

Comprehensive *in silico* analysis of upstream sequences of *TaNRT2* gene family of bread wheat: Unveiling effects of hormonal cross-talk on differential homeolog expressions of *TaNRT2.1-6* under low nitrogen conditions

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Supplementary Data

Table-S1 The gene ids of *NRT2* genes in wheat used for promoter analysis

Gene name	Chr	IWGSC ID, RefSeq v1.1
TaNRT2.1-A1	6A	TraesCS6A02G030700
TaNRT2.1-B1	6B	TraesCS6B02G044500
TaNRT2.1-D1	6D	TraesCS6D02G035900
TaNRT2.1-A2	6A	TraesCS6A02G030800
TaNRT2.1-B2	6B	TraesCS6B02G044400
TaNRT2.1-A3	6A	TraesCS6A02G031000
TaNRT2.1-B3	6B	TraesCS6B02G044200
TaNRT2.1-D3	6D	TraesCS6D02G035700
TaNRT2.1-A4	6A	TraesCS6A02G031100
TaNRT2.1-B4	6B	TraesCS6B02G044100
TaNRT2.1-A5	6A	TraesCS6A02G030900
TaNRT2.1-B5	6B	TraesCS6B02G044300
TaNRT2.1-D5	6D	TraesCS6D02G035800
TaNRT2.1-A6	6A	TraesCS6A02G031200
TaNRT2.1-B6	6B	TraesCS6B02G044000
TaNRT2.1-D6	6D	TraesCS6D02G035600
TaNRT2.2-A1	6A	TraesCS6A02G032800
TaNRT2.2-B1	6B	TraesCS6B02G046500
TaNRT2.2-D1	6D	TraesCS6D02G037800
TaNRT2.2-A2-1	6A	TraesCS6A02G032400
TaNRT2.2-A2-2	6A	TraesCS6A02G032500
TaNRT2.2-B2-1	6B	TraesCS6B02G045600
TaNRT2.2-B2-2	6B	TraesCS6B02G045700
TaNRT2.2-D2-1	6D	TraesCS6D02G037200
TaNRT2.2-D2-2	6D	TraesCS6D02G037300
TaNRT2.2-A3-1	6A	TraesCS6A02G033100
TaNRT2.2-A3-2	6A	TraesCS6A02G033200
TaNRT2.2-B3	6B	TraesCS6B02G046700
TaNRT2.2-D3-1	6D	TraesCS6D02G038200

TaNRT2.2-D3-2	6D	TraesCS6D02G038300
TaNRT2.2-A4-1	6A	TraesCS6A02G032900
TaNRT2.2-A4-2	6A	TraesCS6A02G033000
TaNRT2.2-B4	6B	TraesCS6B02G046600
TaNRT2.2-D4-1	6D	TraesCS6D02G037900
TaNRT2.2-D4-2	6D	TraesCS6D02G038000
TaNRT2.2-D4-3	6D	TraesCS6D02G038100
TaNRT2.3-A1	2A	TraesCS2A02G074800
TaNRT2.3-D1	2D	TraesCS2D02G073500
TaNRT2.4-A1	3A	TraesCS3A02G254000
TaNRT2.4-B1	3B	TraesCS3B02G285900
TaNRT2.4-D1	3D	TraesCS3D02G254900
TaNRT2.4-2	1D	TraesCS1D02G035700
TaNRT2.4-3	Un	TraesCSU02G002800
TaNRT2.5-A1	7A	TraesCS7A02G428500
TaNRT2.5-B1	7B	TraesCS7B02G328700
TaNRT2.5-D1	7D	TraesCS7D02G420900

Table-S2 Different type of Cis-Regulatory Elements distribution in upstream sequences of 46 *TaNRT2* genes of wheat

Types of CRE,s	No. of repeats	%
LIGTH Responsive	341	11.010655
Hormone Responsive	420	13.561511
Growth & Dev. Res.	243	7.8463029
Promoter Responsive	1205	38.908621
Biotic and Abiotic stress Res.	883	28.511463
Circadian Res.	5	0.1614466
Total		3097

LIGTH CRE,s	No. of repeats	%
Box 4	40	11.730205
G-Box	117	34.31085
GA-motif	3	0.8797654
GATA-motif	18	5.2785924
GT1-motif	34	9.9706745
I-box	18	5.2785924
TCT-motif	31	9.0909091
ACE	5	1.4662757
CAG-motif	1	0.2932551
chs-CMA2a	2	0.5865103
Sp1	27	7.9178886
TCCC-motif	12	3.5190616
AE-box	2	0.5865103
ATCT-motif	6	1.7595308
GTGGC-motif	3	0.8797654
ATC-motif	3	0.8797654
Box II	2	0.5865103
3-AF1 bind	1	0.2932551
chs-CMA2c	1	0.2932551

chs-Unit 1 ml	1	0.2932551
LS7	1	0.2932551
C-box	1	0.2932551
Total		341

Development CRE,s	No. of repeats	%
CAT-box	28	11.52263374
O2-site	15	6.172839506
RY-element	18	7.407407407
AAGAA-motif	21	8.641975309
AACA-motif	3	1.234567901
CCGTCC-box	20	8.230452675
CCGTCC motif	21	8.641975309
as-I	97	39.91769547
CARE	3	1.234567901
dOCT	4	1.646090535
E2Fb	1	0.4115226337
F-box	1	0.4115226337
GCN4-motif	3	1.234567901
MSA like	4	1.646090535
NON	4	1.646090535
Total		248

