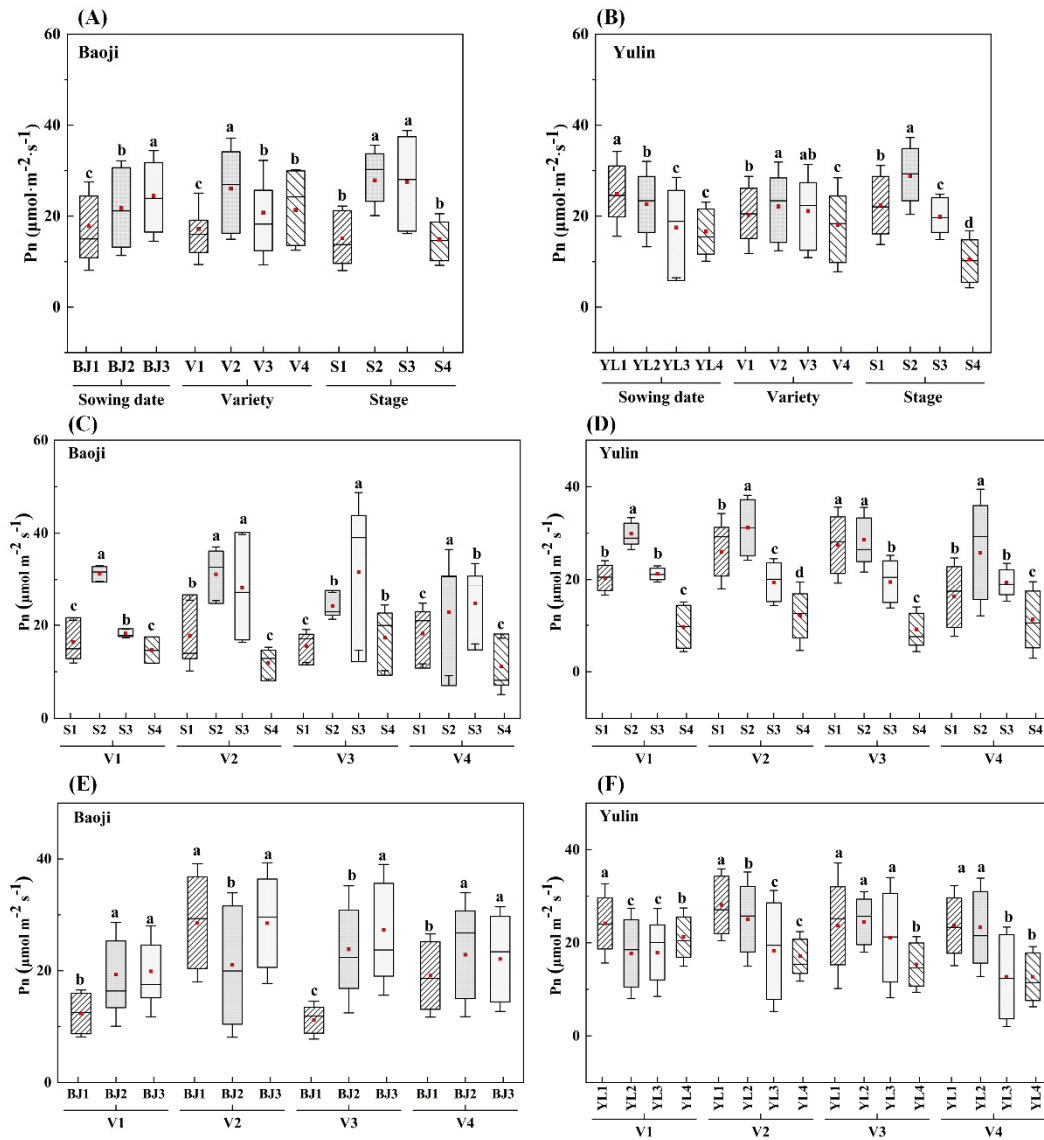
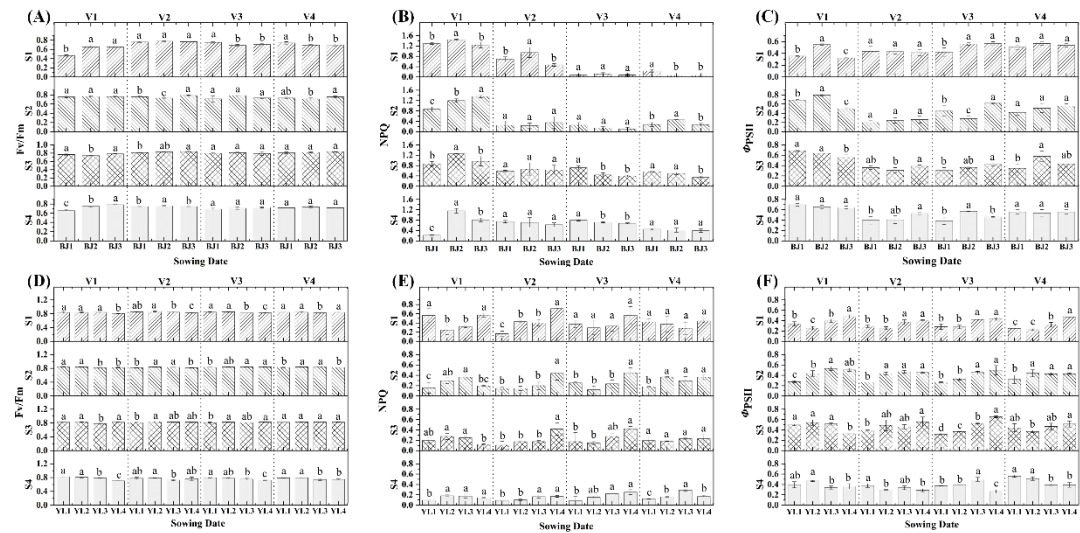


