Table S1. The first observed invasion dates (week no.) and first simulated invasion dates (week no.) of fall armyworm in 125 cities in China

Province	City code	Simulated Initial Invasion Date of FAW (Week)	Observed Initial Invasion Date of FAW (Week)	Province	City code	Simulated Initial Invasion Date of FAW (Week)	Observed Initial Invasion Date of FAW (Week)
Anhui	1	19	20	Shandong	64	29	25
Anhui	2	27	21	Shandong	65	29	29
Anhui	3	29	30	Shandong	66	26	30
Anhui	4	19	20	Shandong	67	31	30
Anhui	5	27	26	Shandong	68	31	31
Anhui	6	26	21	Shandong	69	31	29
Anhui	7	29	24	Shanxi	70	31	28
Anhui	8	30	27	Shaanxi	71	25	23
Anhui	9	18	20	Shaanxi	72	30	26
Anhui	10	18	20	Shaanxi	73	25	24
Anhui	11	27	20	Shaanxi	74	31	25
Anhui	12	25	20	Shaanxi	75	31	26
Anhui	13	25	22	Shaanxi	76	30	26
Anhui	14	29	24	Shaanxi	77	31	27
Anhui	15	25	20	Shaanxi	78	31	28
Gansu	16	25	30	Shanghai	79	24	21
Guizhou	17	12	18	Sichuan	80	24	21
Guizhou	18	19	20	Sichuan	81	16	17
Guizhou	19	19	17	Sichuan	82	19	21
Guizhou	20	16	19	Sichuan	83	25	21
Guizhou	21	16	18	Sichuan	84	24	25
Guizhou	22	14	17	Sichuan	85	25	21
Guizhou	23	12	17	Sichuan	86	20	19
Guizhou	24	16	19	Sichuan	87	18	19
Guizhou	25	16	19	Sichuan	88	25	25
Henan	26	25	29	Sichuan	89	25	20
Henan	27	24	25	Sichuan	90	27	20
Henan	28	25	27	Sichuan	91	24	20
Henan	29	31	25	Sichuan	92	25	20
Henan	30	18	19	Sichuan	93	25	20
Henan	31	29	25	Sichuan	94	25	22
Henan	32	25	24	Zhejiang	95	19	19
Hubei	33	19	20	Zhejiang	96	24	20

Hubei	34	19	20	Zhejiang	97	23	20
Hubei	35	18	20	Zhejiang	98	19	19
Hubei	36	18	20	Zhejiang	99	23	21
Hubei	37	19	21	Zhejiang	100	18	20
Hubei	38	18	20	Zhejiang	101	19	21
Hubei	39	24	21	Zhejiang	102	19	20
Hubei	40	19	24	Zhejiang	103	18	21
Hubei	41	18	20	Jiangsu	104	25	21
Hubei	42	18	19	Jiangsu	105	29	29
Hubei	43	19	20	Jiangsu	106	29	30
Hubei	44	19	21	Jiangsu	107	25	27
Hubei	45	19	19	Jiangsu	108	26	25
Hubei	46	24	20	Jiangsu	109	24	24
Hubei	47	18	21	Jiangsu	110	27	25
Hubei	48	19	21	Jiangsu	111	25	21
Hunan	49	18	19	Jiangsu	112	29	30
Hunan	50	16	17	Jiangsu	113	29	23
Hunan	51	16	19	Jiangsu	114	27	24
Hunan	52	16	19	Jiangsu	115	27	23
Hunan	53	16	20	Jiangsu	116	25	24
Hunan	54	16	17	Jiangxi	117	16	20
Hunan	55	16	20	Jiangxi	118	18	21
Hunan	56	16	20	Jiangxi	119	18	20
Hunan	57	16	19	Jiangxi	120	16	20
Hunan	58	16	19	Jiangxi	121	16	21
Hunan	59	16	19	Jiangxi	122	18	20
Hunan	60	16	19	Jiangxi	123	18	20
Hunan	61	16	21	Jiangxi	124	16	20
Chongqing	62	16	18	Jiangxi	125	18	21
Yunnan	63	20	17				

Table S2. Developmental parameters for fall armyworm [1]

	Constants	Description	Value	Units
Kinetic	ε_c	Relative concentration of development factors (gene activators and/or biochemical catalysts and regulators)	mean = 1.0 and standard deviation ρ	-
	R	The universal gas constant	1.987	cal/(K·mol)

