

Table S1. Cultivar-specific genetic parameters of maize (cv. Longping 206) and soybean (cv. Zhonghuang 13) calibrated for the CERES-Maize and CROPGRO-Soybean models.

Model	Genetic Parameter	Description	Calibrated Values
CERES-Maize	P1 (°C day)	Thermal time from seed emergence to the end of juvenile phase during which the plant is not responsive to photoperiod	106.7
	P2 (day)	Delay in development (days) for each hour that day length is above 12.5 h. If the day length is less than 12.5 h, development occurs at maximum rate	2.1
	P5 (°C day)	Thermal time from silking to physiological maturity	995.5
	G2 (kernel)	Maximum possible number of kernels per plant	502.3
	G3 (mg kernel ⁻¹ day ⁻¹)	Kernel growth rate during the linear grain-filling stage under optimum conditions	10.3
	PHINT (°C day)	The interval in thermal time between successive leaf tip appearances	38.9
CROPGRO-Soybean	EM-FL (photothermal days)	Time between plant emergence and flower appearance	18
	FL-SH (photothermal days)	Time between first flower and first pod	10
	FL-SD (photothermal days)	Time between first flower and first seed	11
	SD-PM (photothermal days)	Time between first seed and physiological maturity	26
	FL-LF (photothermal days)	Time between first flower and end of leaf expansion	19
	CSDL (h)	Critical Short Day Length	12.3
	PPSEN (1/h)	Slope of the relative response of development to photoperiod with time	0.2
	LFMAX (mg CO ₂ m ² s ⁻¹)	Maximum leaf photosynthesis rate	1.3

	SLAVR (cm ² g ⁻¹)	Specific leaf area of cultivar	389.4
	SIZLF (cm ²)	Maximum size of full leaf	141.3
	WTPSD (g)	Maximum weight per seed	0.2
	SDPDV (seeds pod ⁻¹)	Average seed per pod	1.9

Note: The genetic parameters for cv. Longping 206 (CERES-Maize) and cv. Zhonghuang 13 (CROPGRO-Soybean) were obtained from Wei et al. [1] and Wei et al. [2], respectively. They were calibrated in those studies using the GLUE algorithm and field observations at Xinmaqiao station. No re-calibration was performed in the present study.

Table S2. Rain-fed grain yield of summer soybean and summer maize under different sowing date adjustments across climate scenarios.

Period	Sowing date shift (d)	Rain-fed grain yield (kg ha ⁻¹)	
		Soybean	Maize
2001–2020 (Baseline)	0	2363.83	6951.69
2031–2050 (SSP2-4.5)	-30	2464.05	4990.72
	-25	2555.23	5193.4
	-20	2567.46	5468.82
	-15	2572.82	5715.04
	-10	2489.38	6024.93
	-5	2396.12	6504.48
	0	2345.96	6758.61
	5	2258.96	7056.2
	10	2162.72	7276.81
	15	2082.42	7533.19
	20	1973.77	7698.62
	25	1868.36	7428.48
	30	1726.77	6830.65
2031–2050 (SSP5-8.5)	-30	2498.89	4984.49
	-25	2581.07	5181.5
	-20	2618.26	5462.66
	-15	2626.74	5704.2
	-10	2631.21	5982.33
	-5	2493.12	6367.81
	0	2405.32	6588.12
	5	2306.28	6666.81
	10	2163.55	6852.79

	15	2051.19	7102.72
	20	1904.58	7308.43
	25	1765.4	7099.4
	30	1715.42	6601.17

Note: Data are ensemble means of 20-year simulations driven by five GCMs. Negative values of sowing date shift indicate earlier sowing relative to the conventional date (June 10), and positive values indicate delayed sowing.

Table S3. Simulated grain yield of summer soybean and maize at 13 sowing dates under the historical baseline (2001–2020).

Sowing shift vs. June 10 (d)	Sowing date	Soybean yield (kg ha ⁻¹)	Maize yield (kg ha ⁻¹)
-30	11-May	2907	6227
-25	16-May	3009	6354
-20	21-May	3086	6555
-15	26-May	3103	6696
-10	31-May	3148	7063
-5	5-Jun	3194	7398
0	10-Jun	3131	7682
5	15-Jun	3035	7584
10	20-Jun	2963	7430
15	25-Jun	2856	7202
20	30-Jun	2741	6917
25	5-Jul	2589	6433
30	10-Jul	2477	5836

Note: Values are 20-year means under full irrigation. The baseline optimum is defined as the sowing date with the highest 20-year mean simulated yield. For soybean, the yields at -5 d and 0 d were nearly identical, indicating a broad optimum around early-to-mid June; the conventional date (0 d) was retained as the practical baseline reference.

References

1. Wei, Y.; Jin, J.; Jiang, S.; Ning, S.; Cui, Y.; Zhou, Y. Simulated Assessment of Summer Maize Drought Loss Sensitivity in Huaibei Plain, China. *Agronomy* **2019**, *9*, 78. <https://doi.org/10.3390/agronomy9020078>.
2. Wei, Y.; Jin, J.; Cui, Y.; Ning, S.; Zhou, Y.; Liu, Y.; Zhang, B.; Chen, H.; Wang, G. Quantitative Assessment of Soybean Drought Risk in Bengbu City Based on Disaster Loss Risk Curve and DSSAT. *Int. J. Disaster Risk Reduct.* **2021**, *56*, 102126. <https://doi.org/10.1016/j.ijdrr.2021.102126>.