

Table S1 Soil properties under different years of continuous cropped alfalfa

Sample	pH ^a (1 : 2.5)	H ₂ O% (%)	TC (g/kg)	TN (g/kg)	C:N	TP (g/kg)	TK (g/kg)	NH ₄ ⁺ -N (mg/kg)	NO ₃ ⁻ -N (mg/kg)	AN (mg/kg)	AP (mg/kg)	AK (mg/kg)
ACC1y ^b	8.34±0.03c	15.41±1.62ab	22.52±0.38a	1.20±0.04b	18.72±0.43b	0.58±0.03b	20.02±0.22bc	57.91±3.21a	5.67±0.46a	174.16±1.75a	8.60±0.42c	128.34±5.25bc
ACC2y	8.43±0.16bc	14.41±0.21b	19.66±0.08bc	1.18±0.02b	16.6±0.27c	0.71±0.04a	20.16±0.46bc	60.17±6.28a	4.17±0.11bc	111.72±4.20d	9.35±0.15c	133.06±5.40b
ACC6y	8.40±0.05c	14.10±0.85bc	18.73±0.62cd	1.19±0.05b	15.7±0.67cd	0.72±0.02a	21.19±0.76a	56.47±0.96a	3.92±0.12c	145.73±9.84bc	18.05±2.17a	122.36±2.68c
ACC9y	8.60±0.03a	12.73±0.29c	17.39±0.79d	0.83±0.03c	20.91±1.27a	0.69±0.05a	21.46±0.34a	57.51±1.05a	3.93±0.17c	109.23±8.44d	16.16±0.75b	103.93±1.63d
ACC12y	8.54±0.02ab	14.76±0.77ab	24.01±1.49a	1.44±0.14a	16.75±1.29c	0.51±0.04c	19.53±0.59c	56.27±4.16a	4.18±0.14bc	156.24±4.68b	5.79±0.50d	128.58±6.03bc
ACC13y	8.55±0.08ab	14.81±0.48ab	19.08±1.26cd	1.34±0.16ab	14.26±0.86de	0.46±0.01c	20.89±0.02ab	55.91±1.29a	5.45±1.77ab	143.92±4.63c	2.92±0.34e	128.05±0.79bc
ACC35y	8.47±0.01abc	16.26±0.55a	20.88±1.01b	1.54±0.18a	13.66±1.01e	0.40±0.02d	20.78±0.65ab	57.13±2.36a	6.03±0.81a	148.96±2.11bc	3.11±0.67e	159.13±8.35a
ANOVA <i>p</i> -values	0.006	0.004	<0.0001	<0.0001	<0.0001	<0.0001	0.003	0.750	0.012	<0.0001	<0.0001	<0.0001

^a TC, TN, TP and TK indicate soil total carbon, nitrogen, phosphorus and potassium, respectively; AN, AP and AK indicate soil available nitrogen, phosphorus and potassium, respectively; NH₄⁺-N, ammonium nitrogen, NO₃⁻-N, nitrate nitrogen. Values in bold indicate significant correlation (*P* < 0.05).

^b ACC represent the treatment of alfalfa continuous cropping, the number after ACC represent for 1, 2, 6, 9, 12, 13 and 35 continuous cropping years, respectively.

Table S2 Illumina MiSeq sequencing bacterial community diversity indices at 97% sequence similarity

Sample ^a	OTUs	Chao richness	Shannon's diversity	Simpson's diversity	Phylogenetic diversity	Coverage (%)
ACC1y	2134.3±33.8a ^b	2941.0±66.2a	6.40±0.05a	0.004±0.00a	174.43±2.14a	95.93
ACC2y	2073.7±8.5ab	2939.7±66.3ab	6.33±0.01ab	0.005±0.00a	170.76±1.77ab	95.94
ACC6y	2034.0±25.5ab	2919.3±54.4b	6.29±0.01b	0.005±0.00a	167.90±4.96ab	95.92
ACC9y	2011.7±22.8b	2906.0±106.0b	6.27±0.02b	0.005±0.00a	164.58±0.72bc	95.96
ACC12y	1994.3±58.3b	2834.0± 67.0b	6.26±0.03b	0.005±0.00a	161.43±4.50bc	96.02
ACC13y	2000.3±57.5b	2902.7±106.0b	6.29±0.04b	0.004±0.00a	164.53±2.73cd	95.90
ACC35y	1987.0±126.7b	2819.3±231.4b	6.27±0.10b	0.005±0.01a	159.89±6.26d	96.05

^a ACC represent the treatment of alfalfa continuous cropping, the number after ACC represent for 1, 2, 6, 9, 12, 13 and 35 continuous cropping years, respectively.

^b Different letters under the same column indicates significant difference between treatments determined by one-way ANOVA ($P < 0.05$).

Table S3 Spearman's correlation coefficient between soil bacterial phylotype richness and phylogenetic diversity and soil variables

Variable ^a	OTU richness		PD diversity	
	<i>r</i>	<i>P</i>	<i>r</i>	<i>P</i>
pH	-0.556	0.009	-0.492	0.023
TP	0.131	0.570	0.519	0.016
AP	-0.053	0.820	0.350	0.119
AN	0.262	0.252	0.038	0.870
AK	0.129	0.578	-0.280	0.219
TC	0.253	0.269	0.021	0.927
TN	0.138	0.551	-0.277	0.224
C:N	0.071	0.759	0.208	0.366
TK	-0.170	0.462	-0.134	0.563
H ₂ O%	0.199	0.387	-0.066	0.777
NH ₄ ⁺ -N	0.198	0.387	0.205	0.373
NO ₃ ⁻ -N	0.374	0.095	0.024	0.916

^a TC, TN, TP and TK indicate soil total carbon, nitrogen, phosphorus and potassium, respectively; AN, AP and AK indicate soil available nitrogen, phosphorus and potassium, respectively; NH₄⁺-N, ammonium nitrogen, NO₃⁻-N, nitrate nitrogen.