	$H_A^{\neq}$	Enthalpy of activation of the developmental process	11,822.57	cal/mole
	ΔS_L	Change in entropy of low temperature inactivation	-19.59	cal/mole - °K
	ΔH_L	Change in enthalpy of low temperature inactivation	-6603.414	cal/mole
	ΔS_H	Change in entropy of high temperature inactivation	295.08	cal/mole - °K
	ΔH_H	Change in enthalpy of high temperature inactivation	90,678.50	cal/mole
Life stage (egg-to-adult)	ϕ	The life stage constant	12.254	Time^{-1}
	ρ	The standard deviation of ε_c	0.0507	-

Table S3. Probability density of FAW landing points by province for February-August 2020

Province	February	March	April	May	June	July	August
Guangxi	59.63%	38.34%	30.90%	30.34%	5.03%	2.56%	0.96%
Yunnan	19.72%	46.79%	42.44%	5.26%	0.98%	0.25%	0.48%
Guangdong	12.39%	8.92%	9.82%	18.42%	3.26%	0.36%	0.12%
Hainan	3.90%	4.30%	3.37%	1.36%	0.00%	0.00%	0.00%
Fujian	2.29%	0.31%	0.43%	6.17%	4.91%	3.61%	0.91%
Jiangxi	1.61%	0.63%	1.59%	11.97%	21.87%	6.24%	1.82%
Hunan	0.23%	0.00%	5.05%	13.78%	18.52%	13.45%	1.15%
Zhejiang	0.23%	0.00%	0.00%	1.67%	18.43%	21.22%	6.02%
Guizhou	0.00%	0.55%	6.16%	7.03%	5.39%	2.84%	0.90%
Taiwan	0.00%	0.16%	0.05%	0.71%	0.00%	0.00%	0.00%
Chongqing	0.00%	0.00%	0.19%	0.92%	1.42%	5.33%	1.58%
Hubei	0.00%	0.00%	0.00%	1.67%	13.46%	10.64%	3.41%
Anhui	0.00%	0.00%	0.00%	0.59%	4.39%	14.72%	29.77%
Sichuan	0.00%	0.00%	0.00%	0.07%	0.79%	5.71%	5.71%
Henan	0.00%	0.00%	0.00%	0.04%	0.45%	1.98%	8.60%
Jiangsu	0.00%	0.00%	0.00%	0.00%	0.67%	7.84%	26.56%
Shanghai	0.00%	0.00%	0.00%	0.00%	0.26%	1.65%	1.25%
Shaanxi	0.00%	0.00%	0.00%	0.00%	0.15%	1.14%	1.66%
Shandong	0.00%	0.00%	0.00%	0.00%	0.01%	0.18%	7.69%
Gansu	0.00%	0.00%	0.00%	0.00%	0.01%	0.00%	0.00%
Shanxi	0.00%	0.00%	0.00%	0.00%	0.00%	0.25%	0.21%
Hebei	0.00%	0.00%	0.00%	0.00%	0.00%	0.03%	0.54%
Liaoning	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.60%
Tianjin	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.04%

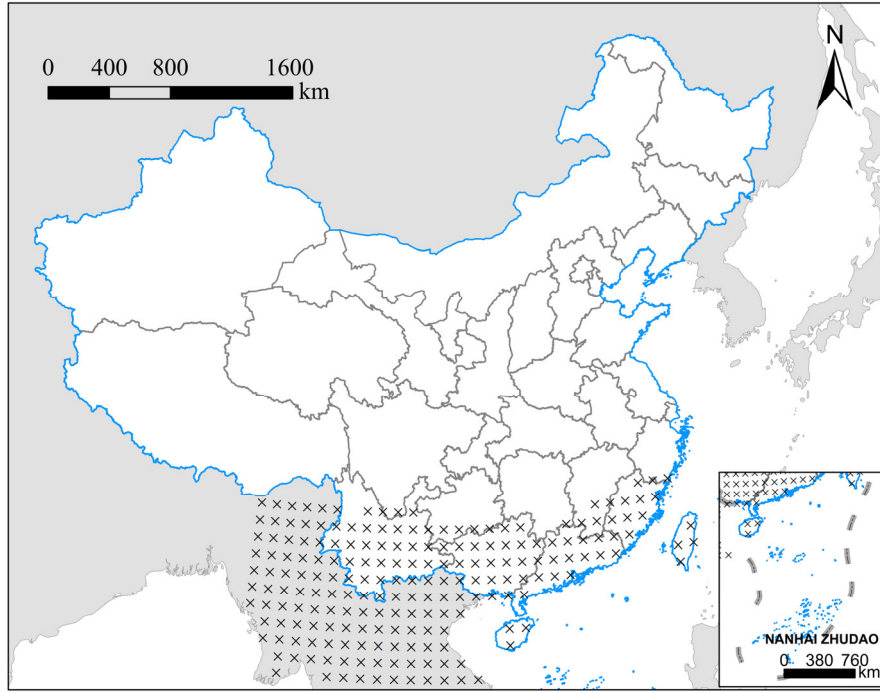| Beijing | 0.00% | 0.00% | 0.00% | 0.00% | 0.00% | 0.00% | 0.02% |

