

Table S1. The indicators and weights of the benefit assessment for different cropping systems

Destination layer	Criterion layer (weight)	Solution layer (weight)
Comprehensive benefit	Economic benefit (0.7334)	Profit (0.4506)
		Profit margin (0.1968)
		Revenue (0.0860)
	Social benefit (0.1991)	Yield (0.1770)
		HI (0.0221)
	Ecological benefit (0.0675)	ACP (0.0470)
		AHM (0.0155)
		Weight of dry straw (0.0051)

Note: Profit, profit margin, and revenue in the context of economic benefit refers to the degree of quality, profitability, and total economic output of production, respectively. In the context of societal benefit, yield reflects the level of food and social security, and harvest index (HI) reflects the resource use efficiency. In the context of ecological benefit, ACP (the weighted average of dimensionless values of pH, SOM, N, P, K) and AHM (the weighted average of dimensionless values of Pb, Hg, Cr, Cd, Cu, and Zn) represent soil fertility and health which are important for rice production. Rice straw biomass, acting as a carbon sink during the growing season to improve soil fertility after being incorporated into the field, is not only a biological factor but also an ecological factor of rice population. The indicators and weight were determined according to their importance degree on the basis of the experiment and expert consultation results by an Analytic Hierarchy Process.