Chen Y *et al.* (2020) *BMC Plant Biology* **Doi**: 10.1186/s12870-020-02390-8

Table S1. Descriptive statistics of additional 16 root traits (root area, root volume and root length density of the whole root system and of root sections, and root growth rate) in 184 wheat genotypes grown in a semi-hydroponic phenotyping platform.

Trait	Abbreviation	Minimum	Maximum	Mean	Median	Std. deviation	CV	Significance
Total root area	RA	65.7	319	181	182	50.8	**0.28**	**0.000**
Total root volume	RV	0.50	2.59	1.40	1.36	0.39	**0.28**	**0.000**
Root length density	RLD	0.47	2.47	1.33	1.35	0.39	**0.29**	**0.000**
Root area s1	RA_s1	23.9	121	63.8	63.9	19.5	**0.31**	**0.000**
Root volume s1	RV_s1	0.17	0.93	0.48	0.47	0.15	**0.31**	**0.000**
Root length density s1	RLD_s1	1.00	4.79	2.64	2.67	0.82	**0.31**	**0.000**
Root area s2	RA_s2	13.4	108	56.2	55.6	17.9	**0.32**	**0.000**
Root volume s2	RV_s2	0.12	0.79	0.39	0.38	0.12	**0.31**	**0.000**
Root length density s2	RLD_s2	0.36	5.05	2.51	2.51	0.83	**0.33**	**0.000**
Root area s3	RA_s3	11.0	135	61.1	60.3	23.4	**0.38**	**0.000**
Root volume s3	RV_s3	0.15	1.23	0.54	0.51	0.20	**0.37**	**0.000**
Root length density s3	RLD_s3	0.07	1.39	0.62	0.62	0.25	**0.40**	**0.000**
Root area in sub-root layer	RA_sub	24.4	229	117	117	37.8	**0.32**	**0.000**
Root volume in sub-root layer	RV_sub	0.26	1.95	0.93	0.90	0.29	**0.31**	**0.000**
Root length density in sub-root layer	RLD_sub	0.43	6.30	3.13	3.13	1.02	**0.33**	**0.000**
Root growth rate	RGR	1.23	4.39	3.04	3.07	0.53	0.17	**0.000**

All the 16 root traits except RGR had CVs (coefficients of variation) ≥0.25 (appeared in red and bold type). Probability (*P*) values were based on a GLM multivariate analysis of 184 genotypes (see Table 3 for units of each trait).

Table S2. Wheat genotypes ranked in the top or bottom 20 genotypes for total root length (RL) of the 184 genotypes, some of which were also ranked in the top or bottom 20 for other traits.

Code #	Genotype name	RL	RL_s1	RL_sub	RGR	RM	SM
6	Hopea	♥	♥	♥	♥	♥	♥
41	Bahatans 87	♥	♥	♥		♥	♥
21	Ghurka	♥		♥		♥	♥
34	Seu Seun 27	♥		♥	♥	♥	
16	Ardito	♥	♥	♥	♥	♥	
25	Orlandi	♥		♥		♥	
50	Kulung	♥	♥			♥	♥
71	Austro Bankut	♥	♥	♥			
52	Nachipundo	♥	♥	♥			♥
35	Blueboy	♥		♥		♥	♥
9	Redman	♥		♥		♥	♥
92	Corin	♥		♥		♥	
2	College Eclipse	♥		♥	♥		♥
59	Cotipora	♥		♥	♥		
82	Rongotea	♥		♥			
4	Flint	♥				♥	
44	Weibullsholm Jo 3045	♥	♥			♥	
8	Pitic 62	♥		♥			
15	Arawa	♥		♥	♥	♥	♥
26	Blondynka	♥		♥		♥	♥
Genotypes ranked in the lower 20 for root length (RL)							
123	Cobra	♦		♦	♦	♦	♦
83	Buck Buck S	♦	♦			♦	
177	Machete	♦	♦				
28	Richelle	♦	♦				
75	Songlen	♦	♦				
126	Mace	♦		♦	♦	♦	♦
164	Excalibar	♦	♦	♦	♦	♦	
133	Hydra	♦	♦	♦		♦	♦
121	Bonnie Rock	♦	♦	♦		♦	
142	Scepter	♦		♦	♦		♦
96	Turda 81	♦		♦	♦		
138	Drysdale	♦	♦	♦			
134	Impress Cl Plus	♦		♦	♦	♦	♦
178	Magsil 30	♦	♦			♦	
139	Grenade Cl Plus	♦		♦	♦	♦	♦
132	Harper	♦	♦	♦	♦	♦	♦
119	W7984	♦		♦	♦		
136	Trojan	♦	♦	♦	♦	♦	♦
79	Limpopo	♦	♦	♦	♦	♦	
157	Tincurrin	♦	♦	♦		♦	♦

Root length (RL), RL in top 20 cm section (RL_s1), RL in the section below 20 cm (RL_sub), root growth rate (RGR), root mass (RM), and shoot mass (SM).

Chen Y *et al.* (2020) *BMC Plant Biology* **Doi**: 10.1186/s12870-020-02390-8

Table S3. General Linear Model (GLM) multivariate analysis for plant position as a main effect in selected root traits (shoot height, root mass and shoot mass).

Source		Type III Sum of Squares	DF	Mean Square	*F*	Sig.
Corrected Model	Shoot height	2.21	1	2.20	0.032	0.858
	Root mass	11708	1	11708.01	2.621	0.106
	Shoot mass	16966	1	16966.49	1.416	0.235
Plant position	Shoot height	2	1	2.20	0.032	0.858
	Root mass	11708	1	11708.01	2.621	0.106
	Shoot mass	16966	1	16966.49	1.416	0.235
Error	Shoot height	37071	540	68.65		
	Root mass	2412327	540	4467.27		
	Shoot mass	6471773	540	11984.77		

Table S4 Pearson's correlation matrix for 25 traits (including 21 root traits and 4 shoot traits) in 184 wheat genotypes.