Table S4 Relative abundance (%) of bacteria at phylum and genus level classified by ribosomal database project (RDP-II) taxonomy

Taxa	ACC1y ^a	ACC2y	ACC6y	ACC9y	ACC12y	ACC13y	ACC35y
Phylum							
<i>Acidobacteria</i>	15.32±0.48b	15.88±0.37ab	16.57±0.74a	16.66±0.15a	16.04±0.32ab	17.04±0.37a	16.09±1.18ab
<i>Actinobacteria</i>	28.18±1.85abc	27.16±0.76c	27.66±0.64bc	26.47±0.89c	30.02±0.1a	28.08±0.84abc	29.54±1.5ab
<i>Alphaproteobacteria</i>	11.76±0.3a	12.00±0.52a	12.17±0.27a	12.47±0.49a	12.16±0.35a	12.63±0.77a	12.34±0.61a
<i>Armatimonadetes</i>	0.93±0.09ab	0.98±0.10a	0.73±0.06c	0.81±0.09bc	0.71±0.05c	0.68±0.08cd	0.57±0.03d
<i>Bacteroidetes</i>	2.34±0.15a	2.17±0.14ab	2.09±0.45abc	1.72±0.17bc	1.62±0.13c	1.62±0.26c	1.79±0.42bc
<i>Betaproteobacteria</i>	5.03±0.58a	4.57±0.06ab	4.95±0.56ab	4.90±0.30ab	4.33±0.27b	4.31±0.15b	4.39±0.23ab
<i>Chlorobi</i>	0.10±0.01b	0.08±0.01b	0.08±0.01b	0.10±0.04b	0.10±0.02b	0.14±0.02a	0.09±0.02b
<i>Chloroflexi</i>	10.54±0.33b	11.55±0.12a	11.2±0.29a	10.52±0.26b	9.85±0.19c	10.05±0.22c	9.98±0.09c
<i>Cyanobacteria</i>	0.21±0.06a	0.19±0.05ab	0.13±0.09ab	0.09±0.04ab	0.10±0.05ab	0.07±0.03b	0.14±0.11ab
<i>Deltaproteobacteria</i>	4.77±0.45ab	4.64±0.16ab	4.39±0.03b	4.40±0.23b	4.83±0.18a	4.85±0.20a	4.73±0.05ab
<i>Firmicutes</i>	1.44±0.12cd	1.96±0.20ab	1.78±0.21bc	2.27±0.34a	1.80±0.13bc	1.39±0.25cd	1.07±0.42d
<i>Gammaproteobacteria</i>	3.67±0.42b	3.35±0.15b	3.55±0.16b	3.55±0.19b	3.52±0.59b	3.85±0.39ab	4.10±0.82a
<i>Gemmatimonadetes</i>	5.45±0.31b	5.46±0.05b	5.31±0.02b	5.90±0.23a	5.28±0.19b	5.27±0.16b	4.69±0.24c
<i>Latescibacteria</i>	0.33±0.02a	0.23±0.06b	0.27±0.05ab	0.27±0.06ab	0.19±0.03b	0.27±0.03ab	0.26±0.08ab
<i>Nitrospirae</i>	2.07±0.18b	2.04±0.06b	2.38±0.12a	2.54±0.19a	2.32±0.06ab	2.31±0.12ab	2.28±0.23ab
<i>Planctomycetes</i>	4.95±0.60a	4.43±0.32a	4.20±0.06a	4.21±0.08a	4.37±0.25a	4.54±0.29a	4.76±0.79a
<i>Verrucomicrobia</i>	0.16±0.02a	0.16±0.01a	0.15±0.03a	0.12±0.02a	0.10±0.04a	0.14±0.03a	0.15±0.07a
Genus							
<i>0319-6M6_norank</i>	0.53±0.11ab	0.43±0.06b	0.51±0.04ab	0.51±0.06ab	0.53±0.01ab	0.56±0.08ab	0.59±0.10a
<i>288-2_norank</i>	1.47±0.21ab	1.28±0.02b	1.11±0.12b	1.17±0.17b	1.72±0.23a	1.36±0.18b	1.78±0.26a
<i>480-2_norank</i>	0.35±0.01bc	0.34±0.03bc	0.40±0.02bc	0.31±0.04c	0.45±0.03b	0.38±0.05bc	0.61±0.15a
<i>ABS-19_norank</i>	0.36±0.01a	0.33±0.02a	0.41±0.13a	0.41±0.06a	0.36±0.05a	0.45±0.11a	0.37±0.03a
<i>Acidibacter</i>	0.63±0.11a	0.70±0.08a	0.73±0.08a	0.65±0.09a	0.54±0.12a	0.76±0.18a	0.75±0.19a
<i>Acidimicrobiales_uncultured</i>	1.06±0.08abc	0.92±0.09bc	0.90±0.10c	0.90±0.06c	1.08±0.07ab	0.99±0.03abc	1.15±0.15a
<i>Actinobacteria_unclassified</i>	1.38±0.16ab	1.09±0.04b	1.02±0.11b	0.89±0.07b	1.38±0.04a	1.38±0.17a	1.52±0.25a
<i>Anaerolineaceae_uncultured</i>	1.64±0.22a	0.89±0.03cd	1.17±0.08b	0.71±0.04de	0.60±0.07e	0.73±0.00de	1.11±0.28bc
<i>Armatimonadetes_norank</i>	0.75±0.08a	0.78±0.10a	0.61±0.05b	0.67±0.07abc	0.56±0.03bcd	0.54±0.09cd	0.44±0.02d
<i>Arthrobacter</i>	2.78±0.51a	2.30±0.15a	2.60±0.26a	2.55±0.12a	1.36±0.20b	1.28±0.18b	0.97±0.22b
<i>Asanoa</i>	0.65±0.07bc	0.71±0.09abc	0.70±0.12abc	0.59±0.05c	0.79±0.02ab	0.84±0.08a	0.87±0.14a
<i>Bacillus</i>	0.53±0.05ab	0.65±0.09a	0.55±0.06ab	0.61±0.05ab	0.58±0.02ab	0.50±0.10ab	0.44±0.18b
<i>Blastocatella</i>	0.28±0.02d	0.43±0.06ab	0.39±0.12abc	0.47±0.03a	0.32±0.05bcd	0.41±0.07abc	0.30±0.02cd
<i>Blastococcus</i>	1.84±0.09a	1.60±0.18abc	1.72±0.24ab	1.37±0.19bc	1.31±0.11c	1.39±0.16bc	1.38±0.36bc
<i>Bradyrhizobium</i>	0.45±0.05bc	0.38±0.02c	0.51±0.02b	0.57±0.08b	0.62±0.05a	0.61±0.10a	0.61±0.06a
<i>Bryobacter</i>	0.54±0.06bc	0.72±0.11a	0.63±0.04ab	0.64±0.07ab	0.51±0.09bc	0.52±0.06bc	0.43±0.07c
<i>Burkholderiaceae_uncultured</i>	0.26±0.04ab	0.3±0.04ab	0.26±0.06ab	0.33±0.06a	0.22±0.02b	0.23±0.05b	0.23±0.04b
<i>CO119_norank</i>	0.30±0.02c	0.65±0.03a	0.43±0.04b	0.39±0.07b	0.33±0.08bc	0.34±0.04bc	0.18±0.04d
<i>Candidatus Alysiosphaera</i>	0.41±0.01a	0.37±0.06a	0.32±0.05a	0.36±0.05a	0.31±0.07a	0.38±0.12a	0.37±0.04a
<i>Candidatus Entotheonella</i>	0.40±0.04b	0.44±0.07ab	0.43±0.04ab	0.44±0.02ab	0.46±0.01ab	0.50±0.05a	0.52±0.07a
<i>Candidatus Nitrososphaera</i>	0.33±0.06a	0.41±0.12a	0.33±0.10a	0.44±0.07a	0.36±0.08a	0.44±0.11a	0.36±0.10a

