

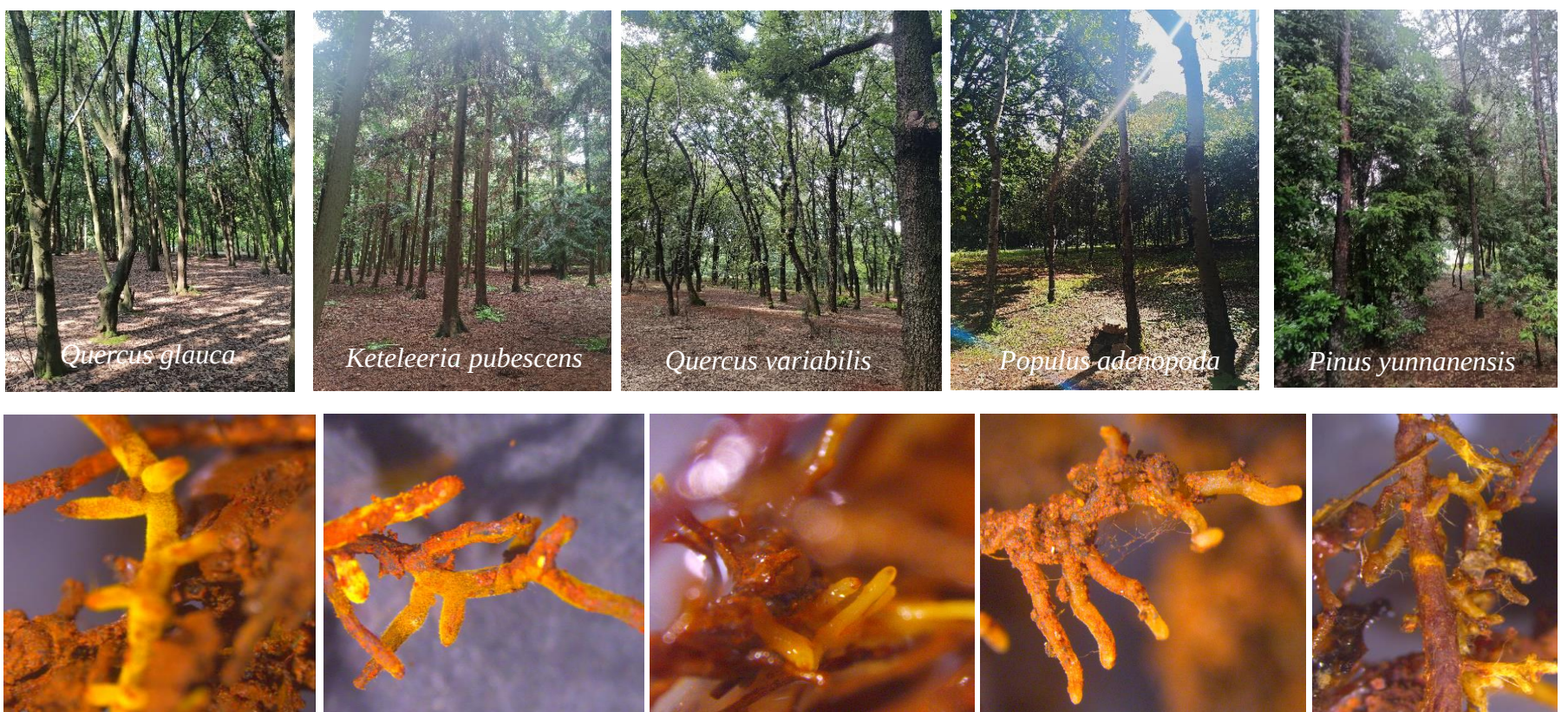


Fig. S1 Ectomycorrhizosphere soil sampling from Kunming Botanical Garden.

