



Appendix

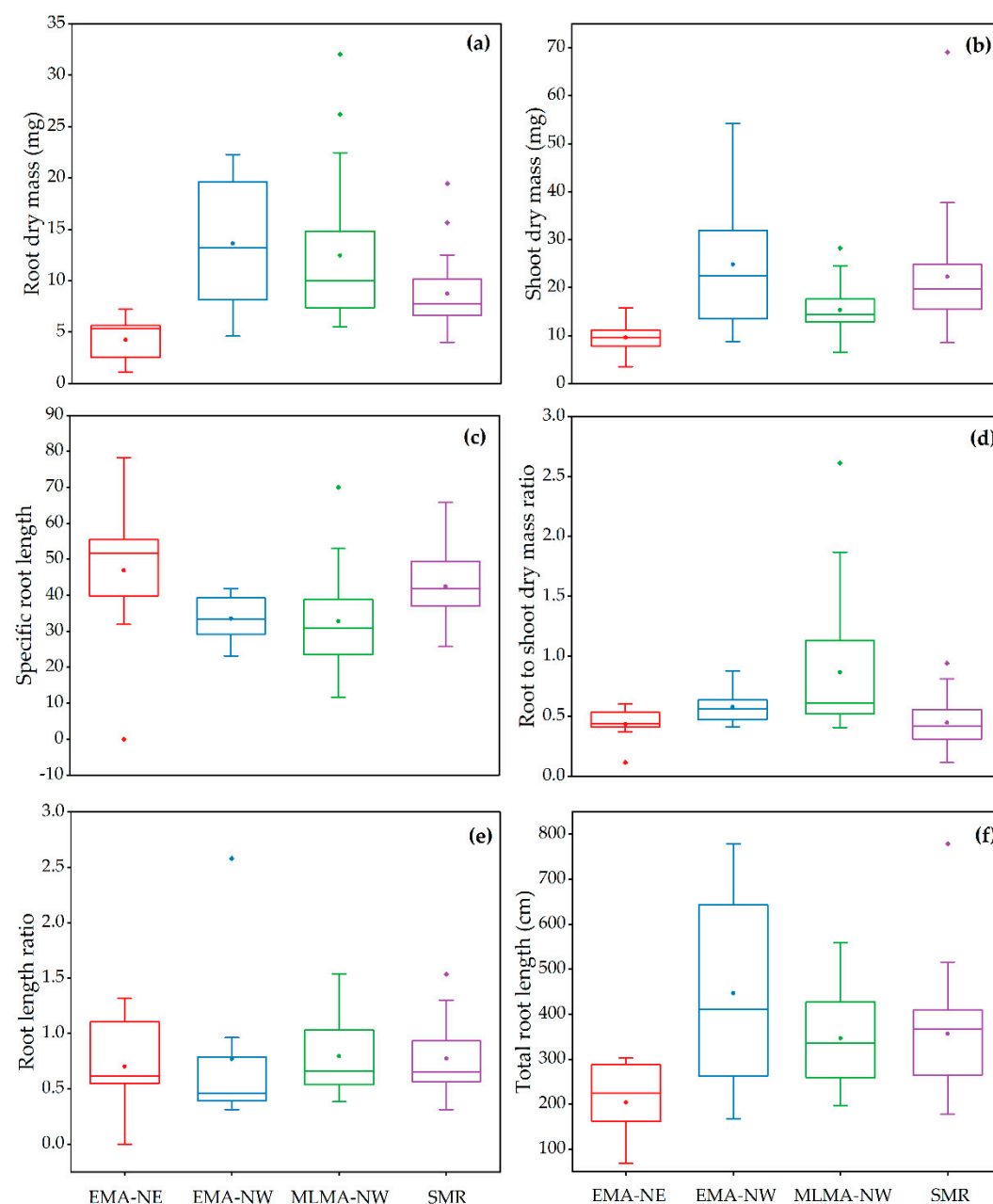


Figure S1. Variations of root and shoot phenotypes among the 4 ecological regions: (a) root dry mass; (b) shoot dry mass; (c) specific root length; (d) shoot to shoot dry mass ratio; (e) root length ratio; (f) total root length.

