

Supplementary Information

Table S2. Correlation Matrix in PCA analysis.

Sample		Correlation coefficient								
WNC	1	0.88	0.884	0.799	0.794	0.783	0.791	0.804	0.785	0.837
WNP	0.88	1	0.876	0.804	0.809	0.771	0.758	0.787	0.745	0.811
WNsKY	0.884	0.876	1	0.823	0.815	0.812	0.814	0.821	0.797	0.855
TZC	0.799	0.804	0.823	1	0.893	0.883	0.746	0.78	0.719	0.804
TZP	0.794	0.809	0.815	0.893	1	0.884	0.733	0.759	0.704	0.779
TZsKY	0.783	0.771	0.812	0.883	0.884	1	0.771	0.786	0.746	0.799
KYC	0.791	0.758	0.814	0.746	0.733	0.771	1	0.85	0.889	0.863
KYsTZ	0.804	0.787	0.821	0.78	0.759	0.786	0.85	1	0.827	0.891
KYP	0.785	0.745	0.797	0.719	0.704	0.746	0.889	0.827	1	0.84
KYsWN	0.837	0.811	0.855	0.804	0.779	0.799	0.863	0.891	0.84	1

Table S6. Main meteorological data at different growth stages at three cultivated regions.

Climate factor	Earlier growing stage			Maturing stage		
	KY	TZ	WN	KY	TZ	WN
Daily mean temperature (°C)	19. 1	23. 6	15. 9	21.7	26. 2	16. 5
≥10 °C accumulated temperature (°C)	1162.3	1156.7	941.6	1379.8	1687.4	1289.9
The amount of sunlight hours (h)	219.7	176.6	270.2	358.1	363.4	261.3
Cumulative rainfall (mm)	395.4	338.7	329.6	282.8	291.5	379.8
Daily mean relative humidity (%)	86. 4	82.7	84. 9	84. 3	83. 6	85. 2

Table S7. Agronomic traits of tobacco plants at 45 and 70 DAT.

Location	Treatments	45 DAT				70 DAT			
		Plant height (cm)	Stem perimeter (cm)	Number of leaves	Maximum leaf area (cm ²)	Plant height (cm)	Stem perimeter (cm)	Number of leaves	Maximum leaf area (cm ²)
WN	WNC	54.7	8.3	17.3	1166.8	117.5	9.8	16.4	1547.5
	WNP	55.5	8.7	17.8	1138	122.6	10	16.5	1511.2
	WNsKY	53.4	8.1	17.2	1017.8	114.6	9.2	15.7	1214.9
TZ	TZC	58.7	6.6	16	873.7	97.5	8	19	1081.8
	TZP	55	6.5	17	830.9	97.5	8.3	19.5	1087.9
	TZsKY	67.3	6.9	17.7	913.4	119	8.8	20	1327.7
KY	KYC	69.1	7.5	16	909.9	133.3	9.5	22	1151.1
	KYP	81.7	8.3	17	1245.4	139.6	9.7	21	1421.3
	KYsTZ	47.2	6.6	14	598.6	103.7	7.6	20	746.8
	KYsWN	87.9	8.5	18	1321.1	151.8	10	22	1481

Table S10. The basic physiochemical property of tested soils.

Cultivated regions	Avail. N (mg/kg)	Avail. P (mg/kg)	Avail. K (mg/kg)	Avail. B (mg/kg)	Avail. Cu (mg/kg)	Avail. Mn (mg/kg)	Avail. Fe (mg/kg)	Avail. S (mg/kg)	pH	Cation exchange capacity (cmol/kg)
KY	183.08	36.58	148.77	0.36	1.87	76.13	22.53	97.06	6.07	28.4
WN	134.15	12.72	168.89	0.17	1.29	35.41	9.25	30.42	5.87	10.08
TZ	142.86	3.22	94.05	0.29	1.53	51.53	13.25	73.94	5.75	12.23

Table S12. qRT-PCR primers used in this study.

Gene name	Forward primer (5'–3')	Reverse primer (5'–3')	Reference gene
<i>HSP17.4-CI</i>	CCGCCGATCCAGCGTCTTCG	AGCCCAGGGACGTCAGCCTT	<i>XLOC_016615</i>
<i>HSP70</i>	GCGATTTCGTGGCTCGACGGT	TTGCACCAGCAGAAGGGCCA	<i>XLOC_018396</i>
<i>OSM34</i>	AACACCTTGGCCGAATACGCA	AGTCGGGGCGAAAGTCATCGG	<i>XLOC_018354</i>
<i>P5CSI</i>	GGCTTGTGCTGCTGTGGGTC	AGCTGAGCTGAGGTTACGTCCA	<i>XLOC_022761</i>
<i>PsbA</i>	CCAGGGCAAGGGTTGATGCCT	CAACAGGTGCTACGCGGCCA	<i>XLOC_008952</i>
<i>SF3A3</i>	GCATCCTGCTGCGCGTGTG	CGCCCTGAACCTTCCTCGCC	<i>XLOC_005963</i>
<i>NtEF-1α</i>	TGAGATGCACCACGAAGCTC	CCAACATTGTCACCAGGAAGTG	<i>XLOC_014807</i>