<i>Comamonadaceae_unclassified</i>	0.51±0.13a	0.51±0.03a	0.58±0.20a	0.46±0.11a	0.40±0.05a	0.43±0.09a	0.41±0.11a
<i>Gaiella</i>	1.78±0.17b	1.77±0.20b	1.58±0.10b	2.03±0.33ab	2.36±0.26a	1.95±0.26ab	2.29±0.38a
<i>Gaiellales_uncultured</i>	3.74±0.39b	3.85±0.09b	3.86±0.44b	3.35±0.47b	5.26±0.33a	4.45±0.55ab	5.00±1.23a
<i>Gemmatimonadaceae_uncultured</i>	3.77±0.28bc	3.78±0.06bc	3.92±0.17b	4.59±0.15a	3.90±0.19bc	3.81±0.01bc	3.47±0.44c
<i>Gemmatimonas</i>	0.60±0.12a	0.57±0.03a	0.54±0.04a	0.49±0.10ab	0.47±0.05ab	0.49±0.06ab	0.37±0.13b
<i>Gitt-GS-136_norank</i>	0.34±0.01b	0.46±0.10ab	0.54±0.09a	0.49±0.1ab	0.58±0.06a	0.52±0.07ab	0.54±0.18a
<i>GR-WP33-30_norank</i>	1.26±0.17a	1.30±0.03a	1.27±0.07a	1.29±0.10a	1.41±0.12a	1.23±0.05a	1.28±0.20a
<i>Haliangium</i>	0.56±0.09ab	0.47±0.02b	0.52±0.04ab	0.46±0.04b	0.63±0.07a	0.67±0.07a	0.60±0.15ab
<i>JG30-KF-CM45_norank</i>	2.46±0.10cd	3.43±0.10a	2.96±0.14b	2.99±0.23b	2.32±0.08d	2.60±0.12c	2.25±0.13d
<i>JG34-KF-361_norank</i>	0.33±0.02c	0.51±0.01a	0.45±0.08ab	0.40±0.09bc	0.45±0.05ab	0.36±0.02bc	0.38±0.02bc
<i>KD4-96_norank</i>	1.35±0.14b	1.43±0.13ab	1.63±0.09a	1.57±0.01ab	1.60±0.03ab	1.50±0.08ab	1.56±0.28ab
<i>Mesorhizobium</i>	0.09±0.01b	0.09±0.01b	0.16±0.05a	0.12±0.03b	0.14±0.05ab	0.14±0.03ab	0.16±0.03a
<i>Microclunatus</i>	1.06±0.05d	1.62±0.08a	1.50±0.16ab	1.32±0.11bc	1.19±0.03cd	1.47±0.19ab	1.05±0.18d
<i>Microbacterium</i>	0.08±0.00ab	0.09±0.01a	0.09±0.01a	0.07±0.03ab	0.04±0.00b	0.05±0.03b	0.04±0.01b
<i>Micromonosporaceae_unclassified</i>	0.42±0.04a	0.36±0.01a	0.40±0.08a	0.36±0.02a	0.45±0.05a	0.41±0.05a	0.43±0.03a
<i>Microvirga</i>	1.45±0.19a	1.69±0.20a	1.47±0.29a	1.50±0.02a	1.37±0.29a	1.46±0.06a	1.39±0.11a
<i>MSB-1E8_norank</i>	0.63±0.10a	0.73±0.05a	0.42±0.06bc	0.34±0.11c	0.59±0.06ab	0.45±0.09bc	0.58±0.14ab
<i>Nitrosomonadaceae_uncultured</i>	1.82±0.01ab	1.57±0.12bc	1.66±0.25abc	1.89±0.20a	1.55±0.06bc	1.53±0.11c	1.63±0.09abc
<i>Nitrospinaceae_uncultured</i>	0.35±0.07a	0.38±0.04a	0.32±0.03a	0.36±0.02a	0.44±0.07a	0.43±0.11a	0.46±0.16a
<i>Nitrospira</i>	2.07±0.18b	2.04±0.06b	2.38±0.12a	2.54±0.19a	2.32±0.06ab	2.31±0.12ab	2.28±0.23ab
<i>Nocardioides</i>	1.08±0.07bc	1.20±0.05ab	1.39±0.09a	1.23±0.13ab	0.87±0.06c	1.11±0.18bc	0.91±0.25c
<i>Nordella</i>	0.44±0.05bc	0.43±0.05bc	0.36±0.03c	0.57±0.04a	0.44±0.08bc	0.48±0.05ab	0.47±0.06ab
<i>P2-11E_norank</i>	0.49±0.03bc	0.44±0.10c	0.60±0.11bc	0.58±0.12bc	0.89±0.05a	0.76±0.21ab	0.74±0.24ab
<i>Pir4 lineage</i>	0.59±0.08ab	0.52±0.1ab	0.51±0.06ab	0.46±0.04b	0.53±0.07ab	0.49±0.07ab	0.61±0.03a
<i>Pirellula</i>	0.52±0.06a	0.45±0.05ab	0.48±0.01ab	0.47±0.05ab	0.44±0.05ab	0.40±0.06b	0.45±0.1ab
<i>Planctomycetaceae_uncultured</i>	1.07±0.15ab	0.92±0.1ab	0.87±0.1b	1.05±0.02ab	1.03±0.06ab	1.09±0.16ab	1.13±0.23a
<i>Pseudomonas</i>	0.03±0.01a	0.02±0.00a	0.02±0.01a	0.02±0.02a	0.02±0.01a	0.01±0.00a	0.02±0.01a
<i>Pseudonocardia</i>	0.74±0.06a	0.73±0.01a	0.72±0.14a	0.72±0.08a	0.79±0.08a	0.92±0.12a	0.91±0.29a
<i>RB41_norank</i>	2.21±0.19d	2.24±0.09d	2.26±0.16d	2.43±0.21cd	2.8±0.15ab	3.06±0.22a	2.71±0.18bc
<i>Rhizobium</i>	0.09±0.03a	0.10±0.00a	0.14±0.04a	0.16±0.03a	0.17±0.06a	0.13±0.02a	0.12±0.05a
<i>Rhizobiales_unclassified</i>	0.90±0.09a	0.93±0.12a	0.95±0.23a	0.93±0.16a	0.90±0.11a	1.02±0.27a	0.95±0.11a
<i>Rhodospirillales_Unclassified</i>	0.60±0.11ab	0.70±0.08a	0.54±0.06bc	0.69±0.15a	0.51±0.04bc	0.52±0.04bc	0.39±0.03c
<i>Roseiflexus</i>	0.80±0.09a	0.75±0.04ab	0.84±0.09a	0.76±0.07ab	0.64±0.02b	0.79±0.06a	0.76±0.06a
<i>Rubrobacter</i>	0.34±0.07a	0.49±0.11a	0.39±0.24a	0.28±0.02a	0.49±0.07a	0.51±0.33a	0.51±0.30a
<i>S0134 terrestrial group_norank</i>	0.51±0.11a	0.44±0.02ab	0.40±0.03ab	0.34±0.01b	0.42±0.03ab	0.41±0.02ab	0.38±0.1b
<i>SC-I-84_norank</i>	0.43±0.1a	0.40±0.03a	0.43±0.02a	0.47±0.02a	0.43±0.05a	0.40±0.02a	0.43±0.05a
<i>Skermanella</i>	0.64±0.05a	0.60±0.04a	0.57±0.13a	0.55±0.14a	0.43±0.13a	0.62±0.11a	0.49±0.16a
<i>Solirubrobacter</i>	1.24±0.02ab	1.00±0.05cd	0.91±0.1d	1.10±0.05bc	1.16±0.03bc	1.15±0.17bc	1.39±0.15a
<i>Solirubrobacterales_unclassified</i>	0.40±0.08ab	0.26±0.02cd	0.28±0.02cd	0.19±0.05d	0.47±0.03a	0.31±0.05bc	0.46±0.11a
<i>Sphingomonas</i>	0.06±0.01b	0.01±0.04ab	0.09±0.04b	0.07±0.00b	0.13±0.04ab	0.17±0.05a	0.10±0.05ab
<i>Sporichthyaceae_uncultured</i>	0.44±0.01c	0.62±0.05a	0.50±0.06bc	0.43±0.06c	0.56±0.06ab	0.61±0.01a	0.43±0.02c
<i>Steroidobacter</i>	0.72±0.16bc	0.63±0.05c	0.82±0.13abc	0.94±0.16ab	0.96±0.18ab	1.07±0.14a	0.99±0.18ab
<i>Streptomyces</i>	0.78±0.04abc	0.65±0.03c	0.72±0.13bc	0.84±0.06ab	0.91±0.11a	0.72±0.12bc	0.81±0.13abc
<i>Subgroup 17</i>	0.55±0.03ab	0.39±0.08c	0.45±0.07bc	0.45±0.05bc	0.51±0.02abc	0.50±0.10abc	0.62±0.13a