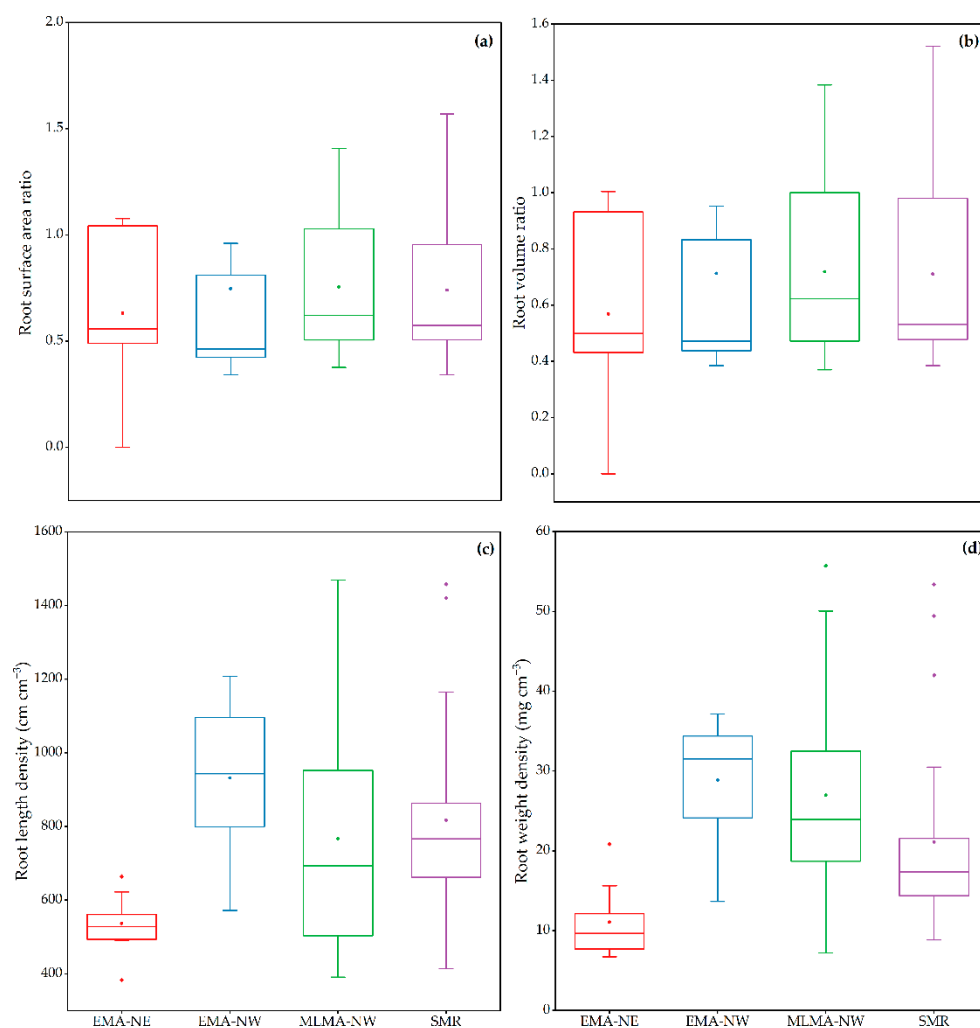


Figure S2. Variations of root phenotypic among the 4 ecological regions: (a) root surface area ratio; (b) root volume ratio; (c) root length density; (d) root weight density.