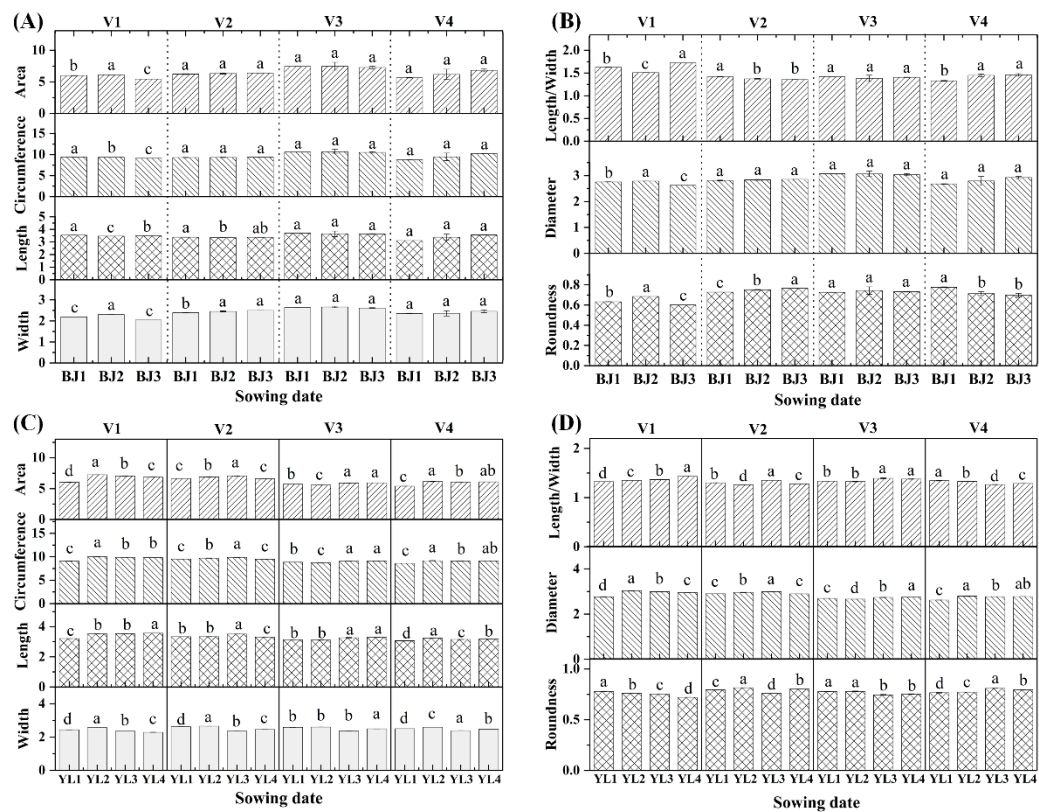
**Figure S1.** The annual average of meteorological factors in two sites.  $S_M$ ,  $S_{VG}$ ,  $S_{RG}$ , and  $T_M$ ,  $T_{VG}$ , and  $T_{RG}$  represent the hours of sunshine duration and accumulated temperature during the whole growth period, the vegetable growth period and the reproductive growth period, respectively. BJ and YL represent Baoji and Yulin. The \* and \*\* represent significant effects at the levels of  $p < 0.05$  and  $p < 0.01$ . These applies to the other figures.