<i>Subgroup 6</i>	9.24±0.30b	9.58±0.18ab	10.45±0.68a	10.15±0.24ab	9.33±0.35b	9.76±0.28ab	9.69±1.02ab
<i>Subgroup 7</i>	0.91±0.09b	0.90±0.09b	0.80±0.10b	0.83±0.05b	0.96±0.05b	1.23±0.19a	0.80±0.12b
<i>TK10_norank</i>	1.51±0.14ab	1.65±0.08a	1.33±0.14b	1.48±0.13ab	1.39±0.03b	1.45±0.05ab	1.39±0.16b
<i>TRA3-20_norank</i>	0.68±0.13a	0.63±0.07a	0.66±0.07a	0.55±0.05a	0.63±0.11a	0.65±0.04a	0.65±0.06a
<i>Variibacter</i>	0.48±0.10cd	0.44±0.04d	0.56±0.08abc	0.56±0.05abc	0.68±0.1ab	0.70±0.07a	0.61±0.04abc
<i>WD2101 soil group_norank</i>	1.17±0.10a	1.27±0.13a	1.12±0.07a	1.01±0.05a	1.19±0.06a	1.22±0.17a	1.18±0.29a
<i>Xanthobacteraceae_unclassified</i>	0.42±0.11b	0.40±0.06b	0.42±0.05b	0.47±0.04b	0.48±0.11b	0.50±0.04ab	0.65±0.15a
<i>Xanthomonadales_uncultured</i>	0.65±0.05ab	0.64±0.04ab	0.57±0.08ab	0.71±0.03a	0.54±0.15b	0.71±0.04a	0.71±0.10a