Trait	SRLZ2	MRD	SRN	RL	RD	SRL	RLI	RTD	RL_s1	RD_s1	RL_s2	RD_s2	RL_s3	RD_s3	RL_sub	RD_sub	RLR_s1/sub	RM	SM	TDM	RMR	SH	LN	TN
SRLZ1	**	**		**	**			*		**	**	**	**	**	**	**	**	**	**	**			**	**
SRLZ2		**		**	**				*	**	**	**	**	**	**	**	**	**	**	**			**	**
MRD				**	**			*		**	**	**	**	**	**	**	**	**	**	**			**	**
SRN				*		**	**	**	**									**	**	**	**	**		
RL					**		**		**		**	**	**	**	**	**	**	**	**	**		**	**	**
RD						**		**	*	**	**	**	**	**	**	**	**		*	*			**	*
SRL								**		**				**		*		**	**	**			*	**
RLI									**		**		**		**			**	**	**		**	**	**
RTD											*	**		**	*	**		**	**	**			**	**
RL_s1										*	**	*	**		**		**	**	**	**		**	**	**
RD_s1												**		**		**	**							
RL_s2												**	**	**	**	**	**	**	**	**		**	**	**
RD_s2													**	**	**	**	**	**	**	**	**	*	**	**
RL_s3														**	**	**	**	**	**	**		*	**	**
RD_s3															**	**	**	**	**	**			**	**
RL_sub																**	**	**	**	**		**	**	**
RD_sub																	**	**	**	**	*		**	**
RLR_s1/sub																		*		*				
RM																			**	**		**	**	**
SM																				**	**	**	**	**
TDM																					**	**	**	**
RMR																						**		
SH																								
LN																								**

**, Correlation is significant at the 0.01 level (2-tailed); *, Correlation is significant at the 0.05 level (2-tailed). Mathematically linked traits such as RA, RV, RLD and RGR were excluded in the correlation analysis. See Table 3 for the trait descriptions.

Table S5 Mean values (cluster centers) of five groups generated by *K*-Means clustering analysis for 9 root-related traits in 184 wheat genotypes.

Root traits	Cluster#1	Cluster#2	Cluster#3	Cluster#4	Cluster#5	*F*	*Sig.*
SRN	*9.94*	11.56	**11.81**	11.53	10.86	1.7	0.1430
RL	*1147*	2469	**2949**	2044	1585	495	0.0000
RLI	*13.0*	20.3	**24.2**	19.4	15.6	48.2	0.0000
RL_s1	*452*	824	**908**	795	573	50.3	0.0000
RL_s2	*383*	837	**1061**	697	542	162	0.0000
RL_s3	*312*	808	**979**	552	469	123	0.0000
RL_sub	*695*	1645	**2040**	1249	1011	323	0.0000
RLR_s1/sub	**0.80**	0.54	*0.48*	0.70	0.61	4.7	0.0010
RM	*96*	214	**255**	165	133	151	0.0000
Members	32	28	16	56	52		
%	17.4	15.2	8.7	30.4	28.3		

Analysis of variance *F* statistics was performed, and both *F* and *P* values for each variable are given. Traits with large *F* values provide the greatest separation among clusters. The number of clusters was set at 5 using the iterate and classify method. Maximum iterations were 10. For each trait, minimums are italicized and maximums are in bold type.

Table S6 The184 genotypes of wheat (*Triticum aestivum*) from 37 countries of origin used in this study.

