Supplementary Materials for

Effects of Cover Crops and Microbial Inoculants in Different Farming Systems on Soil Microbial Communities and Yield of Maize

Supplementary Figure S1. Bar plots showing a) arbuscular mycorrhizal fungi (AMF) and b) bacterial richness of field sites over two years and sampling times under cover crop treatment.

Supplementary Tables S1–S3 are provided as a separate Excel file (.xlsx)

Table S1 (Sheet: Table S1): The complete dataset including 64 observations and 25 variables, summarizing mean values of environmental data (soil properties, management, weather), and microbial diversity. These data were collected over two sampling time points in 2021 and 2022 across all field sites. Sheet Table S1 META DATA describes each variable used in Table S1.

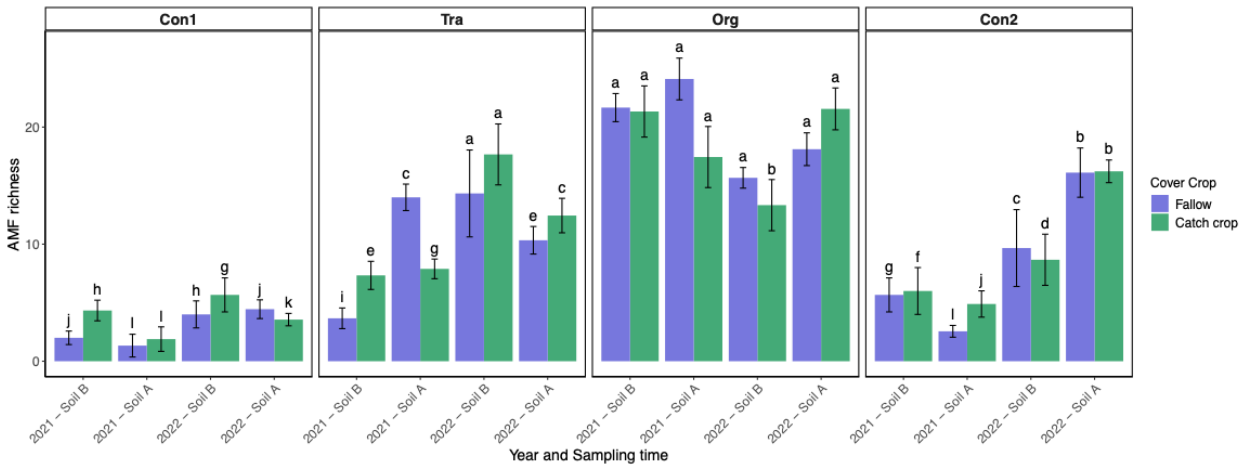
Table S2: Total and relative abundance of arbuscular mycorrhizal fungal (AMF) taxa across all samples (n = 192), as well as within each field site (n = 48 per site).

Table S3: Absolute and relative abundance of bacterial classes detected in the whole community (n = 192), and in each field site (n = 48 per site).

Table S4: Pairwise PERMANOVA results based on Bray–Curtis dissimilarities.

Table S5: Summary of the linear mixed-effects model for maize yield.

