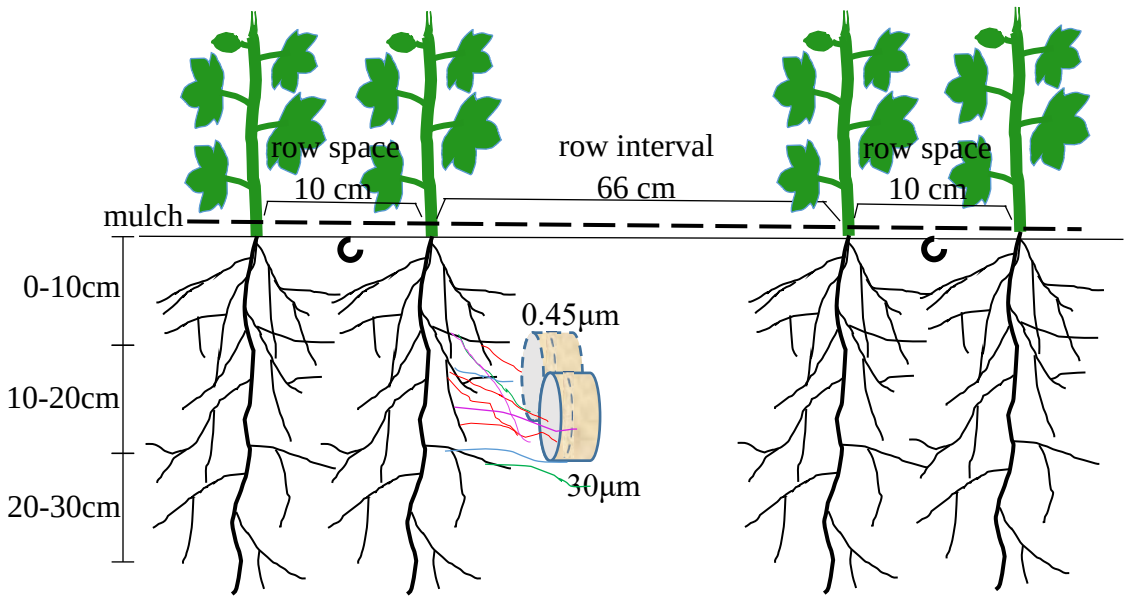
Appendix A. Soil chemical properties of long-term fertilization experimental fields

Treatments	pH	Organic matter (g ŀkg^{-1})	Avail.N (mg ŀkg^{-1})	Olsen-P (mg ŀkg^{-1})	Avail.K (mg ŀkg^{-1})	Salt content (g kg^{-1})
noP	8.36	15.47	45.82	4.26	294.9	1.2
CP	8.3	15.26	34.37	13.29	494.81	1.3
MCP	8.25	27.29	91.64	78.29	641.28	1.5

Appendix B. Basic information of mycorrhizal sequencing of Cotton root in farmland

	No. of total sequence	Minimum (bp)	Maximum (bp)	Median (bp)
Cotton root	675198	135	407	216
	No. of sequence belongs to Glomeromycota	Glomeromycota ratio %	No. of AMF OTUs	No. of AMF genera
Cotton root	522648	77.4%	194	11