No.	Name	Country of origin[1]	Seed provider	Notes
1	Chinese Spring	China	AGG	Balfourier *et al.* (2007)[2]
2	College Eclipse	Australia	AGG	Balfourier *et al.* (2007)
3	Daeraad	South Africa	AGG	Balfourier *et al.* (2007)
4	Flint	United States	AGG	Balfourier *et al.* (2007)
5	Gamenya A	Australia	AGG	Balfourier *et al.* (2007)
6	Hopea	Russia	AGG	Balfourier *et al.* (2007)
7	Mocha De Espriga Branca	Portugal	AGG	Balfourier *et al.* (2007)
8	Pitic 62	Mexico	AGG	Balfourier *et al.* (2007); Narayanan *et al.* (2014)[3]
9	Redman	Canada	AGG	Balfourier *et al.* (2007); Narayanan *et al.* (2014)
10	Sarrubra	Russia[3]	AGG	Balfourier *et al.* (2007)
11	Squareheads Master	United Kingdom	AGG	Balfourier *et al.* (2007)
12	Alma	United Kingdom	AGG	Balfourier *et al.* (2007)
13	Admonter Fruh	Austria	AGG	Balfourier *et al.* (2007)
14	Andes 56	Mexico	AGG	Balfourier *et al.* (2007); Narayanan *et al.* (2014)
15	Arawa	New Zealand	AGG	Balfourier *et al.* (2007)
16	Ardito	Italy	AGG	Balfourier *et al.* (2007)
17	Spear	Australia	CSIRO	Released 1984
18	Coronation	Canada	AGG	Balfourier *et al.* (2007)
19	Africa Mayo	Kenya	AGG	Balfourier *et al.* (2007)
20	Fronthatch	Kenya	AGG	Balfourier *et al.* (2007)
21	Ghurka	Australia	AGG	Balfourier *et al.* (2007)
22	Kitchener	Canada	AGG	Balfourier *et al.* (2007)
23	Little Club	United States	AGG	Balfourier *et al.* (2007); Narayanan *et al.* (2014)
24	Opal	Netherlands	AGG	Balfourier *et al.* (2007)
25	Orlandi	Italy	AGG	Balfourier *et al.* (2007)
26	Blondynka	Poland	AGG	
27	Lang	Australia	CSIRO	
28	Richelle	Tunisia	AGG	
29	Kenya 350	Kenya	AGG	Balfourier *et al.* (2007)
30	Stanley	Canada	AGG	Balfourier *et al.* (2007)
31	Pamucak	Turkey	AGG	Balfourier *et al.* (2007)
32	Aurore	Australia	AGG	Balfourier *et al.* (2007)
33	Gular	Australia	AGG	Balfourier *et al.* (2007)
34	Seu Seun 27	South Korea	AGG	Balfourier *et al.* (2007)
35	Blueboy	United States	AGG	Balfourier *et al.* (2007)
36	Lammas	United Kingdom	AGG	Balfourier *et al.* (2007)
37	Diana	Poland	AGG	
38	Tom Thumb	Mexico	AGG	Balfourier *et al.* (2007)
39	Berzataka	Russia[4]	AGG	Balfourier *et al.* (2007)
40	Ebro 3	Spain	AGG	Balfourier *et al.* (2007)
41	Bahatans 87	Algeria	AGG	Balfourier *et al.* (2007)
42	BT-2281	Tunisia	AGG	Balfourier *et al.* (2007)
43	Agatha	Canada	AGG	Balfourier *et al.* (2007)
44	Weibullsholm Jo 3045	Finland	AGG	Balfourier *et al.* (2007)
45	Chitlang	Nepal	AGG	
46	Dhoje	Nepal	AGG	Balfourier *et al.* (2007)
47	Chirkung	Nepal	AGG	
48	Benchung	Nepal	AGG	

49	Gudel	Nepal	AGG	
50	Kulung	Nepal	AGG	
51	Monjo	Nepal	AGG	
52	Nachipundo	Nepal	AGG	
53	Jubing	Nepal	AGG	
54	Junbesi	Nepal	AGG	
55	Ritak 1	Nepal	AGG	
56	Chyamtang	Nepal	AGG	
57	Honggaoan	Nepal	AGG	
58	Centurk	United States	AGG	Balfourier *et al.* (2007)
59	Cotipora	Brazil	AGG	Balfourier *et al.* (2007)
60	Candeal De Arevalo	Portugal	AGG	Balfourier *et al.* (2007)
61	Dolis Puri	Russia[3]	AGG	Balfourier *et al.* (2007)
62	Buck Atlantico	Argentina	AGG	Balfourier *et al.* (2007)
63	Pato	Argentina	AGG	Balfourier *et al.* (2007)
64	Vakka	Finland	AGG	Balfourier *et al.* (2007)
65	Glenlea	Canada	AGG	Balfourier *et al.* (2007)
66	Matraderecskei	Hungary	AGG	Balfourier *et al.* (2007)
67	Chanate	Mexico	AGG	Balfourier *et al.* (2007)
68	Barani 70	Pakistan	AGG	Balfourier *et al.* (2007)
69	Nyu Bay	Japan	AGG	Balfourier *et al.* (2007)
70	Tau-Bugda	Russia[3]	AGG	Balfourier *et al.* (2007)
71	Austro Bankut	Austria	AGG	Balfourier *et al.* (2007)
72	Apex	Canada	AGG	Balfourier *et al.* (2007)
73	Ferrugineum	Russia[3]	AGG	Balfourier *et al.* (2007)
74	Nong Da 141	China	AGG	Balfourier *et al.* (2007)
75	Songlen	Iraq	CSIRO	Drought tolerant
76	Caribo	Germany	AGG	Balfourier *et al.* (2007)
77	Minturk	United States	AGG	Balfourier *et al.* (2007)
78	Canuck	Canada	AGG	Balfourier *et al.* (2007)
79	Limpopo	Zimbabwe	AGG	Balfourier *et al.* (2007)
80	Balkan	Yugoslavia	AGG	Balfourier *et al.* (2007)
81	Arkas	France	AGG	Balfourier *et al.* (2007)
82	Rongotea	New Zealand	AGG	Balfourier *et al.* (2007)
83	Buck Buck S	Mexico	AGG	Balfourier *et al.* (2007)
84	Emu S	Mexico	AGG	Balfourier *et al.* (2007)
85	Horoshiri-Komugi	Japan	AGG	Balfourier *et al.* (2007)
86	Benni	United States	AGG	Balfourier *et al.* (2007)
87	Katyil	Australia	AGG	Balfourier *et al.* (2007)
88	Ogosta	Bulgaria	AGG	Balfourier *et al.* (2007)
89	Akadaruma	Japan	AGG	Balfourier *et al.* (2007)
90	Bass	Australia	AGG	Balfourier *et al.* (2007)
91	Compton	United States	AGG	Balfourier *et al.* (2007)
92	Corin	United Kingdom	AGG	Balfourier *et al.* (2007)
93	Comet	Australia	AGG	Balfourier *et al.* (2007)
94	Opata 85	Mexico	AGG	Balfourier *et al.* (2007)
95	Wattines	Germany	AGG	Balfourier *et al.* (2007)
96	Turda 81	Romania	AGG	Balfourier *et al.* (2007)
97	Recital	France	AGG	Balfourier *et al.* (2007)
98	Adular	Germany	AGG	Balfourier *et al.* (2007)
99	Granit	Germany	AGG	Balfourier *et al.* (2007)
100	Dal'nevostochnaya 10	Russia[3]	AGG	Balfourier *et al.* (2007)
101	Corsodor	France	AGG	Balfourier *et al.* (2007)
102	3716-1	Bulgaria	AGG	Balfourier *et al.* (2007)
103	Mv Ma	Bulgaria	AGG	Balfourier *et al.* (2007)
104	Flamura 85	Romania	AGG	Balfourier *et al.* (2007)
105	Axona	United Kingdom	AGG	Balfourier *et al.* (2007)