^a ACC represent the treatment of alfalfa continuous cropping, the number after ACC represent for 1, 2, 6, 9, 12, 13 and 35 continuous cropping years, respectively

Table S5 Spearman's correlation coefficient of bacterial phylum and genus with soil variables

Taxa	Years	pH	TP	AP	AN	AK	TC	TN	C:N	TK	H ₂ O%	NH ₄ ⁺ -N	NO ₃ ⁻ -N
Phylum													
<i>Acidobacteria</i>	0.143	0.262	-0.033	0.129	-0.293	-0.306	-0.431	-0.083	-0.162	0.341	-0.315	-0.504*	-0.119
<i>Actinobacteria</i>	0.455*	0.106	-0.583**	-0.560**	0.522*	0.430	0.540*	0.565**	-0.373	-0.383	0.556**	0.042	0.262
<i>Alphaproteobacteria</i>	0.275	0.275	-0.184	-0.098	-0.157	-0.044	-0.214	0.121	-0.202	0.135	-0.277	-0.098	-0.036
<i>Armatimonadetes</i>	-0.773**	-0.207	0.626**	0.337	-0.21	-0.379	-0.034	-0.475*	0.515*	-0.150	-0.235	0.412	-0.201
<i>Bacteroidetes</i>	-0.415	-0.578**	0.391	0.249	0.169	0.085	0.097	-0.036	0.072	-0.194	0.126	0.324	0.079
<i>Betaproteobacteria</i>	-0.401	-0.243	0.468*	0.544*	0.033	-0.354	-0.224	-0.478*	0.447*	0.088	-0.008	0.140	-0.264
<i>Chlorobi</i>	0.014	0.148	-0.436*	-0.331	0.204	-0.135	0.019	0.073	-0.020	-0.059	0.022	-0.153	0.132
<i>Chloroflexi</i>	-0.589**	-0.397	0.833**	0.600**	-.461*	-0.231	-0.424	-0.459*	0.183	0.173	-0.410	0.337	-0.407
<i>Cyanobacteria</i>	-0.195	-0.346	0.187	-0.001	0.193	0.203	0.273	0.141	-0.003	-0.379	0.286	0.367	0.261
<i>Deltaproteobacteria</i>	0.166	-0.074	-0.536*	-0.642**	0.363	0.413	0.551**	0.548*	-0.338	-0.336	0.272	-0.338	0.403
<i>Firmicutes</i>	-0.533*	0.198	0.690**	0.630**	-.606**	-0.717**	-0.392	-0.734**	0.635**	0.190	-.649**	0.105	-0.657**
<i>Gammaproteobacteria</i>	0.436*	-0.060	-0.425	-0.259	0.256	0.381	0.150	0.451*	-0.257	-0.045	0.350	-0.370	0.358
<i>Gemmatimonadetes</i>	-0.691**	0.188	0.614**	0.565**	-0.423	-0.794**	-0.343	-0.794**	0.775**	0.199	-.726**	0.054	-0.440*
<i>Latescibacteria</i>	-0.100	-0.189	-0.010	0.129	0.25	-0.066	-0.172	-0.282	0.239	0.304	-0.002	0.097	0.293
<i>Nitrospirae</i>	0.226	0.508*	0.035	0.326	-0.249	-0.371	-0.455*	-0.374	0.190	0.560**	-.471*	-0.217	-0.315
<i>Planctomycetes</i>	0.139	-0.317	-0.367	-0.365	0.362	0.482*	0.414	0.388	-0.175	-0.087	0.354	-0.048	0.615**
<i>Verrucomicrobia</i>	-0.049	-0.288	0.162	0.026	0.07	0.252	-0.109	0.052	-0.174	-0.189	0.241	0.195	0.312
Genus													
<i>0319-6M6_norank</i>	0.458*	0.109	-0.550**	-0.347	0.308	0.184	0.059	0.195	-0.190	0.109	0.521*	-0.214	0.036
<i>288-2_norank</i>	0.553**	0.076	-0.730**	-0.654**	0.406	0.602**	0.521*	0.529*	-0.308	-0.295	0.564**	-0.046	0.311
<i>480-2_norank</i>	0.782**	0.038	-0.585**	-0.439*	0.324	0.787**	0.331	0.721**	-0.626**	-0.111	0.556**	0.043	0.428
<i>ABS-19_norank</i>	0.031	0.247	-0.031	0.036	0.001	-0.254	-0.217	-0.034	-0.055	0.298	-0.219	-0.225	0.196
<i>Acidibacter</i>	0.194	-0.145	-0.037	-0.014	-0.166	0.294	-0.376	0.074	-0.334	0.289	0.143	0.194	0.132
<i>Acidimicrobiales_uncultured</i>	0.504*	-0.209	-0.707**	-0.579**	0.564**	0.539*	0.566**	0.480*	-0.213	-0.422	0.526*	-0.390	0.398
<i>Actinobacteria_unclassified</i>	0.488*	-0.123	-0.807**	-0.788**	0.612**	0.610**	0.524*	0.633**	-0.467*	-0.301	0.702**	-0.201	0.415
<i>Anaerolineaceae_uncultured</i>	-0.147	-0.679**	0.083	0.105	0.536*	0.276	0.207	0.095	-0.003	-0.113	0.341	0.219	0.440*