Core Promoter	No. of repeats	%
AT~TATA-box	103	8.5477178
CAAT-box	434	36.016598
TATA-box	648	53.775934
A-box	20	1.659751
Total		1205

Hormone CRE,s	No. of repeats	%
ABRE	119	28.333333
AuxRR-Core	6	1.4285714
CGTCA-Motif	93	22.142857
ERE	10	2.3809524
GARE-motif	7	1.6666667
P-Box	9	2.1428571
TATC-box	3	0.7142857
TCA-element	14	3.3333333
TGACG-motif	90	21.428571
TGA-element	1	0.2380952
ABRE4	28	6.6666667
ABRE2	1	0.2380952
ABRE3a	33	7.8571429
TCA	6	1.4285714
Total		420

Biotic and Abiotic Motifs	No. of repeats	%
ARE	59	6.681766704
CCAAT-box	18	2.038505096
DRE core	32	3.62400906
DRE 1	6	0.6795016988
GC-motif	21	2.378255946
Total		883

Genes	Circadian
TaNRT2.2-B2-1	1
TaNRT2.2-B2-2	1
TaNRT2.2-D2-1	1
TaNRT2.2-B4	1
TaNRT2.2-D4-3	1
Total	5

Table-S3 Transcription Factor Binding Sites (TFBS) involved in nitrogen use efficiency in promoters of the all 46 *NRT2* genes in wheat

Genes	LBD	GATA	Nin-like	Dof	MYB	NAC	MIKC_MADS	bZIP	Total
TaNRT2.1-A1	1	16	10	0	21	5	5	2	60
TaNRT2.1-B1	3	12	14	14	8	0	34	5	90
TaNRT2.1-D1	0	14	11	16	40	5	30	4	120
TaNRT2.1-A2	1	19	11	3	32	8	18	9	101
TaNRT2.1-B2	1	17	5	9	7	7	14	6	66
TaNRT2.1-A3	0	4	0	4	16	0	5	0	29
TaNRT2.1-B3	1	5	9	9	11	0	14	3	52
TaNRT2.1-D3	1	6	6	1	17	1	13	1	46
TaNRT2.1-A4	6	5	4	13	25	7	4	5	69
TaNRT2.1-B4	4	2	8	19	38	8	24	12	115
TaNRT2.1-A5	1	21	4	10	29	13	34	0	112
TaNRT2.1-B5	4	13	2	11	21	6	37	2	96
TaNRT2.1-D5	1	20	4	16	16	15	42	4	118
TaNRT2.1-A6	4	22	7	9	9	15	3	12	81
TaNRT2.1-B6	4	21	13	23	6	27	25	2	121
TaNRT2.1-D6	4	28	7	13	5	17	7	1	82
TaNRT2.2-A1	6	14	4	4	13	12	6	3	62
TaNRT2.2-B1	2	14	4	7	4	17	11	24	83
TaNRT2.2-D1	0	6	3	16	7	10	28	3	73
TaNRT2.2-A2-1	3	4	5	8	16	5	20	16	77
TaNRT2.2-A2-2	2	5	7	18	6	21	25	7	91
TaNRT2.2-B2-1	1	4	3	4	8	19	24	4	67
TaNRT2.2-B2-2	5	17	5	14	14	5	9	8	77
TaNRT2.2-D2-1	11	7	1	12	7	9	20	4	71
TaNRT2.2-D2-2	3	5	1	19	8	4	25	3	68
TaNRT2.2-A3-1	3	9	0	6	21	14	4	9	66
TaNRT2.2-A3-2	5	22	0	14	6	6	17	4	74
TaNRT2.2-B3	4	13	3	5	16	4	14	14	73
TaNRT2.2-D3-1	0	13	6	5	13	13	18	5	73

TaNRT2.2-D3-2	1	6	8	9	36	15	20	5	100
TaNRT2.2-A4-1	5	9	2	6	6	3	12	8	51
TaNRT2.2-A4-2	10	7	4	4	1	10	14	6	56
TaNRT2.2-B4	2	2	0	5	8	22	10	28	77
TaNRT2.2-D4-1	1	3	2	1	7	4	2	9	29
TaNRT2.2-D4-2	2	1	0	8	8	14	2	13	48
TaNRT2.2-D4-3	8	6	2	1	10	9	19	0	55
TaNRT2.3-A1	15	11	3	1	18	7	9	3	67
TaNRT2.3-D1	0	13	1	2	3	7	19	15	60
TaNRT2.4-A1	6	9	0	37	19	7	29	0	107
TaNRT2.4-B1	1	4	16	21	24	1	23	12	102
TaNRT2.4-D1	2	2	8	13	12	1	34	12	84
TaNRT2.4-2	15	14	8	10	29	11	34	10	131
TaNRT2.4-3	27	12	0	3	36	11	3	14	106
TaNRT2.5-A1	2	14	1	16	11	15	34	2	95
TaNRT2.5-B1	16	20	4	11	16	11	14	5	97
TaNRT2.5-D1	8	14	2	11	9	10	4	14	72
Total	202	505	218	461	693	431	812	328	3650
Percentage	5.534	13.835	5.972	12.630	18.986	11.808	22.246	8.986	100