Figure S1. The starting points of the fall armyworm's migration every night in February 2020. The points are evenly distributed in the annual breeding area in a 1°×1° grid.
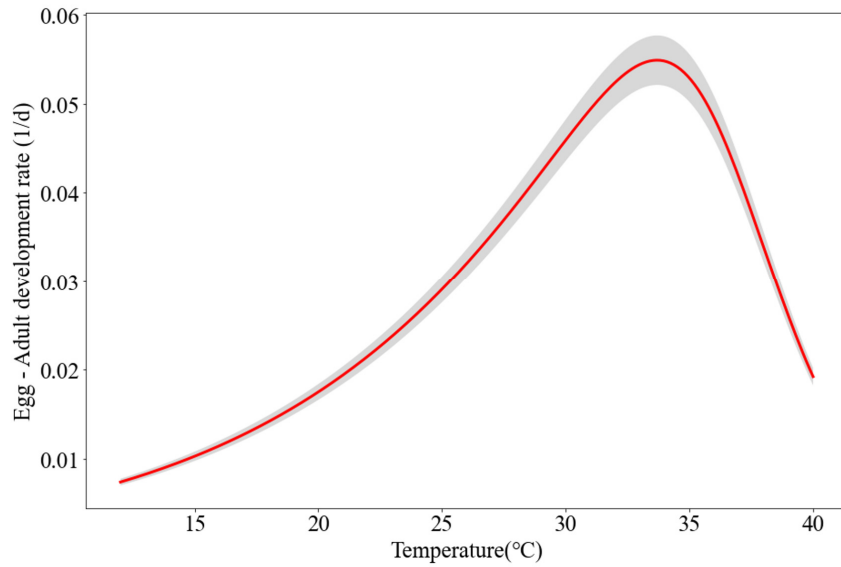

Figure S2. Simulation results of the temperature-dependent model of fall armyworm [1,2]. The growth rate of fall armyworm changes with temperature. The shaded area is given as the mean value ±1 std.
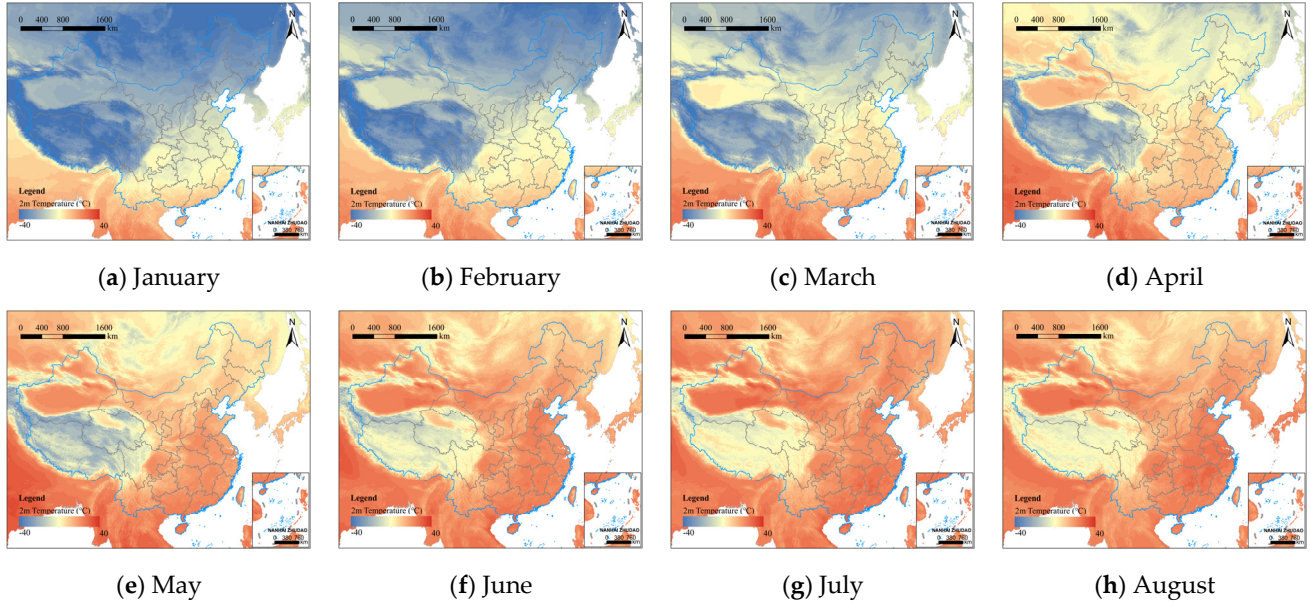
(**a**) January   (**b**) February   (**c**) March   (**d**) April