106	Genesis	Canada	AGG	
107	Hana	Czech Republic	AGG	Balfourier *et al.* (2007)
108	Kirac 66	Turkey	AGG	Balfourier *et al.* (2007)
109	Dneprovskaya 155	Russia[3]	AGG	Balfourier *et al.* (2007)
110	Szoke (GK)	Hungary	AGG	Balfourier *et al.* (2007)
111	Grenier	France	AGG	Balfourier *et al.* (2007)
112	Sary Bugda	Russia[3]	AGG	
113	Renan	France	AGG	Balfourier *et al.* (2007)
114	Landrace	Armenia	AGG	
115	Apache	France	AGG	Balfourier *et al.* (2007)
116	Kraka	Denmark	AGG	Balfourier *et al.* (2007)
117	Cadenza	United Kingdom	AGG	Balfourier *et al.* (2007)
118	Soor Ghanum	Pakistan	AGG	
119	W7984	Mexico	AGG	
120	Strubes Dickopf	Germany	AGG	Balfourier *et al.* (2007)
121	Bonnie Rock	Australia	InterGrain	WA top 10 cultivar
122	Calingiri	Australia	InterGrain	WA top 10 cultivar
123	Cobra	Australia	LPB	WA top 10 cultivar
124	Corack	Australia	AGT	WA top 10 cultivar
125	Justica Cl Plus	Australia	AGT	WA top 10 cultivar
126	Mace	Australia	AGT	WA top 10 cultivar; released in 2014
127	Magenta	Australia	InterGrain	WA top 10 cultivar
128	Stiletto	Australia	ARI	WA top 10 cultivar
129	Wyalkatchem	Australia	InterGrain	WA top 10 cultivar; released in 2001
130	Yitpi	Australia	ARI	WA top 10 cultivar
131	Bremer	Australia	AGT	Recent release
132	Harper	Australia	InterGrain	Recent release
133	Hydra	Australia	InterGrain	Recent release
134	Impress Cl Plus	Australia	InterGrain	Recent release
135	Supreme	Australia	InterGrain	Recent release; Narayanan *et al.* (2014)
136	Trojan	Australia	LPB	Recent release
137	Zen	Australia	InterGrain	Recent release
138	Drysdale	Australia	CSIRO	Saradadevi *et al.* (2014)[5]; released in 2002
139	Grenade Cl Plus	Australia	AGT	Recent release; drought tolerant
140	Igw-3119	Australia	CSIRO	Saradadevi *et al.* (2014)
141	Igw-3262	Australia	CSIRO	Saradadevi *et al.* (2014)
142	Scepter	Australia	AGT	Recent release; drought tolerant
143	Beyaz Tir	Turkey	AWCC	
144	Ciano 67	Mexico	AWCC	
145	Downy	United States	AWCC	
146	Gleennson 81	Mexico	AWCC	
147	Hobbit Sib	United Kingdom	AWCC	
148	Hongmang	China	AWCC	
149	IBIS	Denmark	AWCC	
150	Kauz Dwarf	Mexico	AWCC	
151	Kauz S	Mexico	AWCC	
152	Maris Templar	United Kingdom	AWCC	
153	PI 74494	Russia[3]	AWCC	
154	Seri 82	Mexico	AWCC	Narayanan *et al.* (2014)
155	Sonora 64	Mexico	AWCC	Narayanan *et al.* (2014)
156	Sportsman	United Kingdom	AWCC	
157	Tincurrin	Australia	AWCC	
158	Yecora	Mexico	AWCC	
159	Kauz Tall	Mexico	AWCC	
160	AMC 71	Iraq	CSIRO	Drought tolerant
161	Condor	Australia	CSIRO	Released in 1997

162	Cranbrook	Australia	CSIRO	
163	Egawildy	Australia	CSIRO	Balfourier *et al.* (2007)
164	Excalibar	Australia	CSIRO	
165	Frame	Australia	CSIRO	Released in 1994
166	Gamenya B	Australia	CSIRO	Balfourier *et al.* (2007)
167	gladius	Australia	CSIRO	Released in 2007
168	Halberd	Australia	CSIRO	Released in 1969
169	Hartog	Australia	CSIRO	Narayanan *et al.* (2014)
170	Heron	Australia	CSIRO	Released in 1958
171	Janz	Australia	CSIRO	Released in 1989
172	Kalannie	Australia	CSIRO	
173	Kennedy	Australia	CSIRO	
174	Krichauff	Australia	CSIRO	Released in 1997
175	Lincoln	Australia	CSIRO	More tillers
176	Livingston	Australia	CSIRO	
177	Machete	Australia	CSIRO	
178	Magsil 30	Australia	CSIRO	
179	RAC 875	Australia	CSIRO	
180	SB 034	Mexico	CSIRO	
181	SB 072	Mexico	CSIRO	
182	Silverstar	Australia	CSIRO	
183	Sunco	Australia	CSIRO	
184	Warigal	Australia	CSIRO	

Notes:

[1] County of origin (number of genotypes): Australia (55), Mexico (18), Nepal (13), Russia (10), Canada (9), United Kingdom (9), United States (8), France (6), Germany (5), Bulgaria (3), China (3), Japan (3), Kenya (3), Turkey (3), Argentina (2), Austria (2), Denmark (2), Finland (2), Hungary (2), Iraq (2), Italy (2), New Zealand (2), Pakistan (2), Poland (2), Portugal (2), Romania (2), Tunisia (2), Algeria (1), Armenia (1), Brazil (1), Czech Republic (1), Netherlands (1), South Africa (1), South Korea (1), Spain (1), Yugoslavia (1), Zimbabwe (1). Continent of origin (number of genotypes): Africa (10), Asia (30), Europe (51), North America (35), Oceania (57) and South America (1).