<i>Armatimonadetes_norank</i>	-0.787**	-0.420	0.638**	0.418	-0.231	-0.500*	-0.053	-0.497*	0.551**	-0.170	-0.288	0.193	-0.339
<i>Arthrobacter</i>	-0.769**	-0.359	0.797**	0.760**	-0.147	-0.588**	-0.235	-0.666**	0.655**	0.149	-0.479*	0.112	-0.321
<i>Asanoa</i>	0.558**	0.261	-0.609**	-0.639**	0.253	0.622**	0.228	0.700**	-0.715**	-0.104	0.413	0.098	0.522*
<i>Bacillus</i>	-0.485*	0.093	0.528*	0.357	-0.373	-0.469*	-0.195	-0.495*	0.426	-0.114	-0.454*	0.098	-0.627**
<i>Blastocatella</i>	-0.248	0.386	0.514*	0.408	-0.714**	-0.503*	-0.599**	-0.479*	0.221	0.511*	-0.656**	0.073	-0.306
<i>Blastococcus</i>	-0.446*	-0.647**	0.344	0.272	0.210	-0.023	0.127	0.019	0.035	-0.086	0.008	-0.044	0.211
<i>Bradyrhizobium</i>	0.588**	0.546*	-0.539*	-0.224	0.191	0.137	0.052	0.206	-0.130	0.124	0.142	-0.196	0.186
<i>Bryobacter</i>	-0.611**	0.069	0.776**	0.580**	-0.546*	-0.484*	-0.352	-0.532*	0.409	0.231	-0.442*	0.308	-0.448*
<i>Burkholderiaceae_uncultured</i>	-0.428*	0.085	0.536*	.526*	-0.461*	-0.328	-0.401	-0.620**	.558**	0.196	-0.419	0.355	-0.228
<i>C0119_norank</i>	-0.654**	-0.086	0.746**	0.383	-0.626**	-0.350	-0.372	-0.435*	0.192	-0.057	-0.494*	0.274	-0.553**
<i>Candidatus Alysiosphaera</i>	-0.052	-0.038	-0.111	-0.205	0.065	0.031	0.100	0.064	0.015	-0.036	0.132	0.001	0.661**
<i>Candidatus Entotheonella</i>	0.619**	0.377	-0.552**	-0.439*	0.002	0.403	-0.030	0.361	-0.442*	0.220	0.203	0.039	0.082
<i>Candidatus Nitrososphaera</i>	0.004	0.163	0.003	-0.086	-0.433*	-0.244	-0.364	-0.242	0.049	-0.022	-0.035	-0.314	-0.152
<i>Comamonadaceae_unclassified</i>	-0.345	-0.256	0.393	0.388	-0.096	-0.188	-0.176	-0.216	0.130	0.194	-0.178	-0.014	-0.048
<i>Gaiella</i>	0.539*	0.382	-0.573**	-0.464*	0.021	0.282	0.222	0.241	-0.114	-0.066	0.183	-0.093	0.041
<i>Gaiellales_uncultured</i>	0.526*	0.131	-0.648**	-0.585**	0.337	0.466*	0.365	0.514*	-0.452*	-0.311	0.414	-0.265	0.041
<i>Gemmatimonadaceae_uncultured</i>	-0.350	0.409	0.468*	0.561**	-0.440*	-0.846**	-0.455*	-0.817**	0.757**	0.253	-0.589**	-0.068	-0.571**
<i>Gemmatimonas</i>	-0.683**	-0.318	0.522*	0.326	0.038	-0.279	0.065	-0.206	0.259	-0.159	-0.439*	0.163	-0.045
<i>Gitt-GS-136_norank</i>	0.345	0.279	-0.158	-0.041	-0.122	0.036	-0.130	0.055	-0.213	0.068	0.004	-0.388	-0.201
<i>GR-WP33-30_norank</i>	-0.007	0.088	-0.008	-0.019	0.022	-0.064	0.156	-0.024	0.122	-0.274	-0.204	0.237	-0.190
<i>Haliangium</i>	0.346	0.068	-0.615**	-0.554**	0.506*	0.407	0.489*	0.733**	-0.558**	-0.176	0.383	-0.063	0.512*
<i>JG30-KF-CM45_norank</i>	-0.570**	-0.046	0.781**	0.572**	-0.723**	-0.436*	-0.550**	-0.554**	0.292	0.245	-0.570**	0.292	-0.440*
<i>JG34-KF-361_norank</i>	-0.193	0.054	0.420	0.262	-0.431	-0.061	-0.049	-0.098	0.039	-0.264	-0.159	0.026	-0.541*
<i>KD4-96_norank</i>	0.248	0.143	-0.061	0.211	-0.138	-0.057	-0.189	-0.069	-0.039	0.270	0.016	-0.343	-0.448*
<i>Mesorhizobium</i>	0.472*	0.250	-0.201	-0.038	0.060	0.177	-0.146	0.236	-0.391	0.340	0.001	-0.147	0.121
<i>Microbacterium</i>	-0.597**	-0.335	0.730**	0.593**	-0.305	-0.384	-0.369	-0.452*	0.249	0.194	-0.344	0.156	-0.163
<i>Microlunatus</i>	-0.422	0.049	0.541*	0.289	-0.601**	-0.342	-0.562**	-0.316	-0.093	0.303	-0.466*	0.076	-0.560**
<i>Micromonosporaceae_unclassified</i>	0.233	-0.147	-0.471*	-0.279	0.586**	0.327	0.652**	0.590**	-0.292	-0.274	0.468*	-0.396	0.303
<i>Microvirga</i>	-0.292	0.058	0.364	0.130	-0.410	-0.149	-0.153	-0.134	0.032	0.290	-0.348	0.389	-0.040