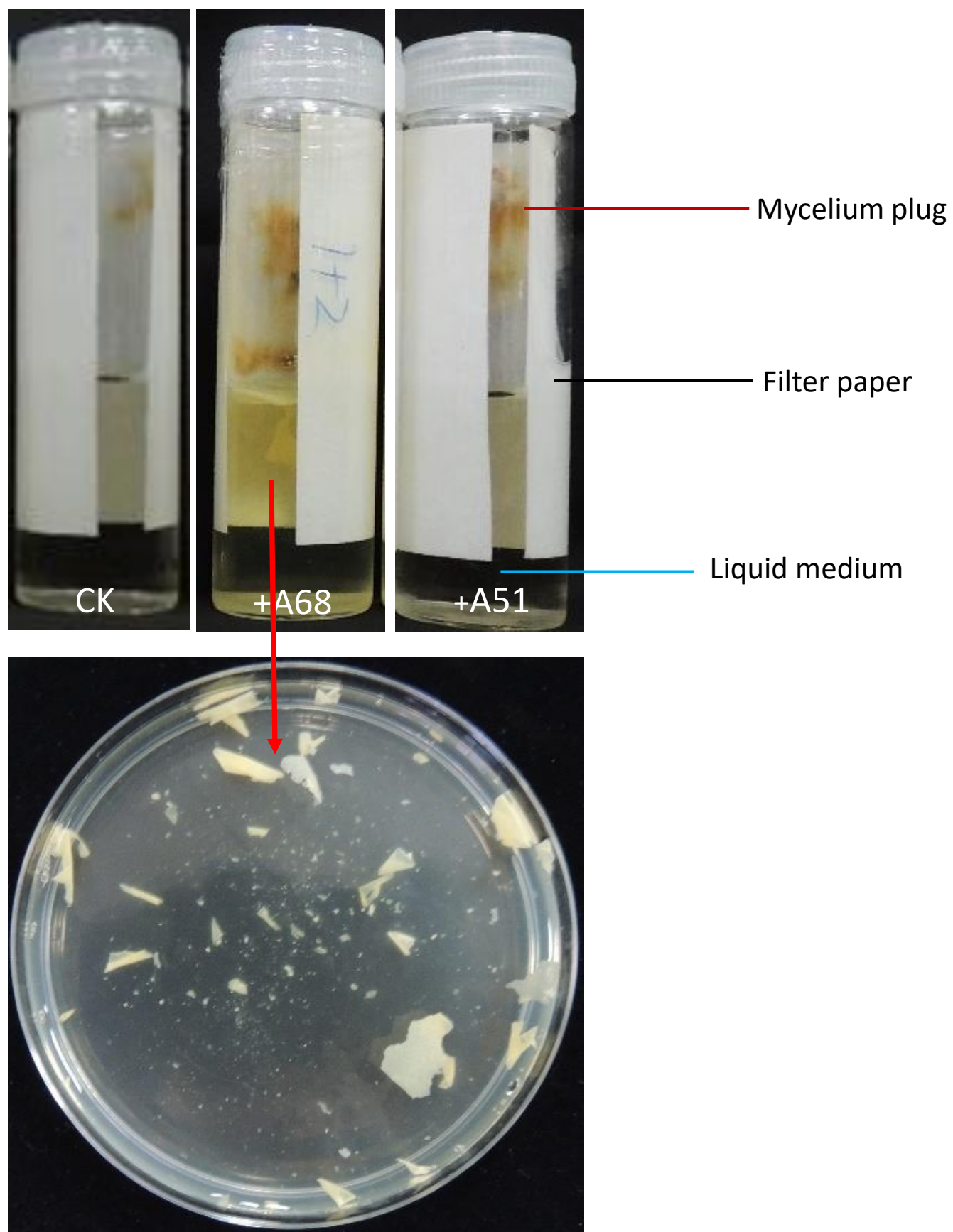


Fig. S2 The co-culture system of ectomycorrhizal fungal (*Lactarius deliciosus* NZ) mycelium and oxalotrophic bacteria A68 and A51, and the bacterial biofilm when NZ was co-cultured with A68. A51, *Ancylobacter rudongensis*; A68, *Variovorax paradoxus*.