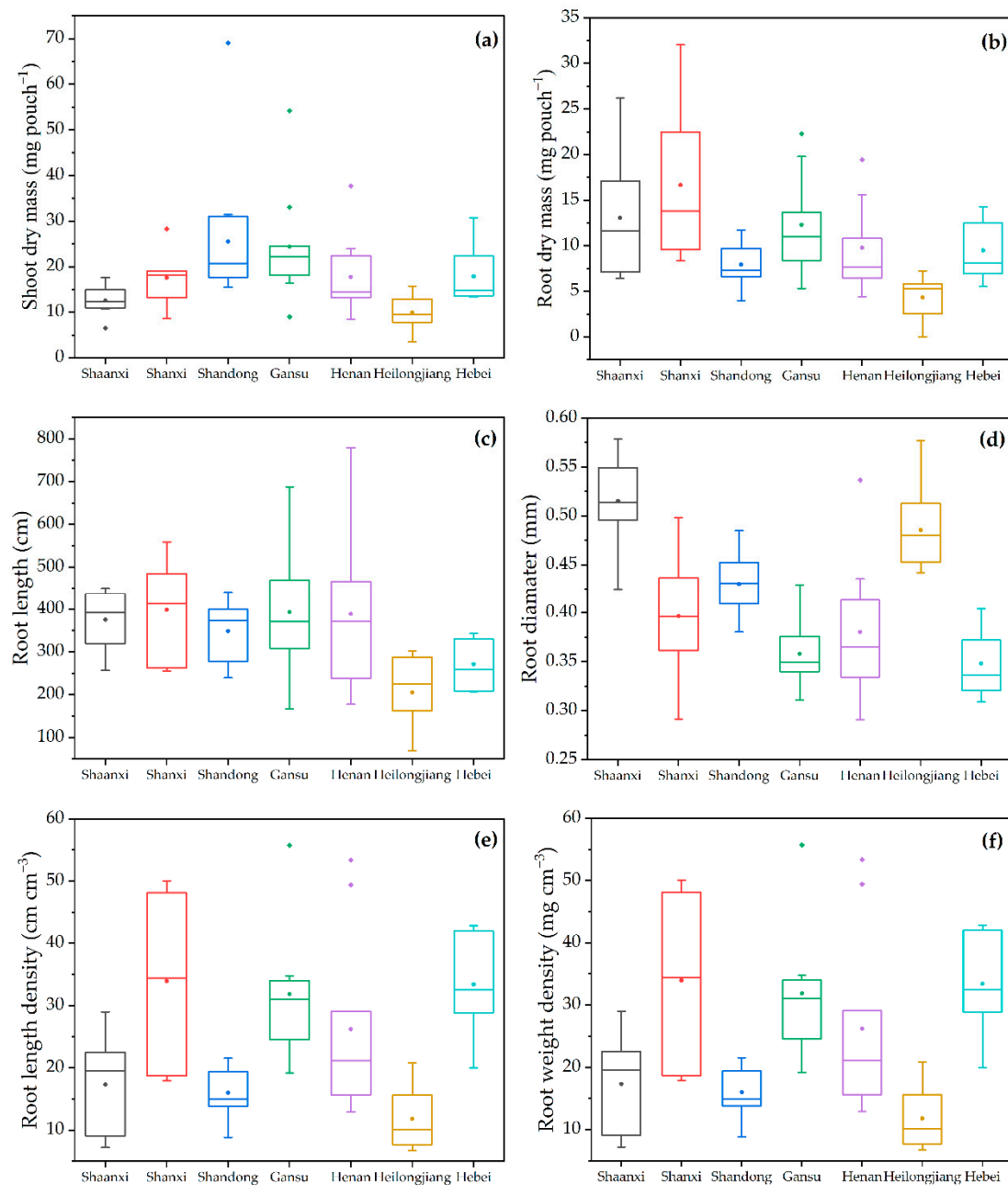


Figure S3. Variations of root and shoot phenotypes traits in the 7 provinces: (a) shoot dry mass; (b) root dry mass; (c) root length; (d) root diameter; (e) root length density; (f) root weight density.