**Figure S2.** The leaf photosynthesis (Pn) of broomcorn millet under different treatment in Baoji (A, C and E) and Yulin (B, D and F). V, and S represent variety and measuring stage, BJ and YL represent different sowing dates in Baoji and Yulin, respectively; the different lowercases in (A) and (B) represent the significant differences between treatments in each group. These applies to other figures.



**Figure S3.** The overall difference in leaf fluorescence characteristics of broomcorn millet at Baoji (Fv/Fm, NPQ and  $\Phi_{PSII}$ , A, B and C, respectively) and Yulin (Fv/Fm, NPQ and  $\Phi_{PSII}$ , D, E and F, respectively). The different lowercases in represent the significant differences among treatments at each site and measuring stage. These applies to other figures.



**Figure S4.** The overall difference in grain size parameters of broomcorn millet at Baoji (A and B) and Yulin (C and D).

**Table S1.** Multivariate analysis results for different treatments of broomcorn millet in Baoji and Yulin.

Location	Variation source	Variety (V)	Sowing date (D)	V × D	Stage (S)	S × V	S × D	V × D × S
Baoji	Pn	40.044***	45.217***	163.028***	23.027***	18.785***	7.046***	7.883***
	Fv/Fm	70.21***	23.74***	194.327***	15.707***	34.884***	2.179ns	11.959***
	NPQ	451.053***	19.141***	28.201***	22.851***	65.184***	5.755***	6.596***
	$\Phi_{PSII}$	127.848***	12.168***	20.347***	16.451***	28.508***	2.196ns	7.648***
	Length	13.191***	1.421ns	3.261*				
	Width	112.763***	3.446ns	7.765**				
	Area	27.92***	0.917ns	3.116*				
	Circumference	23.609***	2.004ns	3.425*				
	Length/Width	127.282***	11.705**	17.09***				
	Roundness	82.898***	6.976*	12.631***				
	Diameter	32.577***	0.896ns	3.837*				
Yulin	Pn	10.976***	60.061***	215.551***	9.074***	7.32***	9.349***	7.233***
	Fv/Fm	0.413 ns	54.841***	385.974***	4.074***	4.682***	18.994***	4.997***
	NPQ	0.781 ns	39.437***	103.553***	9.849***	1.695 ns	5.794***	3.915***
	$\Phi_{PSII}$	6.054**	54.004***	76.843***	9.147***	8.935***	32.1***	8.499***
	Length	2051.027***	634.28***	220.413***				
	Width	3638.333***	785***	224.889***				
	Area	4386.179***	1000.484***	261.987***				
	Circumference	2454.467***	627.419***	167.518***				
	Length/Width	551.778***	81.111***	178.889***				
	Roundness	231***	41.667***	95.667***				
	Diameter	3800.133***	849.2***	231.156***				

ns represent for no significant difference, \*, \*\* and \*\*\* represent significant effects at the levels of  $p < 0.05$ ,  $p < 0.01$  and  $p < 0.001$ , respectively.