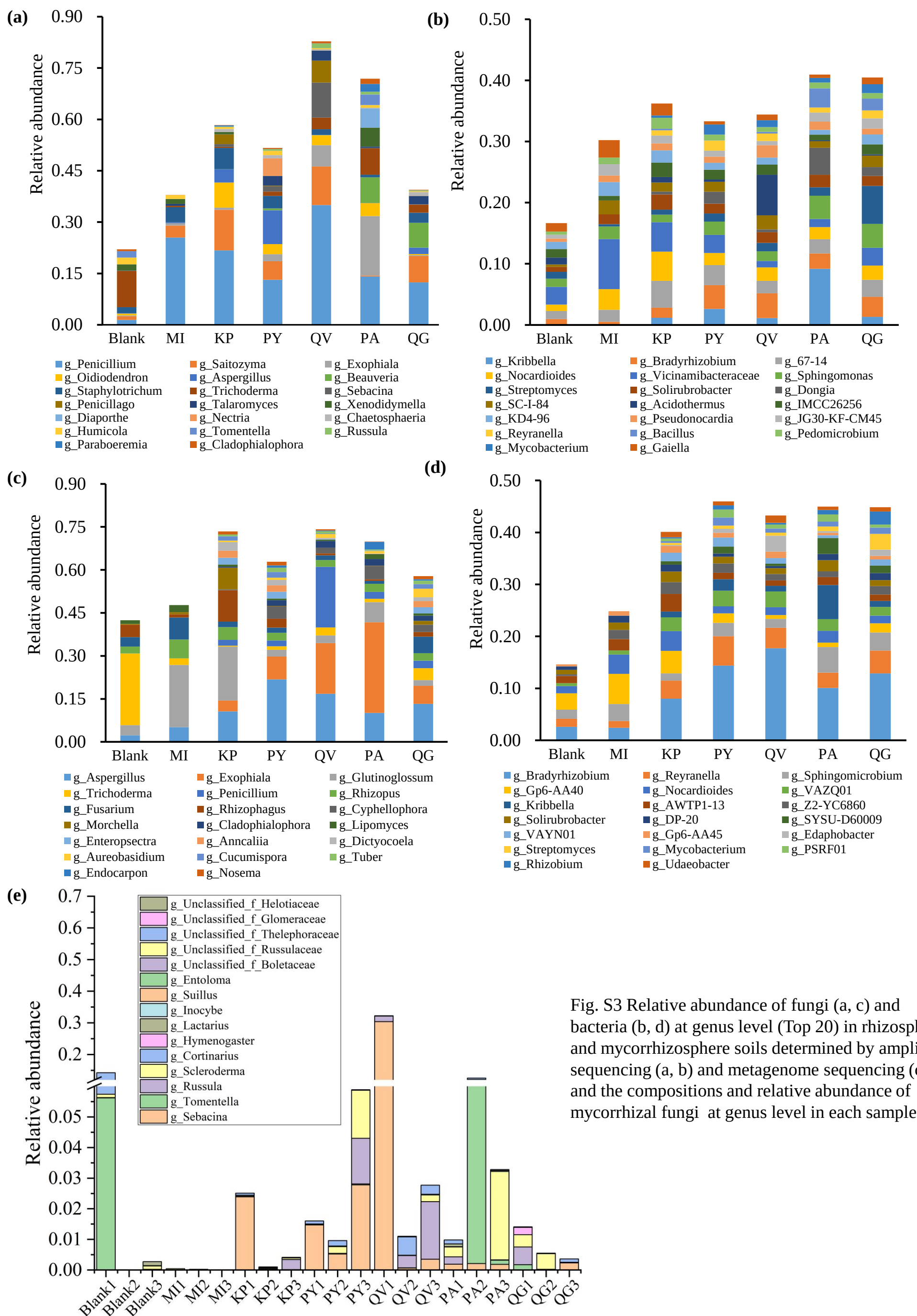


Fig. S3 Relative abundance of fungi (a, c) and bacteria (b, d) at genus level (Top 20) in rhizosphere and mycorrhizosphere soils determined by amplicon sequencing (a, b) and metagenome sequencing (c, d), and the compositions and relative abundance of mycorrhizal fungi at genus level in each samples (e).