[2] Balfourier F, Roussel V, Strelchenko P, Exbrayat-Vinson F, Sourdille P, Boutet G, Koenig J, Ravel C, Mitrofanova O, Beckert M, Charmet G (2007) A worldwide bread wheat core collection arrayed in a 384-well plate. Theoretical and Applied Genetics. 114(7): 1265−75.

[3] Narayanan S, Mohan A, Gill KS, Prasad PV (2014) Variability of root traits in spring wheat germplasm. PLoS One 9: e100317.

[4] The country of origin of these nine genotypes originally recorded as “Former Soviet Union” were combined with “Russia” in this study.

[5] Saradadevi R, Bramley H, Siddique KH, Edwards E, Palta JA (2014) Contrasting stomatal regulation and leaf ABA concentrations in wheat genotypes when split root systems were exposed to terminal drought. Field Crops Research. 165: 5−14.

Chen Y *et al.* (2020) *BMC Plant Biology* **Doi**: 10.1186/s12870-020-02390-8

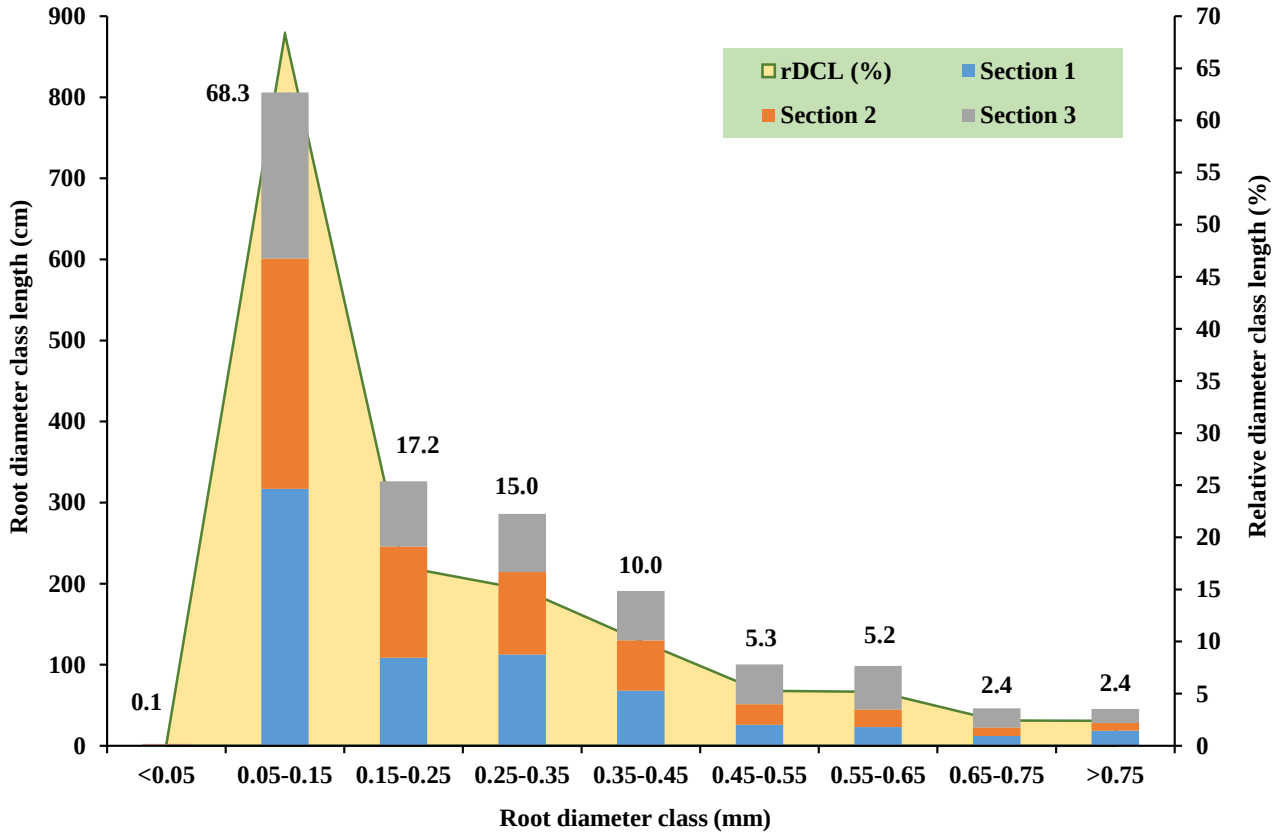

Fig. S1. Root diameter class length (DCL, cm) in sections and relative diameter class length (rDCL, %) among 184 wheat genotypes grown in a semi-hydroponic phenotyping platform 35 days after transplanting. Percentage values for rDCL in each diameter class are plotted on the secondary axis. Mean DCL values in each root section are presented with SEs for the total root length in the respective root diameter class.