(**e**) May   (**f**) June   (**g**) July   (**h**) August

Figure S3. Monthly average 2m temperature from January to August 2020; (a)–(h) represent different months.

(**a**) January   (**b**) February   (**c**) March   (**d**) April

(**e**) May   (**f**) June   (**g**) July   (**h**) August

Figure S4. Monthly total precipitation from January to August 2020; (a)–(h) represent different months.
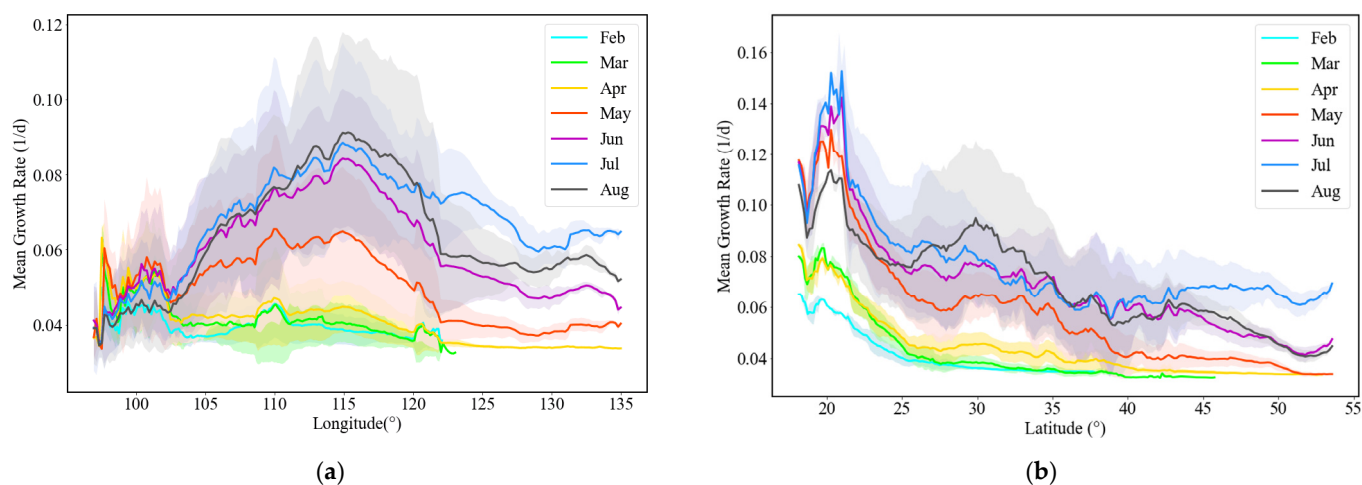
Figure S5. The monthly mean daily growth rate (environmental suitability) of FAW by (a) longitude, (b) latitude from January to August 2020; The shaded area is given as the mean value ±1 std.

References

1. Barfield, C.S.; Mitchell, E.R.; Poeb, S.L.; A Temperature-Dependent Model for Fall Armyworm Development. *Ann. Entomol. Soc. Am.* **1978**, *71*, 70–74. https://doi.org/10.1093/aesa/71.1.70.
2. Maino, J.L.; Schouten, R.; Overton, K.; Day, R.; Ekesi, S.; Bett, B.; Barton, M.; Gregg, P.C.; Umina, P.A.; Reynolds, O.L. Regional and Seasonal Activity Predictions for Fall Armyworm in Australia. *Curr. Res. Insect Sci.* **2021**, *1*, 100010. https://doi.org/10.1016/j.cris.2021.100010.