Table S1 The C, N, and P proportions of WS, RS, and AS

Organic materials	TC (%)	TN (%)	TP (%)	C/N
WS	39.6	0.83	0.076	47.87
RS	40.0	0.93	0.078	43.07
AS	41.1	1.66	0.066	24.83

Notes: TC: Total carbon, TN: Total nitrogen, TP: Total phosphorus, C/N: TC/TN

Table S2 Application of chemical fertilizer and organic materials (WS, RS, AS) in a column experiment

Treatments	N-fertilizer [a](g/column)	P-fertilizer [b](g/ column)	organic materials (g/ column)
CK	0	0	0
CF	0.15	0.59	0
RF	0.12	0.47	0
RFWS	0.12	0.47	3.93
RFRS	0.12	0.47	2.36
RFAS	0.12	0.47	2.36

Notes： Fertilizers and organic materials powders were mixed with soil (0-10 cm) before leaching experiment. a: Nitrogen (N); b: P_2O_5; CK: control; CF: conventional fertilization; RF: 20% fertilizer reduction; RFWS: RF plus wheat straw amendment; RFRS: RF plus rapeseed shell amendment; RFAS: RF plus astragalus smicus amendment.

Table S3 Statistics of bacterial community diversity among different treatments

Treatments	Chao	ACE	Simpanon	Shanon
CK	2940.8b	2941.8c	0.9970a	9.7027c
CF	3174.3ab	3165.8bc	0.9970a	9.8073bc
RF	3290.9a	3297.6ab	0.9977a	9.9303ab
RFWS	3398.3a	3413.3a	0.9980a	10.0427a
RFRS	3036.4b	3051.4c	0.9973a	9.7657bc
RFAS	3153.3ab	3153.8bc	0.9980a	10.0103a
	F=4.875, P=0.011	F=5.245, P=0.009	F=2.280, P=0.112	F=5.983, P=0.005

Notes: CK: control; CF: conventional fertilization; RF: 20% fertilizer reduction; RFWS: RF plus wheat straw amendment; RFRS: RF plus rapeseed shell amendment; RFAS: RF plus astragalus smicus amendment.

Table S4 Soil (0-10 cm) environmental factors used to relate to the top ten bacterial communities

Treatments	TN ($g\ kg^{-1}$)	TP ($g\ kg^{-1}$)	SOM ($g\ kg^{-1}$)	NO_3^--N ($g\ kg^{-1}$)	NH_4^+-N ($g\ kg^{-1}$)	AP ($mg\ kg^{-1}$)	MBC ($mg\ kg^{-1}$)	MBN ($mg\ kg^{-1}$)	DOC ($g\ kg^{-1}$)	FI	HIX	BIX	β:α
CK	1.49±0.01d	0.48±0.01d	18.92±0.14ab	15.22±0.22c	1.99±0.04d	9.20±0.85e	646.58±15.26ab	17.82±0.56d	0.05959±0.003bc	1.46±0.01b	0.65±0.66c	0.73±0.28b	0.71±0.35c
CF	1.41±0.01e	0.52±0.01c	11.40±0.42c	53.62±0.62a	3.97±0.52b	10.90±0.54d	634.58±28.26ab	16.99±1.55d	0.06795±0.009a	1.85±0.06a	4.12±0.21ab	0.76±0.04b	0.73±0.04c
RF	1.19±0.01f	0.52±0.00c	17.67±0.42b	47.02±1.21b	4.73±0.33a	11.20±0.17cd	658.82±35.38a	33.78±3.43b	0.05778±0.004c	1.92±0.14a	4.15±1.11ab	0.83±0.09ab	0.79±0.07bc
RFWS	1.90±0.02a	0.58±0.01ab	20.62±1.41a	44.40±0.98b	2.95±0.13c	14.0±0.21a	559.56±42.39b	24.51±0.09c	0.0589±0.006bc	1.98±0.11a	3.15±0.21b	0.88±0.04a	0.83±0.03ab
RFRS	1.56±0.01c	0.56±0.01b	18.79±0.11ab	49.02±0.46ab	2.09±0.04cd	12.60±0.28b	595.38±28.30b	16.58±0.02d	0.05876±0.006bc	1.99±0.07a	3.83±1.59ab	0.91±0.09a	0.86±0.07a
RFAS	1.66±0.00b	0.60±0.01a	19.10±1.21ab	50.15±0.39ab	4.74±0.31a	12.20±0.64bc	647.56±56.68ab	41.74±0.16a	0.06687±0.005ab	2.04±0.25a	5.34±1.52a	0.81±0.09ab	0.77±0.07bc

TN: Total nitrogen; TP: Total phosphorus; SOM: Soil organic matter; AP: Available phosphorus; MBC: Microbial biomass carbon; MBN: Microbial biomass nitrogen; DOC: Dissolved organic carbon; NO_3^-N: Nitrate nitrogen NH_4^+-N: Ammonium nitrogen; FI: Fluorescence intensity; HIX: Humification index; α: β (ratio of old and new carbon; BIX: Biological index.