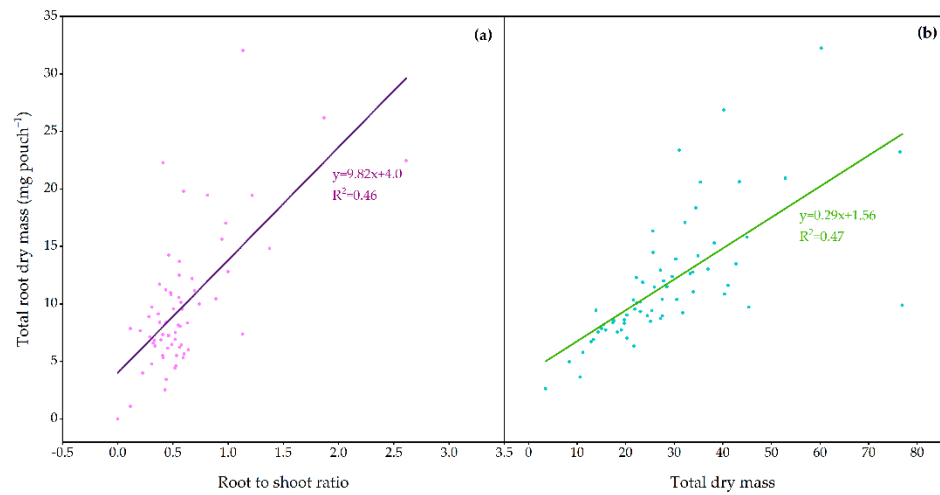


Figure S4. Linear fitting of root phenotypes: **(a)** total root dry mass vs. root to shoot ratio; **(b)** root dry mass vs. total dry mass.

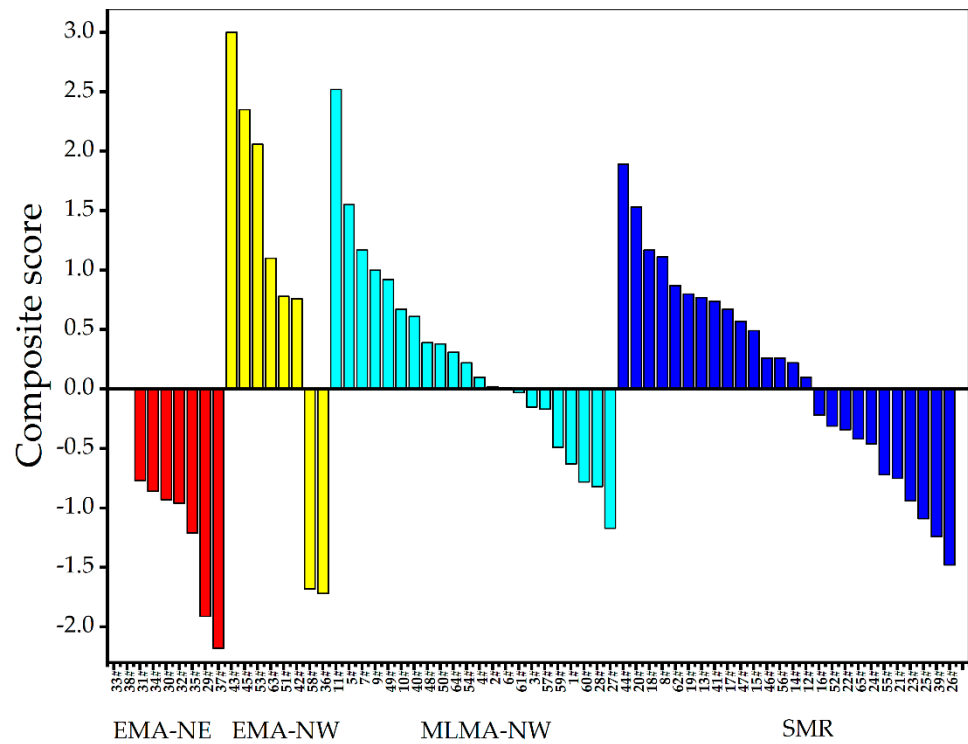


Figure S5. Comprehensive values of 18 selected traits. Composite score sorted from small to large, divided by ecological regions.