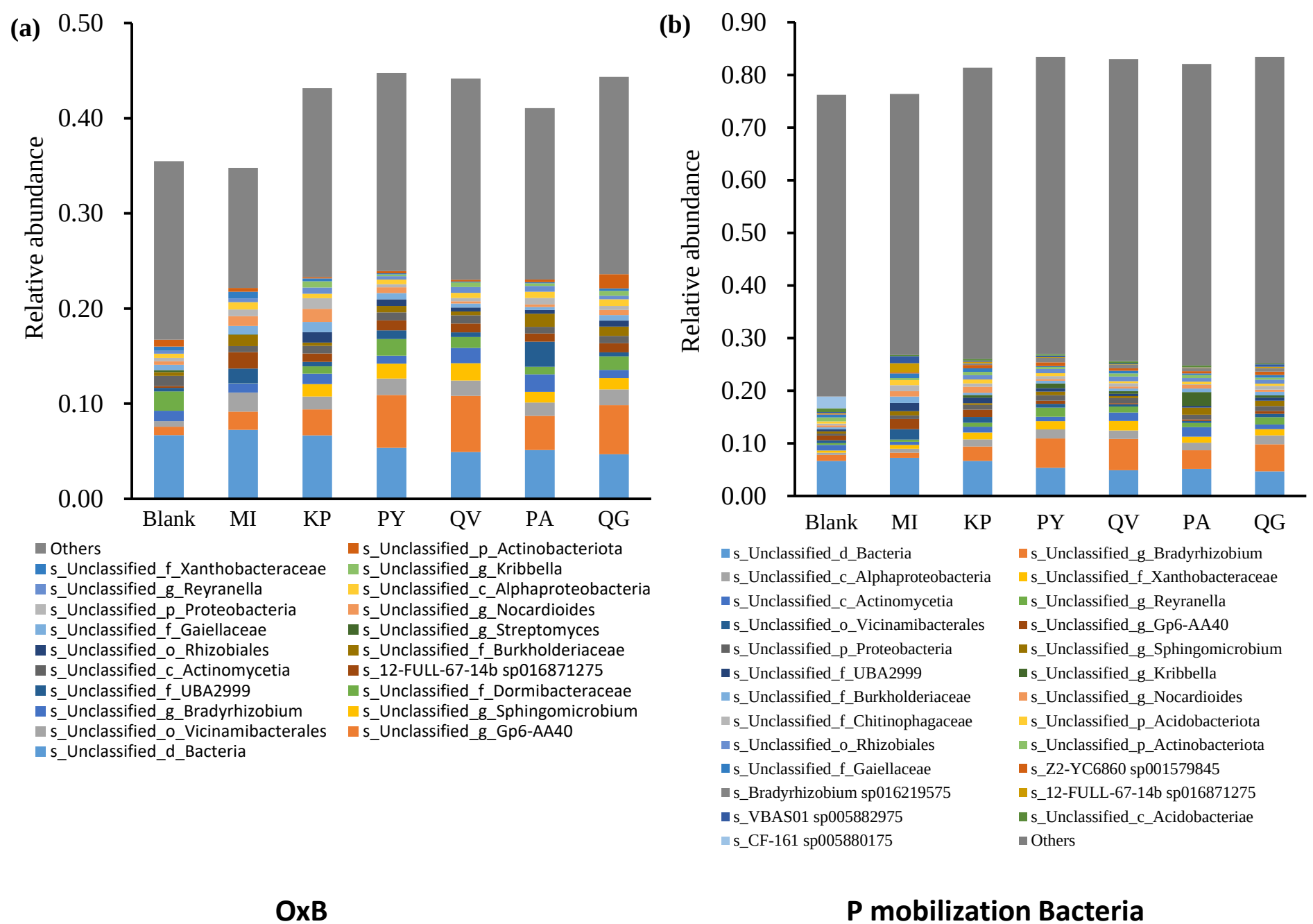


Fig. S4 Relative abundance and community of oxalotrophic bacteria (a) and phosphorus mobilization bacteria (b) at species level in rhizosphere and mycorrhizosphere soils determined by metagenome sequencing.