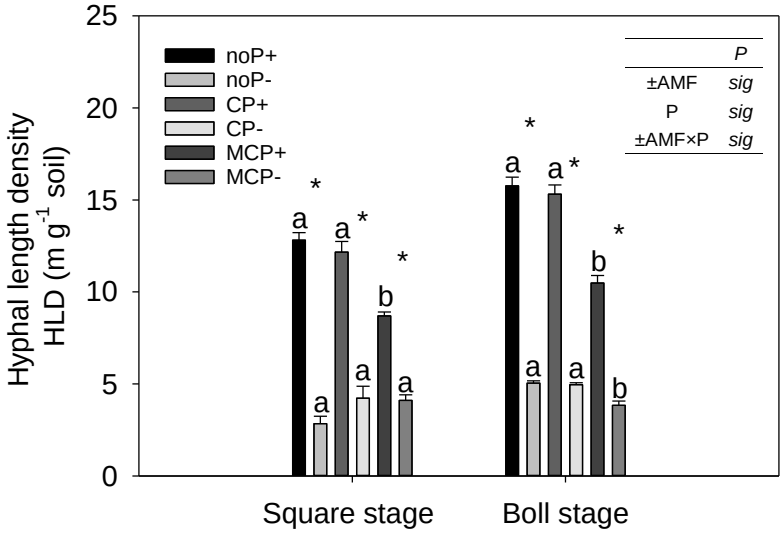


Appendix C. Schematic diagram of experimental equipment. The surface films were laid out and seeds were sown using an integrative machine. Cotton seeds were sown with a row spacing of 66 cm, with 10 cm spacing between each plant. Chambers were constructed using polyvinylchloride (PVC) tubes (10 cm in diameter, 5 cm in length) sealed 30 μm mesh (permitting AMF hyphae but not roots to penetrate) or 0.45 μm membrane (excluding AMF hyphae and root penetration) on the two ends. The substrate filled the in growth tubes came from soil collected from 10-20 cm depth in the field. Tubes were buried at a depth of 10-20 cm in the soil 15 cm away from a cotton plant root at the seeding stage (03 June 2015). The experimental plot covered an area of 468 m^2 per treatment. The chamber position of each treatment was randomized with three replicates. The crop was cotton (*Gossypium* spp.). During the growth period, the field management measures remained the same for all three treatments.

Appendix D. Two-way ANOVA on root length colonization (%), arbuscular abundance (%) and hyphal length density (HLD^+).

	root length colonization (%)			arbuscular abundance (%)			hyphal length density (HLD^+)		
Source of variable	*df*	F	*P*	*df*	F	*P*	*df*	F	*P*
Growth stage	1	49.561	**	1	21.432	**	1	63.887	**
Treatment	2	10.451	**	2	23.260	**	2	170.425	**
Growth stage × Treatment	2	5.621	*	2	28.847	**	2	5.362	*

Note: *P<0.05; **P<0.01; ns, non-significant. HLD^+ represent the proliferation of extraradical mycelium in hyphal chambers



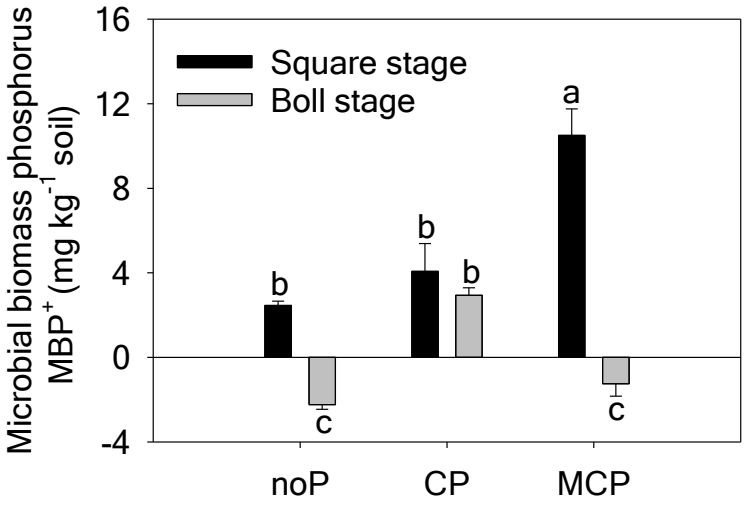
Appendix E. Hyphal length density (HLD) in the chambers buried in the cotton field. The chambers were sampled at the square and boll stage. noP (no P fertilizer); CP (chemical P

fertilizer); MCP (combined organic manure with chemical P fertilizer). Data are means ± SE (n=3). Different letters (a, b) above bars denote significant differences between different treatments at square and boll stage, while asterisks above bars denote significant differences between 30 μm mesh (+AMF) and 0.45 μm membrane (-AMF) for the same treatment ($P \leq 0.05$). P values in the panelled table are results of two way ANOVAs ($P \leq 0.05$) of AMF hyphae penetrate or not (±AMF) and treatments (P). *sig* in the table denote significant differences between AMF hyphae penetrate (+AMF) or not (-AMF) and/or treatments (P).