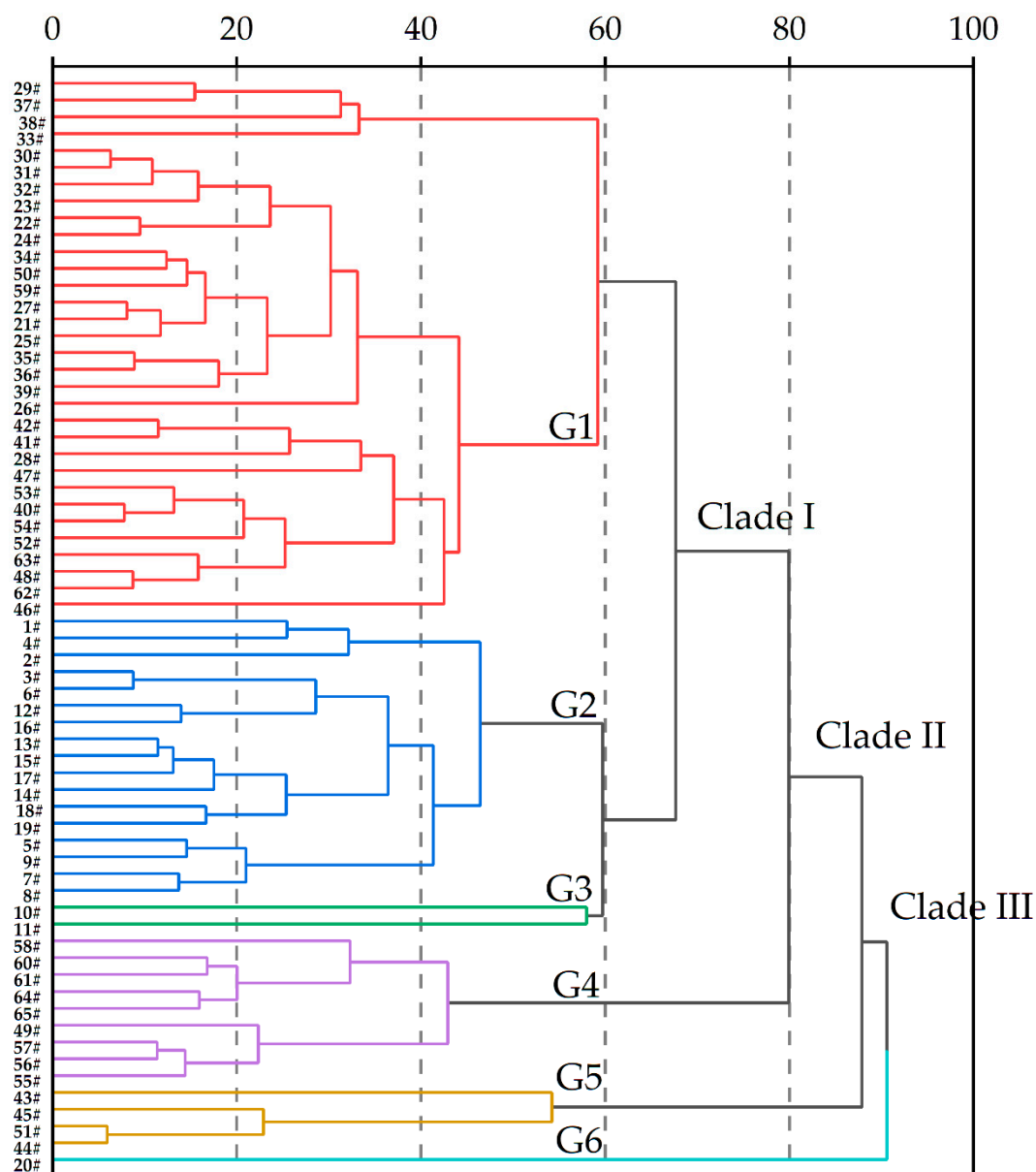


Figure S6. Dendrogram of agglomerative hierarchical clustering (AHC) on 18 selected root traits. The 65 millet genotypes were assigned to one of three general clades (Clade I, Clade II and Clade III) at a rescaled distance of 80 containing six groups (G1 to G6) at a rescaled distance 60.