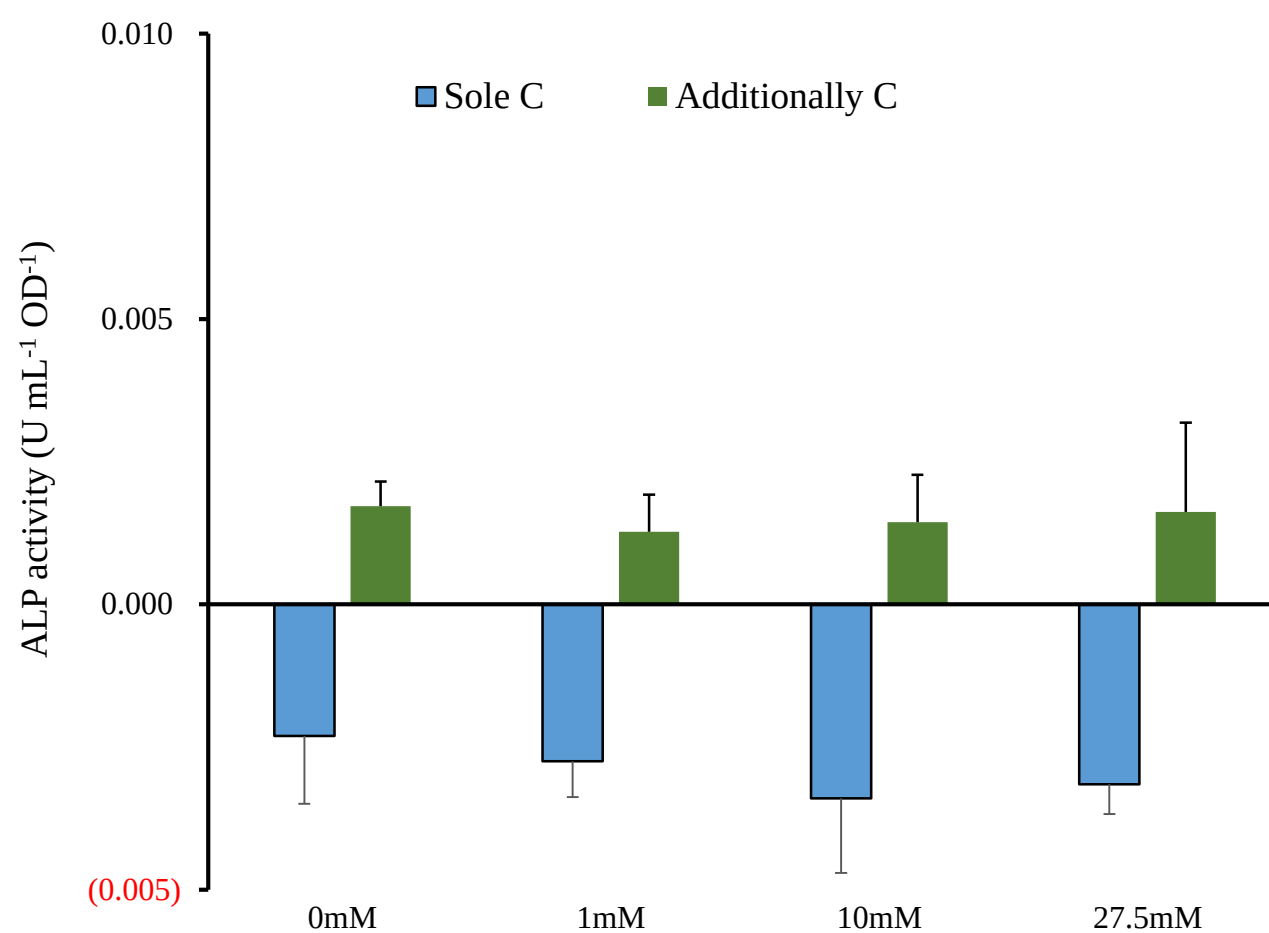


Fig. S5 Alkaline phosphatase (ALP) activity in culture medium of A17 with different concentrations of K-oxalate as the only C source (Sole C) and additionally C source (Additionally C), respectively. A17, *Cupriavidus pinatubonensis*.