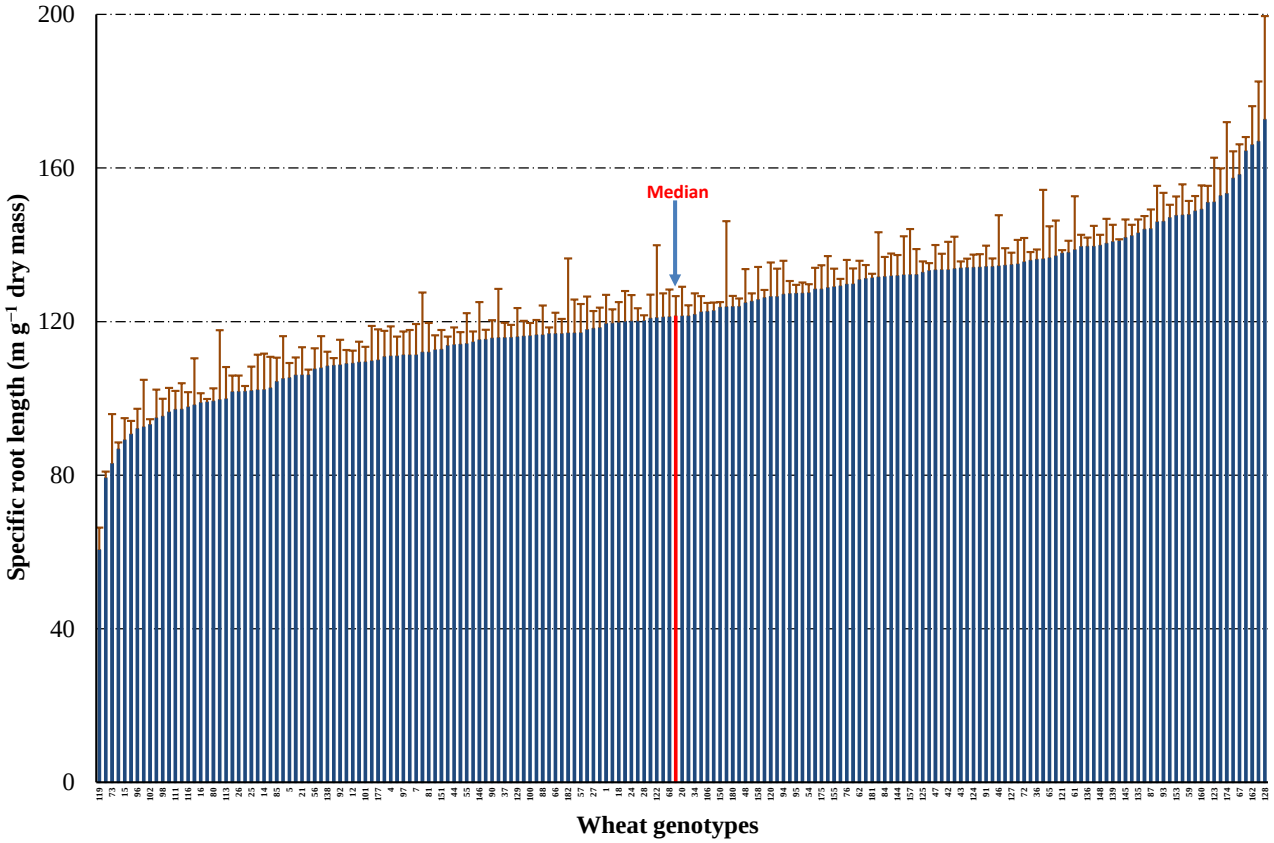

Fig. S2. Phenotypic variation in specific root length (SRL) among 184 wheat genotypes grown in a semi-hydroponic phenotyping platform 35 days after transplanting. Data were plotted from the lowest to the highest SRL values. The median value for all genotypes is presented (red bar).