Table S1. Cultivar, origin, seed provider, ecological region of 65 millet genotypes

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No	Cultivar	Origin	Seed provider	Ecological region
1	2019 Drought resistance of 8	Shaanxi	Yulin AAS	Mid-late maturing region in Northwest China
2	Yulin drought resistance of 1	Shaanxi	Yulin AAS	Mid-late maturing region in Northwest China
3	Yulin drought resistance of 2	Shaanxi	Yulin AAS	Mid-late maturing region in Northwest China
4	2019 Drought resistance of 2	Shaanxi	Yulin AAS	Mid-late maturing region in Northwest China
5	2019 Drought resistance of 4	Shaanxi	Yulin AAS	Mid-late maturing region in Northwest China
6	2019 Drought resistance of 5	Shaanxi	Yulin AAS	Mid-late maturing region in Northwest China
7	JinGu 21	Shanxi	Yulin AAS	Mid-late maturing region in Northwest China
8	YuGu 1	Shaanxi	Yulin AAS	Summer maturing region
9	Yulin Gu 1	Shaanxi	Yulin AAS	Mid-late maturing region in Northwest China
10	ChangSheng 7	Shanxi	Yulin AAS	Mid-late maturing region in Northwest China
11	Nong 2019	Shanxi	Yulin AAS	Mid-late maturing region in Northwest China
12	JiGu 14	Shandong	Shandong AAS	Summer maturing region
13	JiGu 15	Shandong	Shandong AAS	Summer maturing region
14	JiGu 16	Shandong	Shandong AAS	Summer maturing region
15	JiGu 17	Shandong	Shandong AAS	Summer maturing region
16	JiGu 18	Shandong	Shandong AAS	Summer maturing region
17	JiGu 19	Shandong	Shandong AAS	Summer maturing region
18	JiGu 20	Shandong	Shandong AAS	Summer maturing region
19	JiGu 21	Shandong	Shandong AAS	Summer maturing region
20	JiGu 22	Shandong	Shandong AAS	Summer maturing region
21	JiGu 23	Shandong	Shandong AAS	Summer maturing region
22	JiGu 24	Shandong	Shandong AAS	Summer maturing region
23	JiGu 25	Shandong	Shandong AAS	Summer maturing region
24	JiGu 26	Shandong	Shandong AAS	Summer maturing region
25	JiGu 27	Shandong	Shandong AAS	Summer maturing region
26	JiGu 28	Shandong	Shandong AAS	Summer maturing region
27	Qitoubai	Heilongjiang	Heilongjiang AAS	Mid-late maturing region in Northwest China
28	QinGu 5	Shaanxi	Yulin AAS	Mid-late maturing region in Northwest China

29	LongGu 23	Heilongjiang	Heilongjiang AAS	Early maturing area of Northeast China
30	LongGu 25	Heilongjiang	Heilongjiang AAS	Early maturing area of Northeast China
31	LongGu 44	Heilongjiang	Heilongjiang AAS	Early maturing area of Northeast China
32	LongGu 31	Heilongjiang	Heilongjiang AAS	Early maturing area of Northeast China
33	LongGu 39	Heilongjiang	Heilongjiang AAS	Early maturing area of Northeast China
34	ShengGu 1	Heilongjiang	Heilongjiang AAS	Early maturing area of Northeast China
35	LongGu 38	Heilongjiang	Heilongjiang AAS	Early maturing area of Northeast China
36	NenXuan 15	Heilongjiang	Heilongjiang AAS	Early maturing area of Northwest China
37	LongGu 37	Heilongjiang	Heilongjiang AAS	Early maturing area of Northeast China
38	LongGu 26	Heilongjiang	Heilongjiang AAS	Early maturing area of Northeast China
39	YuGu 14	Henan	Anyang AAS	Summer maturing region
40	JinGu 29	Shanxi	Shanxi AAS	Mid-late maturing region in Northwest China
41	YuGu 5	Henan	Anyang AAS	Summer maturing region
42	LongGu 7	Gansu	Gansu AAS	Early maturing area of Northwest China
43	LongGu 4	Gansu	Gansu AAS	Early maturing area of Northwest China
44	YuGu 11	Henan	Anyang AAS	Summer maturing region
45	LongGu 5	Gansu	GansuAAS	Early maturing area of Northwest China
46	YuGu 31	Henan	Anyang AAS	Summer maturing region
47	YuGu 9	Henan	Anyang AAS	Summer maturing region
48	JinGu 40	Shanxi	Shanxi AAS	Mid-late maturing region in Northwest China
49	YuGu 6	Gansu	Gansu AAS	Mid-late maturing region in Northwest China
50	LongGu 3	Gansu	Gansu AAS	Mid-late maturing region in Northwest China
51	LongGu 8	Gansu	Gansu AAS	Early maturing area of Northwest China
52	YuGu 32	Henan	Anyang AAS	Summer maturing region