<i>MSB-IE8_norank</i>	-0.065	-0.443*	-0.139	-0.403	0.178	0.485*	0.448*	0.306	-0.179	-0.540*	0.409	0.060	0.055
<i>Nitrosomonadaceae_uncultured</i>	-0.187	-0.141	0.255	0.471*	-0.019	-0.312	-0.123	-0.488*	0.625**	0.084	-0.276	-0.079	0.043
<i>Nitrospinaceae_uncultured</i>	0.421	0.303	-0.501*	-0.496*	0.065	0.230	0.022	0.113	-0.163	-0.172	0.308	-0.040	-0.096
<i>Nitrospira</i>	0.226	0.423	0.022	0.326	-0.201	-0.431	-0.417	-0.374	0.237	0.382	-0.363	-0.193	-0.314
<i>Nocardioides</i>	-0.484*	-0.189	0.670**	0.677**	-0.350	-0.442*	-0.483*	-0.388	0.165	0.386	-0.496*	-0.010	-0.161
<i>Nordella</i>	0.221	0.484*	-0.161	-0.118	-0.370	-0.321	-0.226	-0.310	0.341	0.216	-0.145	-0.096	-0.041
<i>P2-11E_norank</i>	0.465*	0.296	-0.577**	-0.380	0.247	0.138	0.164	0.264	-0.244	-0.160	0.198	-0.417	-0.042
<i>Pir4 lineage</i>	0.293	-0.329	-0.287	-0.320	0.399	0.588**	0.318	0.353	-0.256	-0.194	0.455*	0.262	0.176
<i>Pirellula</i>	-0.226	-0.273	0.274	0.304	0.156	-0.086	0.120	-0.160	0.308	-0.108	-0.069	0.185	0.126
<i>Planctomycetaceae_uncultured</i>	0.379	0.150	-0.481*	-0.442*	0.225	0.194	0.163	0.239	-0.103	-0.159	0.128	-0.048	0.316
<i>Pseudomonas</i>	0.043	-0.134	0.118	0.072	0.106	0.129	0.188	0.009	0.148	-0.064	-0.092	0.063	0.207
<i>Pseudonocardia</i>	0.445*	0.201	-0.491*	-0.506*	0.133	0.422	0.207	0.611**	-0.548*	0.041	0.372	-0.101	0.527**
<i>RB41_norank</i>	0.519*	0.473*	-0.738**	-0.614**	0.147	0.200	0.089	0.396	-0.405	-0.031	0.275	-0.201	0.090
<i>Rhizobium</i>	0.122	0.405	0.037	0.138	-0.095	-0.386	-0.106	-0.223	0.198	-0.039	-0.278	-0.403	-0.375
<i>Rhizobiales_unclassified</i>	0.068	0.163	-0.063	-0.102	-0.012	0.017	0.062	0.259	-0.223	0.231	-0.180	0.093	0.305
<i>Rhodospirillales_Unclassified</i>	-0.661**	0.093	0.732**	0.465*	-0.503*	-0.595**	-0.313	-0.649**	0.564**	0.096	-0.629**	0.375	-0.335
<i>Roseiflexus</i>	-0.118	-0.250	0.276	0.227	-0.021	-0.046	-0.364	-0.068	-0.176	0.457*	-0.028	0.215	0.097
<i>Rubrobacter</i>	0.215	0.010	-0.266	-0.381	0.053	0.309	0.060	0.270	-0.346	-0.441*	0.364	-0.147	0.105
<i>S0134 terrestrial group_norank</i>	-0.363	-0.484*	0.052	-0.159	0.377	0.099	0.446*	0.239	-0.045	-0.506*	0.338	0.208	0.226
<i>SC-I-84_norank</i>	0.027	0.077	0.041	0.222	-0.106	-0.294	-0.206	-0.330	0.333	0.096	0.021	-0.196	-0.238
<i>Skermanella</i>	-0.332	-0.238	0.208	0.090	-0.032	-0.127	-0.041	-0.013	0.022	0.157	-0.084	0.153	0.177
<i>Solirubrobacter</i>	0.612**	0.093	-0.705**	-0.622**	0.369	0.572**	0.420	0.468*	-0.216	-0.038	0.491*	0.001	0.714**
<i>Solirubrobacterales_unclassified</i>	0.438*	-0.127	-0.678**	-0.599**	0.671**	0.583**	0.696**	0.594**	-0.317	-0.447*	0.607**	-0.241	0.319
<i>Sphingomonas</i>	0.214	0.306	-0.360	-0.452*	0.009	0.147	0.013	0.319	-0.426	-0.229	0.204	-0.344	0.130
<i>Sporichthyaceae_uncultured</i>	-0.277	0.121	0.001	-0.293	-0.186	0.001	-0.004	0.186	-0.348	-0.287	-0.039	0.106	-0.166
<i>Steroidobacter</i>	0.497*	0.536*	-0.481*	-0.305	0.063	0.113	-0.024	0.297	-0.286	0.247	0.029	0.018	0.266
<i>Streptomyces</i>	0.232	0.379	-0.253	-0.085	0.209	-0.102	0.287	-0.093	0.343	-0.213	0.097	-0.217	-0.055
<i>Subgroup 17</i>	0.547*	-0.191	-0.640**	-0.414	0.525*	0.556**	0.471*	0.559**	-0.291	-0.063	0.507*	-0.181	0.557**
<i>Subgroup 6</i>	0.014	0.123	0.305	0.510*	-0.298	-0.187	-0.517*	-0.280	0.002	0.621**	-0.165	0.084	-0.289

