

Table S1. List of main data used in this study.

Data type	Specific data	Data source	Data usage
Meteorological data (2018)	Temperature, precipitation, air pressure, relative humidity, wind speed and sunshine duration	National Meteorological Science Data Center ( <a href="http://www.nmic.cn/">http://www.nmic.cn/</a> )	Calculation for photosynthesis-, light temperature-, climate potential productivity
	Solar radiation data	Geographic Remote Sensing Ecological Network Platform( <a href="http://www.gisrs.cn/">http://www.gisrs.cn/</a> )	
Soil Type	Soil texture, pH, organic carbon, total exchangeable bases(TEB), carbon exchange capacity (CEC), base saturation(BS)	Resource Environmental Science and Data Center, Chinese Academy of Sciences ( <a href="http://www.resdc.cn/Default.asp">http://www.resdc.cn/Default.asp</a> )	Calculation for land potential productivity
Basic geographic information data in 2018	Land use data	Resource Environmental Science and Data Center, Chinese Academy of Sciences ( <a href="http://www.resdc.cn/Default.asp">http://www.resdc.cn/Default.asp</a> )	Types and distribution of farmland
	Administrative division data for counties and townships		Visualization of farmer's behavior correction coefficient
Statistics data (2018)	Actual grain yield	Yuanjiang Statistics Bureau	Reliability verification of model estimated results
	Population		
	Crop sown area		
Farms' behavior (2018)	Characteristics of farmer and family	Questionnaire	Farmers' behavior correction coefficient
	Production substances input		
	Agricultural technical trainings		
	Farmers' willingness to plant grain crops		

**Table S2.** Comparison of the actual correction coefficient of sample point and the coefficient obtained by interpolation method

Sample Number	Corresponding Village	Fertilization Correction Coefficient		Comprehensive Factor Correction Coefficient	
		Interpolation	Actual	Interpolation	Actual
1	Huaguoshan	0.99	0.96	0.72	0.70
2	Xinwan	0.88	0.90	0.67	0.69
3	Yuzhu	1.00	1.06	0.73	0.77
4	Zhufeng	0.70	0.75	0.51	0.63
5	Donghe	0.78	0.83	0.56	0.50
6	Beixiang	0.98	0.95	0.71	0.75
7	Huangmaozhou	0.81	0.79	0.59	0.66
8	Baxingcha	0.93	0.90	0.67	0.69
9	Huying	0.95	0.96	0.69	0.70
10	Zimucheng	0.86	0.88	0.63	0.61
11	Lishan	1.11	1.04	0.73	0.69
12	Mupinghubei	1.14	1.02	0.74	0.71
13	Fuan	1.00	0.91	0.67	0.68
14	Niuzhou	0.97	0.89	0.69	0.70
15	Fumin	0.89	0.80	0.66	0.65
16	Shengtian	0.99	1.05	0.65	0.64
17	Shangmatou	1.01	0.96	0.64	0.61
18	Yuejin	0.84	0.79	0.72	0.77
19	Xingfu	1.00	0.88	0.73	0.72
20	Dadongkou	0.87	0.91	0.63	0.60
21	Yuque	1.08	1.04	0.72	0.67
Correlation Coefficient		0.85		0.75	