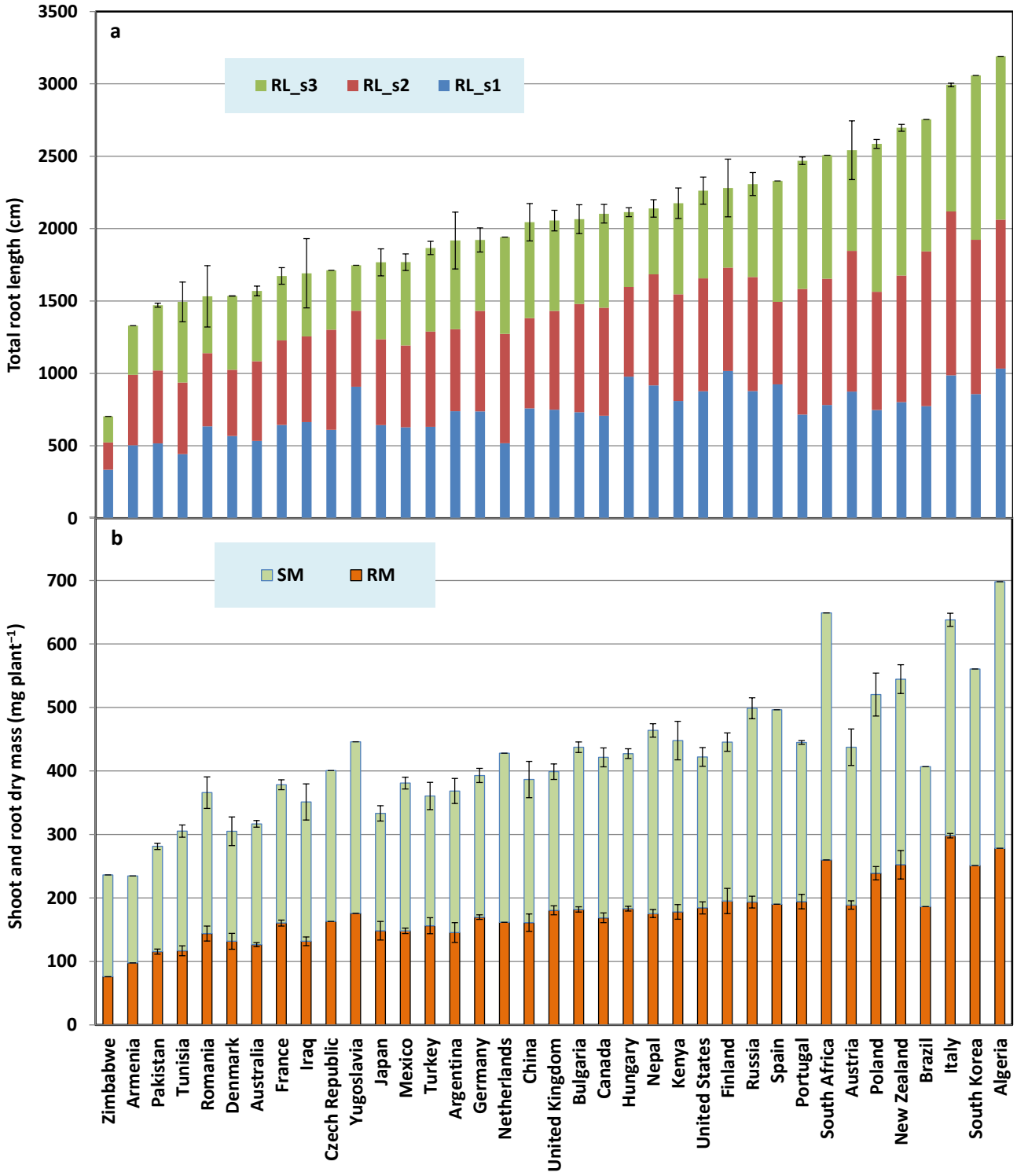

Fig. S3 Variation among the 37 countries of origin in (a) total root length, (b) shoot and root dry mass (SM and RM, respectively) in 184 wheat genotypes grown in a semi-hydroponic phenotyping platform 35 days after transplanting. Root data are the means for each country. Total root length in section 1 (RL_s1, 0–20 cm), section 2 (RL_s2, 20–40 cm), and section 3 (RL_s3, 40–110 cm) ± SE of total root length of all sections is presented. Country names are ordered by the total root length value. The number of genotypes in each country varied and ranged from one to 55 (see Table S3).

