	INOUI	PLAYER	TOGANO
ARKEOS	CROISADE	INSPIRATION	POTENZIAL	TOISONDOR
ARLEQUIN	CROUSTY	INSTINCT	PR22R20	TOREADOR
ARTDECO	DIALOG	INTERET	PR22R28	TRAPEZ
ASCOTT	DINOSOR	IRIDIUM	PR22R58	TREMIE
ASTRAKAN	DSV_50115	ISENGRAIN	PREMIO	TROCADERO
ASTUCE	EINSTEIN	ISIDOR	PREVERT	TULIP
ATHLON	EMERALD	ISTABRAQ	PRIMO	USKI
ATTITUDE	ENESCO	JAGUAR	QUALITY	VALODOR
ATTLASS	EPHOROS	JBDIEGO	QUATUOR	VANTORIS
AUBUSSON	EPIDOC	KALAHARI	RACINE	VERLAINE
AUDI	EQUILIBRE	KALANGO	RAISON	VISCOUNT
AURELE	ESKET	KALYSTAR	RASPAIL	WARRIOR
AUTAN	ESPERIA	KARILLON	RAZZANO	XI19
AUTENTIC	ESTICA	KOMETUS	RECITAL	
AVANTAGE	ETECHO	KORELI	RENAN	
AVENUE	EUCLIDE	KWSPIDIUM	RESSOR	
AXIMACK	EUREKA	LANCELOT	RICHEPAIN	
AZIMUT	EVEIL	LASER	RIMBAUD	
AZTEC	EXELCIOR	LAURIER	RITMO	
AZZERTI	EXOTIC	LEAR	ROBIGUS	
AZZURO	EXPERT	LIMES	RODRIGO	
BAGOU	FADELA	LONA	RONSARD	
BAROK	FAIRPLAY	LORD	ROSARIO	
BAROUDEUR	FARANDOLE	MANAGER	ROYSSAC	
BASMATI	FARINELLI	MARCELIN	RUBENS	
BASTIDE	FIGARO	MARKSMAN	RUBISKO	
BATTANT	FIorenZO	MAXWELL	RUNAL	
BERGAMO	FIORETTO	MELKIOR	RUSTIC	
BERMUDE	FLAIR	MENDEL	SAINTEX	