<i>Subgroup 7</i>	-0.092	0.174	-0.291	-0.488*	0.113	-0.030	0.084	0.290	-0.322	-0.137	0.035	-0.072	0.104
<i>TK10_norank</i>	-0.333	-0.038	0.199	-0.037	-0.237	0.038	0.014	-0.187	0.267	-0.240	-0.116	0.513*	0.070
<i>TRA3-20_norank</i>	0.021	-0.360	-0.096	-0.160	0.421	0.148	0.235	0.277	-0.252	-0.313	0.336	-0.078	0.253
<i>Variibacter</i>	0.453*	0.570**	-0.593**	-0.376	0.271	0.126	0.071	0.302	-0.290	-0.029	0.179	-0.242	0.209
<i>WD2101 soil group_norank</i>	0.016	-0.136	-0.122	-0.363	0.128	0.367	0.340	0.548*	-0.460*	-0.348	0.211	0.253	0.187
<i>Xanthobacteraceae_unclassified</i>	0.721**	0.165	-0.642**	-0.413	0.108	0.426	-0.067	0.240	-0.306	0.146	0.331	-0.212	0.216
<i>Xanthomonadales_uncultured</i>	0.260	0.183	-0.167	-0.172	-0.250	0.176	-0.378	-0.039	-0.115	0.385	-0.089	0.365	0.377

Table S6 Information of the bacterial nodes served as module hubs and connectors in less (L10) and more than 10 years (M10) of continuous cropped alfalfa

Treatments	OTU ID	Generalists	P_i	Z_i	Node degree	Taxa	Identity (%)	Access number
L10	OTU1114	Module hubs	0.15	2.60	12	Actinobacteria_Microlunatus	99	EU298226
	OTU1404	Module hubs	0.00	2.68	6	Chloroflexi_uncultured bacterium	99	JX493976
	OTU3686	Module hubs	0.00	2.70	6	Proteobacteria_Myxococcales bacterium	99	FJ889277
	OTU4163	Module hubs	0.00	2.85	5	Chloroflexi_Ktedonobacteria	99	HE588195
	OTU4179	Module hubs	0.00	3.49	6	Bacteroidetes_Ohtaekwangia	97	MG662377
	OTU940	Module hubs	0.00	3.55	12	Firmicutes_Tumebacillus	99	KM108715
	OTU2283	Connectors	0.63	0.00	4	Actinobacteria_Micromonosporaceae	98	EF018508
	OTU1043	Connectors	0.63	-0.80	4	Planctomycetes_Planctomyces	100	JF776927
	OTU943	Connectors	0.63	-0.80	1	Chloroflexi_Roseiflexus	95	KX035369
	OTU1597	Connectors	0.67	-1.06	3	Gemmatimonadetes_Gemmatimonadaceae	98	JX494164
OTU1402	Connectors	0.67	-1.08	3	Planctomycetes_Planctomycetales	99	JN002827	
M10	OTU1300	Module hubs	0.24	2.53	7	Gemmatimonadetes_Gemmatimonadaceae	100	JN409146
	OTU2265	Module hubs	0.00	2.58	5	Acidobacteria_Subgroup 6	99	HG325728
	OTU3570	Module hubs	0.45	2.58	7	Proteobacteria_Acetobacteraceae	96	KX476138
	OTU1580	Module hubs	0.00	2.64	7	Proteobacteria_Nannocystis	98	JN679172
	OTU293	Module hubs	0.00	3.14	6	Actinobacteria_Actinomycetales	97	LN555023
	OTU756	Connectors	0.63	-0.70	4	Actinobacteria_Nocardioides	100	KY445601
	OTU2503	Connectors	0.64	-0.66	5	Planctomycetes_Planctomycetaceae	97	JF988578
	OTU2289	Connectors	0.67	-0.15	6	Actinobacteria_Blastococcus	100	MF573339
	OTU3674	Connectors	0.67	-1.15	3	Acidobacteria_Subgroup 6	99	HQ729832
	OTU135	Connectors	0.67	-1.18	3	Actinobacteria_Amycolatopsis	100	MH598363
	OTU3774	Connectors	0.69	0.33	8	Chloroflexi_P2-11E	100	JX082267
	OTU1168	Connectors	0.72	-0.30	5	Chloroflexi_Anaerolineales	95	AM936857
	OTU2313	Connectors	0.75	-1.36	4	Gemmatimonadetes_Gemmatimonadaceae	95	EU299573