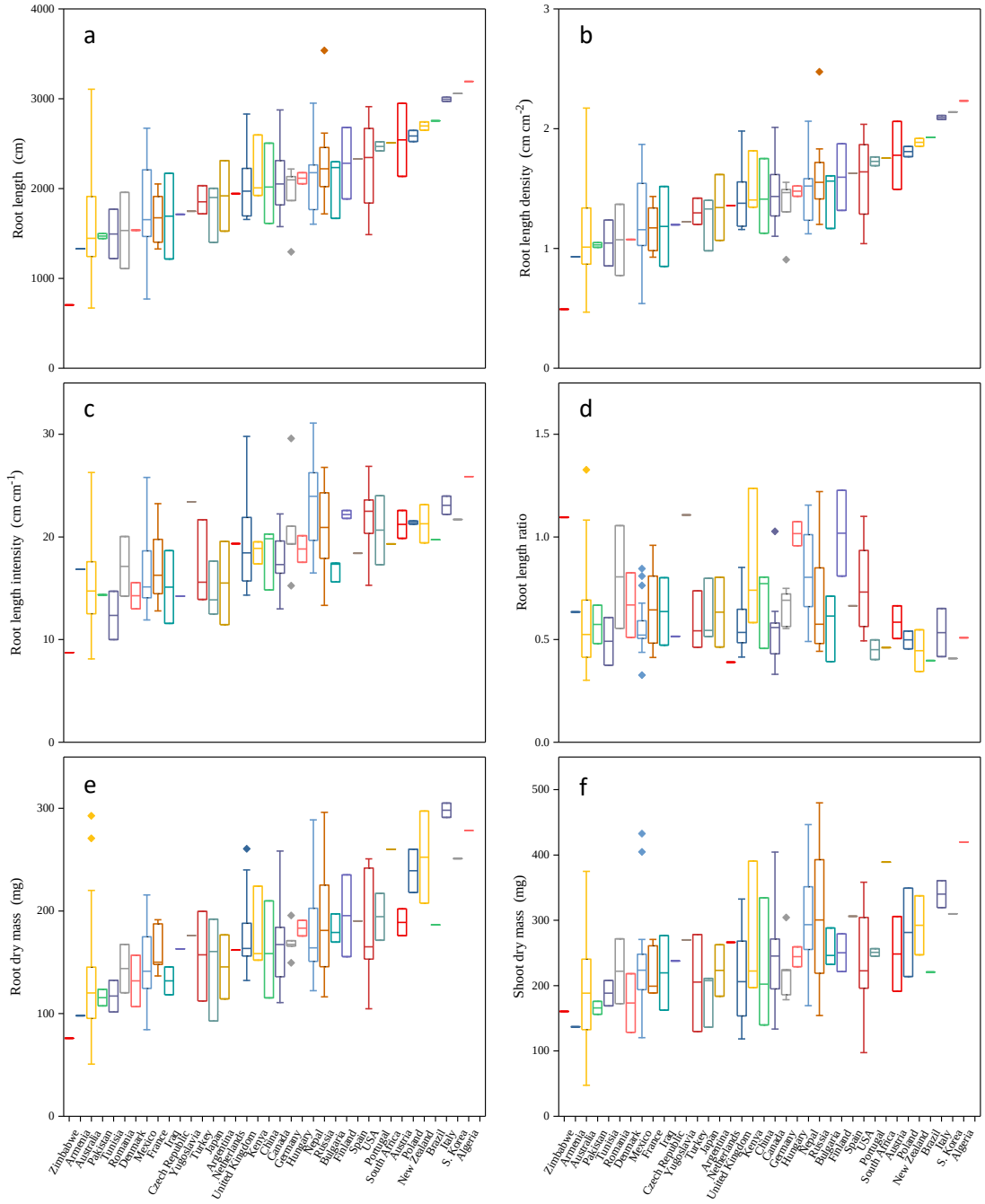

Fig. S4 Variation among the 37 countries of origin in (a) total root length, (b), root length density, (c) root length intensity, (d) root length ratio, (e) root dry mass, and (f) shoot dry mass in 184 wheat genotypes grown in a semi-hydroponic phenotyping platform 35 days after transplanting. Country names are ordered by the median values of root length from least to most. The boxplots were confined to the first and third quartile with the middle lines being the median. The number of genotypes in each country varied and ranged from one to 55 (see Table S3).

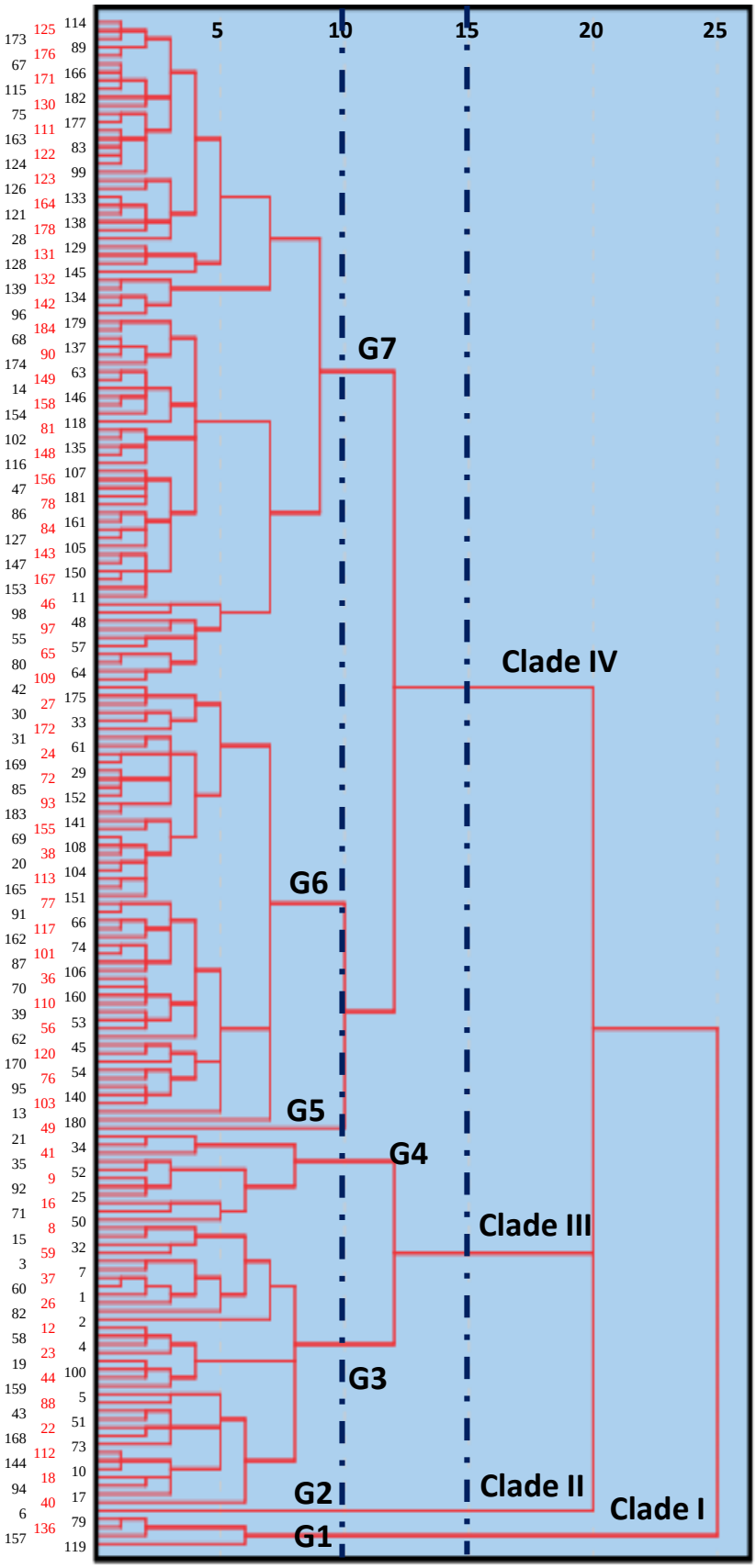

Fig. S5. Dendrogram of agglomerative hierarchical clustering (AHC) using the average linkage method with squared Euclidean distance as the interval measurement on 19 selected root traits with CVs ≥0.25. The 184 wheat genotypes were assigned to one of four general clades (Clade I, II, III or IV) at a rescaled distance of 15 (left dashed line) containing seven groups (G1 to G7) at a rescaled distance of 10 (right dashed line). See Table S3 for a list of the 184 wheat genotypes used in this study.