53	LongGu 9	Gansu	Gansu AAS	Early maturing area of Northwest China
54	ChangNong 35	Shanxi	Shanxi AAS	Mid-late maturing region in Northwest China
55	YuGu 2	Henan	Anyang AAS	Summer maturing region
56	YuGu 7	Henan	Anyang AAS	Summer maturing region
57	LongGu 11	Gansu	Gansu AAS	Mid-late maturing region in Northwest China
58	LongGu 10	Gansu	Gansu AAS	Early maturing area of Northwest China
59	HuangQi	Hebei	Hebei AAS	Mid-late maturing region in Northwest China
60	JiGu 42	Hebei	Hebei AAS	Mid-late maturing region in Northwest China
61	JiGu 22	Hebei	Hebei AAS	Mid-late maturing region in Northwest China
62	JiChuang 1	Hebei	Hebei AAS	Summer maturing region
63	JiZhangGu 2	Hebei	Hebei AAS	Early maturing area of Northwest China
64	Cheng 11-727	Hebei	Hebei AAS	Mid-late maturing region in Northwest China
65	Bao 008	Hebei	Hebei AAS	Summer maturing region

Note: The abbreviation of four ecological regions: Early maturing area of Northeast China (EMA-NE), Early maturing area of Northwest China (EMA-NW), Mid-late maturing region in Northwest China (MLMA-NW), Summer maturing region (SMR).

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Table S2. Pearson's correlation matrix for 18 selected traits of 65 millet genotypes

Traits	MRL	RN	SDM	RDM	RL	RA	RV	RD	RLD	RWD	SRL	RSM	RGR	TDM	RLR	RSAR	RVR
LN	0.535**	0.511**	0.414**	0.385**	0.465**	0.200	-0.033	-0.640**	0.613**	0.537**	-0.382**	-0.053	-0.127	0.482**	-0.219	-0.168	-0.110
MRL		0.881**	0.665**	0.594**	0.678**	0.562**	0.376**	-0.315*	0.274*	0.365**	-0.328**	0.110	0.487**	0.765**	-0.595**	-0.578**	-0.549**
RN			0.495**	0.720**	0.710**	0.628**	0.471**	-0.226	0.187	0.360**	-0.288*	0.295*	0.433**	0.687**	-0.624**	-0.613**	-0.583**
SDM				0.344**	0.495**	0.364**	0.181	-0.221	0.153	0.116	-0.177	-0.268*	0.303*	0.918**	-0.347**	-0.340**	-0.322*
RDM					0.669**	0.644**	0.532**	-0.041	0.019	0.455**	-0.212	0.667**	0.489**	0.689**	-0.356**	-0.343**	-0.323**
RL						0.901**	0.687**	-0.018	0.047	0.021	-0.257*	0.217	0.402**	0.665**	-0.650**	-0.663**	-0.653**
RA							0.932**	0.362**	-0.331**	-0.212	-0.228	0.340**	0.621**	0.554**	-0.590**	-0.644**	-0.683**
RV								0.612**	-0.570**	-0.352**	-0.164	0.408**	0.698**	0.364**	-0.450**	-0.525**	-0.594**
RD									-0.928**	-0.737**	0.267*	0.165	0.389**	-0.188	0.006	-0.101	-0.219
RLD										0.758**	-0.184	-0.166	-0.388**	0.127	0.023	0.129	0.245
RWD											-0.228	0.349**	-0.079	0.282*	0.092	0.188	0.282*
SRL												-0.188	-0.103	-0.227	-0.084	-0.133	-0.163
RSM													0.363**	0.075	-0.030	-0.030	-0.034
RGR														0.440**	-0.187	-0.226	-0.270*
TDM															-0.423**	-0.412**	-0.390**
RLR																0.980**	0.902**
RSAR																	0.969**

** , correlation is significant at the 0.01 level (two-tailed); * , correlation is significant at the 0.05 level (two-tailed).