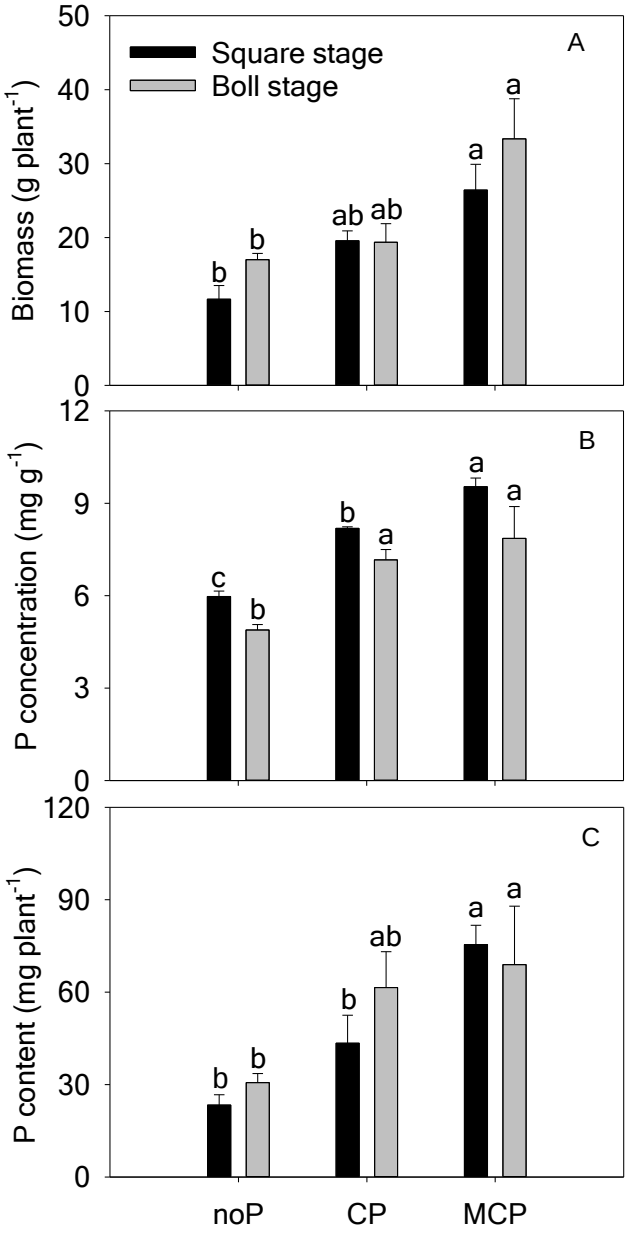
Appendix F. Two-way ANOVA on soil available P, Olsen-Pi^+ (Olsen-$Pi_{30\ \mu m\ membrane}$−Olsen-$Pi_{0.45\ \mu m\ membrane}$) contents and Olsen-$Po^+$ (Olsen-$Po_{30\ \mu m\ membrane}$−Olsen-$Po_{0.45\ \mu m\ membrane}$) contents.

		Olsen-Pi^+			Olsen-Po^+	
Source of variable	*df*	F	*P*	*df*	F	*P*
Growth stage	1	4.698	ns	1	0.882	ns
Treatment	2	4.651	*	2	1.743	ns
Growth stage ×Treatment	2	0.890	ns	2	26.245	**

