

Table S3: All the identified MTAs for grain size and shape-related traits in durum panel. Stable MTAs marked by asterisk

Trait	Environment	MTA	SNP-ID	Chr.	Position	P value ¹	MAF	Add. Eff. ²
AS	E2/BLUP	<i>QAS.su.2A1*</i>	<i>SNP-1095449</i>	2A	104,655,222	1.02E-12	0.33	-0.76
	E2	<i>QAS.su.2A2</i>	<i>SNP-991434</i>	2A	531,237,720	3.60E-16	0.39	-1.04
	BLUP	<i>QAS.su.2A3</i>	<i>SNP-1127014</i>	2A	501,916,772	6.96E-09	0.38	-0.49
	BLUP	<i>QAS.su.2A4</i>	<i>SNP-1071334</i>	2A	723,735,918	1.14E-06	0.24	-0.35
	E1	<i>QAS.su.4A1</i>	<i>SNP-1017888</i>	4A	584,706,382	4.04E-06	0.04	1.30
	E1	<i>QAS.su.6A1</i>	<i>SNP-1006957</i>	6A	451,640,237	2.38E-10	0.16	0.93
	E1	<i>QAS.su.7B1</i>	<i>SNP-2293044</i>	7B	634,388,110	5.42E-06	0.20	0.57
	E2	<i>QAS.su.7B2</i>	<i>SNP-1091721</i>	7B	716,307,209	1.62E-09	0.09	-1.55
	BLUP	<i>QAS.su.7B3</i>	<i>SNP-1127813</i>	7B	500,368,572	9.49E-06	0.42	0.28
PL	E1/E2/BLUP	<i>QPL.su.1B1*</i>	<i>SNP-100083695</i>	1B	29,327,461	3.37E-09	0.20	0.40
	E1	<i>QPL.su.2A1</i>	<i>SNP-1102402</i>	2A	120,126,537	2.68E-08	0.35	0.35
	E2	<i>QPL.su.2A2</i>	<i>SNP-991434</i>	2A	531,237,720	1.19E-14	0.39	-0.49
	BLUP	<i>QPL.su.2A3</i>	<i>SNP-1095449</i>	2A	104,655,222	1.54E-08	0.33	0.28
	BLUP	<i>QPL.su.2A4</i>	<i>SNP-1127014</i>	2A	501,916,772	9.02E-06	0.38	-0.23
	E2	<i>QPL.su.5A1</i>	<i>SNP-10983760</i>	5A	509,939,168	3.51E-06	0.17	0.30
	E1	<i>QPL.su.6A1</i>	<i>SNP-1006957</i>	6A	451,640,237	1.63E-08	0.16	-0.45
	E2	<i>QPL.su.7A1</i>	<i>SNP-1125288</i>	7A	56,088,430	7.70E-08	0.13	-0.40
	E2	<i>QPL.su.7B1</i>	<i>SNP-1091721</i>	7B	716,307,209	7.26E-06	0.09	-0.60
L	E1/E2/BLUP	<i>QL.su.1B1*</i>	<i>SNP-100083695</i>	1B	29,327,461	1.53E-11	0.20	0.22
	E1	<i>QL.su.2A1</i>	<i>SNP-991737</i>	2A	505,958,255	4.74E-10	0.36	-0.18
	E2	<i>QL.su.2A2</i>	<i>SNP-991434</i>	2A	531,237,720	4.32E-17	0.40	-0.22
	BLUP	<i>QL.su.2A3</i>	<i>SNP-1095449</i>	2A	104,655,222	1.54E-08	0.33	-0.28
	BLUP	<i>QL.su.2A4</i>	<i>SNP-1127014</i>	2A	501,916,772	9.02E-06	0.38	-0.23
	E2	<i>QL.su.5A1</i>	<i>SNP-10983760</i>	5A	509,939,168	1.73E-07	0.18	0.15
	E1	<i>QL.su.6A1</i>	<i>SNP-1006957</i>	6A	451,640,237	4.23E-08	0.17	-0.19
	E2	<i>QL.su.6B1</i>	<i>SNP-1091395</i>	6B	653,235,473	1.47E-09	0.05	0.30
LWR	E1/BLUP	<i>QLWR.su.2A1*</i>	<i>SNP-1150369</i>	2A	148,130,749	6.62E-09	0.28	0.05
	E1/BLUP	<i>QLWR.su.2A2*</i>	<i>SNP-991737</i>	2A	505,958,255	1.09E-08	0.36	-0.05
	BLUP	<i>QLWR.su.3A1</i>	<i>SNP-1127543</i>	3A	47,156,933	1.85E-07	0.28	-0.03
CS	E1/BLUP	<i>QCS.su.2A1*</i>	<i>SNP-1150369</i>	2A	148,130,749	8.48E-10	0.28	-0.01
	E1/BLUP	<i>QCS.su.2A2*</i>	<i>SNP-991737</i>	2A	505,958,255	2.88E-09	0.36	-0.01
	BLUP	<i>QCS.su.2A3</i>	<i>SNP-1725042</i>	2A	724,616,734	1.21E-05	0.21	-0.01
	BLUP	<i>QCS.su.3A1</i>	<i>SNP-1127543</i>	3A	47,156,933	9.14E-06	0.28	0.01
	E1/BLUP	<i>QCS.su.7A1*</i>	<i>SNP-1059714</i>	7A	673,131,697	1.94E-08	0.41	-0.01
TGW	E2	<i>QTGW.su.1A1</i>	<i>SNP-1209291</i>	1A	527,910,602	7.27E-06	0.18	-2.43
	E1	<i>QTGW.su.2A1</i>	<i>SNP-1041769</i>	2A	127,602,655	7.28E-09	0.38	-2.75
	E2/BLUP	<i>QTGW.su.2A2*</i>	<i>SNP-3025548</i>	2A	106,204,569	2.35E-09	0.33	-2.90
	E1/E2/BLUP	<i>QTGW.su.2A3*</i>	<i>SNP-991434</i>	2A	531,237,720	3.17E-17	0.40	-4.24
	E2	<i>QTGW.su.2A4</i>	<i>SNP-2256686</i>	2A	726,762,051	3.39E-06	0.11	2.87
	E2	<i>QTGW.su.5B1</i>	<i>SNP-992710</i>	5B	243,670,953	1.49E-06	0.14	-2.94
	E1/E2/BLUP	<i>QTGW.su.7B1*</i>	<i>SNP-5369680</i>	7B	500,369,002	2.48E-08	0.45	-2.12

¹: The highest p value over environments, ²: Additive effects of the significant MTAs on the related traits