a



b

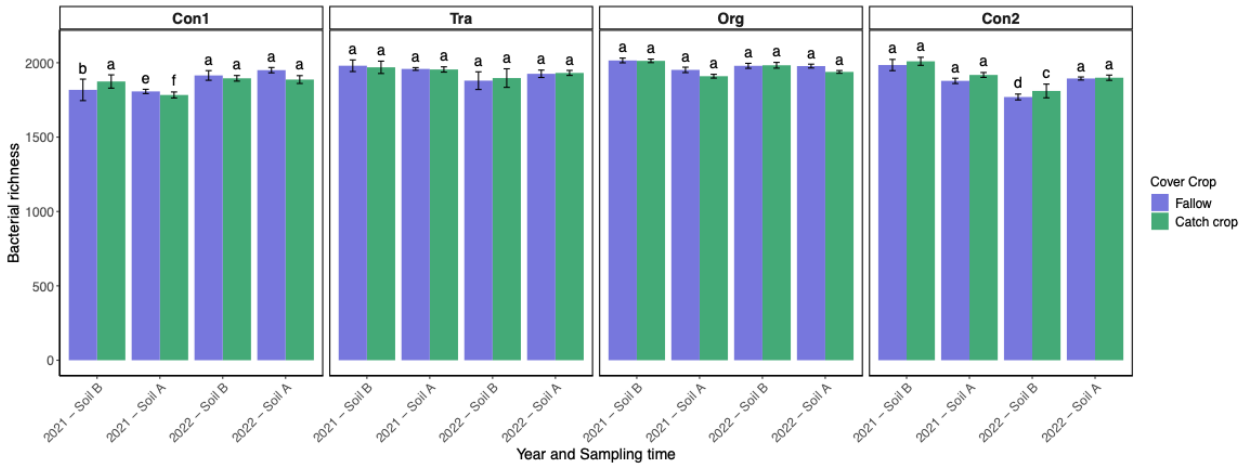


Fig S1. Richness of a) arbuscular mycorrhizal fungi (AMF) and b) bacteria in soil of four farming systems. The farming systems represent Con1 = conventional 1, Tra = transitional, Org = organic, and Con2 = conventional 2. The samples were collected in two years (2021 and 2022) at two sampling time points: Soil B (before maize sowing, n = 3) and Soil A (after maize harvest, n = 9) after fallow or cover crop treatment. Bars represent means (± SE). Different letters indicate statistically significant differences among treatment combinations based on one-way ANOVA followed by Tukey's HSD test ($p < 0.05$).

Table S4. Pairwise PERMANOVA results based on Bray-Curtis dissimilarities, testing the effects of cover crop, inoculation and field sites on microbial community composition. Adjusted p-values (p_{adj}) are reported for multiple comparisons.

	Pairwise tests	Sum of Squares	F	R^2	p_{adj}
AMF community					
Cover crop					
1	Fallow vs Catch crop	0.357	1.124	0.006	0.337
Inoculation					
1	Control vs AMF	0.196	0.645	0.008	1.000
2	Control vs AMF + BAK	0.249	0.780	0.009	1.000
3	AMF vs AMF + BAK	0.515	1.657	0.019	0.606
Field sites					
1	Tra vs Org	4.761	22.226	0.191	0.006
2	Tra vs Con1	2.054	6.929	0.076	0.006
3	Tra vs Con2	1.308	4.712	0.049	0.012
4	Org vs Con1	5.792	22.533	0.212	0.006
5	Org vs Con2	3.955	16.366	0.151	0.006
6	Con1 vs Con2	1.444	4.385	0.051	0.006
Bacterial community					
Cover crop					
1	Fallow vs Catch crop	0.013	1.673	0.009	0.126
Inoculation					
1	Control vs AMF	0.004	0.579	0.006	1.000
2	Control vs AMF + BAK	0.003	0.460	0.005	1.000
3	AMF vs AMF + BAK	0.001	0.122	0.001	1.000
Field sites					
1	Tra vs Org	0.053	8.968	0.087	0.006
2	Tra vs Con1	0.070	12.546	0.118	0.006
3	Tra vs Con2	0.221	38.854	0.292	0.006
4	Org vs Con1	0.098	18.753	0.166	0.006
5	Org vs Con2	0.251	47.082	0.334	0.006
6	Con1 vs Con2	0.130	26.166	0.218	0.006

Table S5. The effect of field site, cover crop, inoculation, year and the interactions on maize yield. Differences among means per treatment were tested by a linear mixed effect model with "field site", "cover crop" and "inoculation" as fixed factors and "year" as random factor. The analysis includes 108 measurements (3 field sites, 2 cover crop treatments, 3 inoculation treatments, 3 replicates per subplot, and 2 years).

Model	Df	Sum of Squares	Mean Square	F	Pr(>F)
Field site	2	679.8	339.9	239.383	< 2e-16
Cover crop	1	9.3	9.3	6.582	0.012
Inoculation	2	9.2	4.6	3.227	0.044
Field site: Cover crop	2	23.5	11.8	8.277	0.001
Field site: Inoculation	4	11.8	2.9	2.073	0.091
Cover crop: Inoculation	2	0.3	0.1	0.096	0.909
Field site: Cover crop: Inoculation	4	13.4	3.4	2.365	0.059
Residuals	89	126.4	1.4		