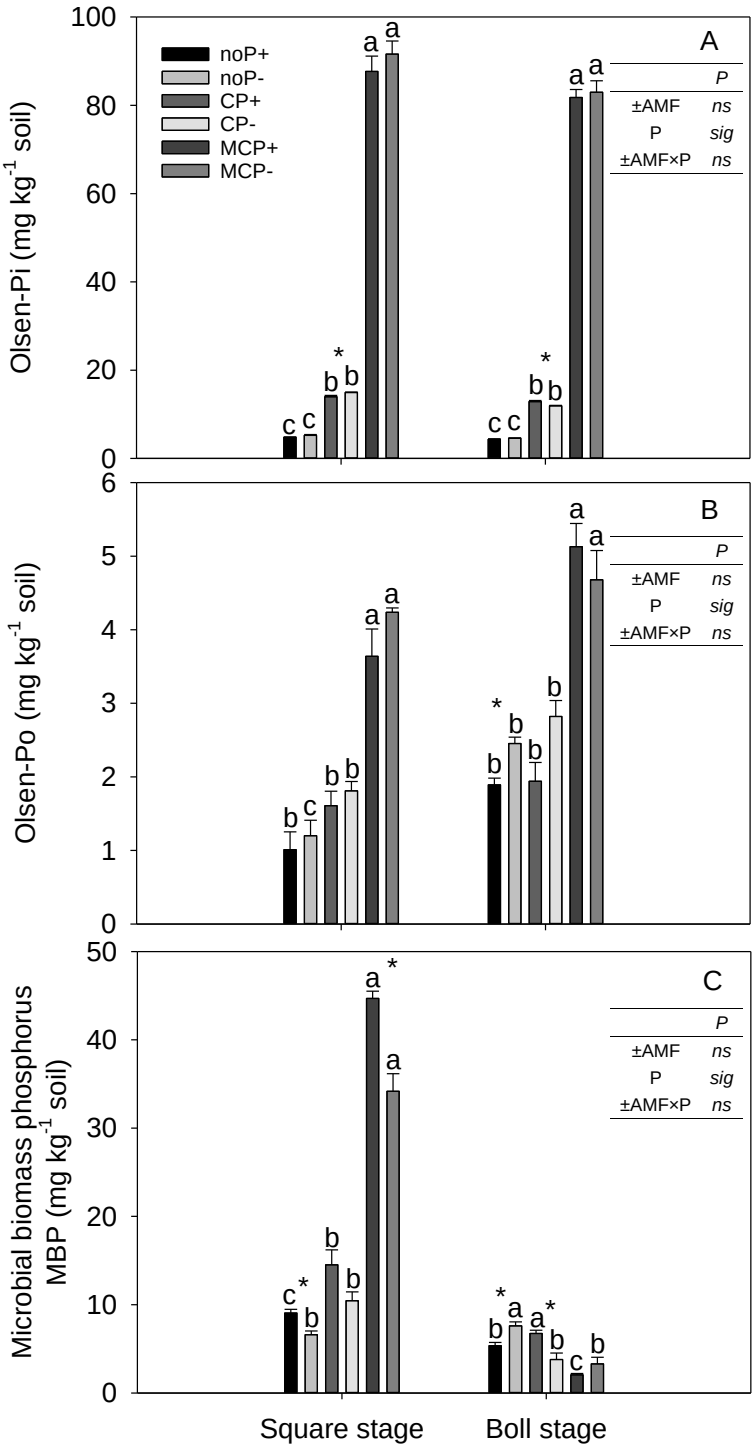
Note: *P<0.05; **P<0.01; ns, non-significant.



Appendix G. Microbial biomass phosphorus (MBP^+) in the chambers buried in cotton field with or without the presence of AMF at square stage and boll stage. Data are means ± SE (n=3). noP (no P fertilizer); CP (chemical P fertilizer); MCP (combined organic manure with chemical P fertilizer). Different letters indicate significant differences amongst fertilizer and plant stage treatments ($P \leq 0.05$).



Appendix H. A, Biomass. B, P concentration. C, P content of aboveground dry matter of cotton at square and boll stages. Note: noP (no P fertilizer); CP (chemical P fertilizer); MCP (combined organic manure with chemical P fertilizer). Data are means ± SE (n=3). Different letters indicate significant differences amongst fertilizer and plant stage treatments ($P \leq 0.05$).



Appendix I. A, Olsen-Pi. B, Olsen-Po. C, MBP of different treatments at square and boll stages. noP (no P fertilizer); CP (chemical P fertilizer); MCP (combined organic manure with chemical P fertilizer). Data are means ± SE (n=3). Different letters (a, b) above bars denote significant differences between different treatments at square and boll stage, while asterisks above bars

denote significant differences between 30 μm mesh (+AMF) and 0.45 μm membrane (-AMF) for the same treatment ($P \leq 0.05$). P values in the panelled table are results of two way ANOVAs ($P \leq 0.05$) of AMF hyphae penetrate or not (±AMF) and treatments (P). *sig* in the table denote significant differences between AMF hyphae penetrate (+AMF) or not (-AMF) and/or treatments (P), while *ns* denote no significant difference.