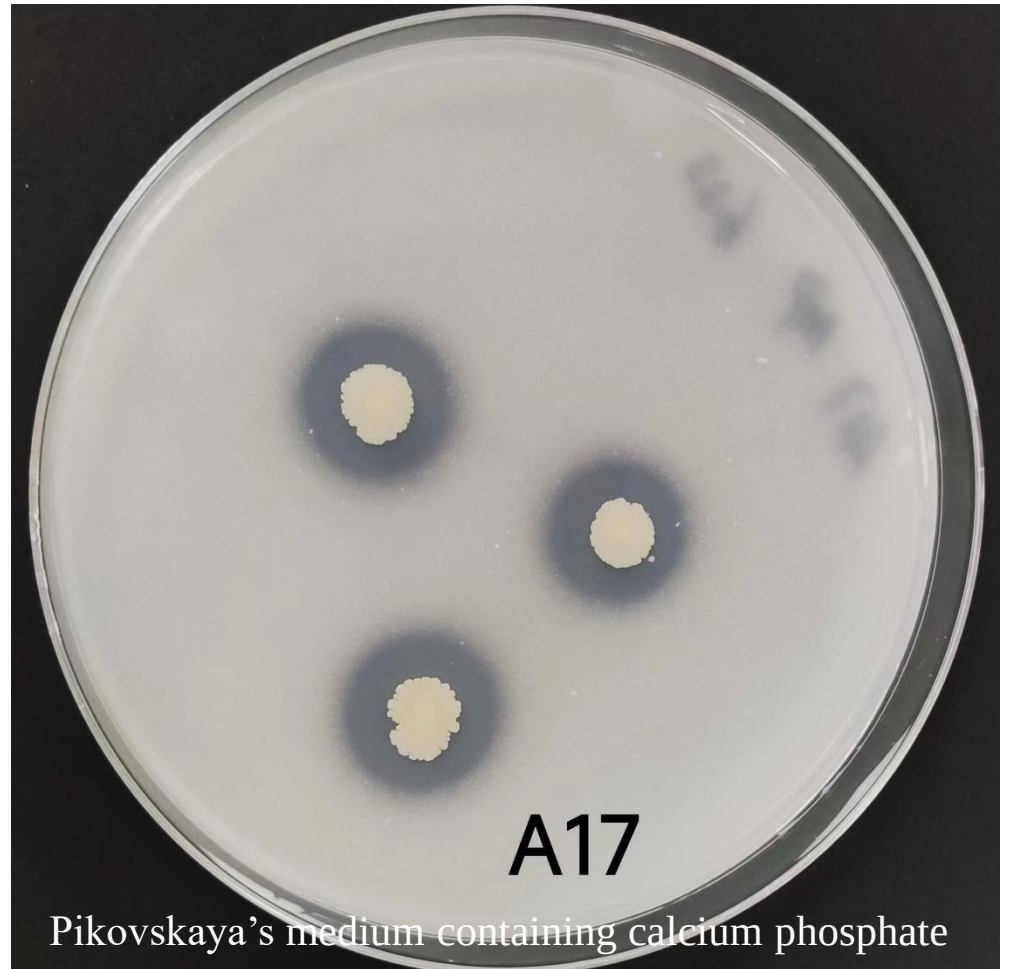
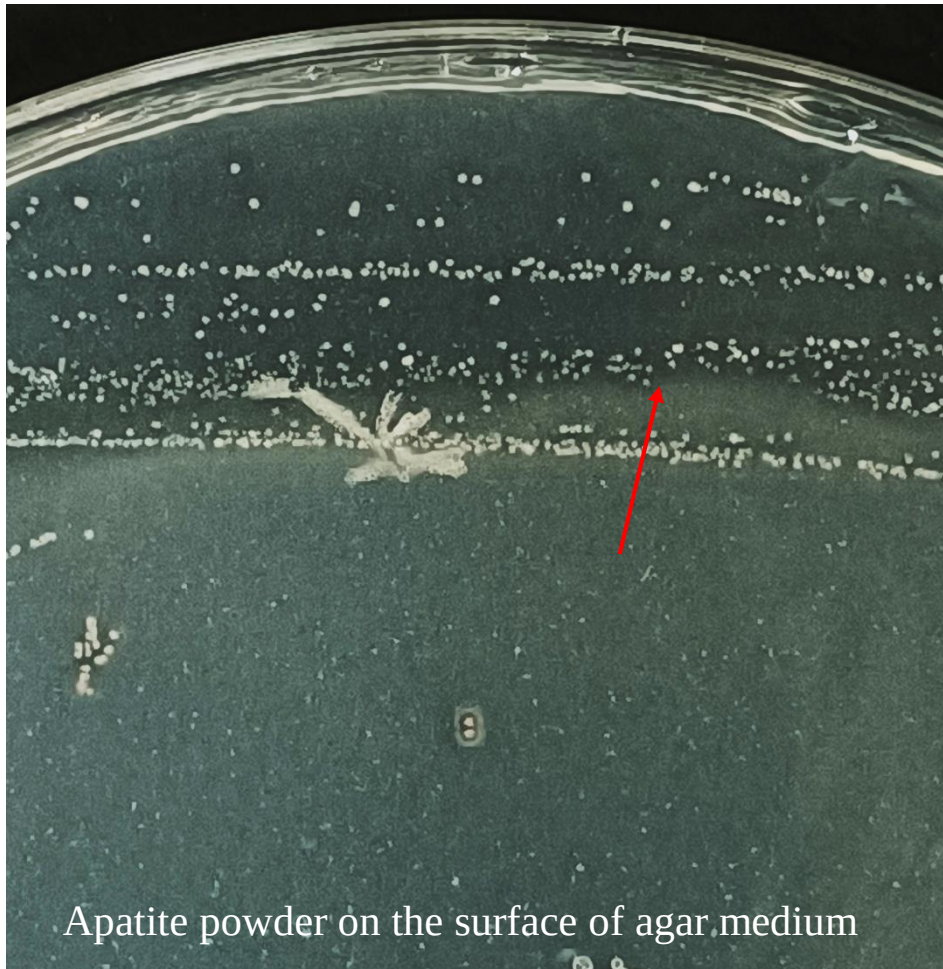


Fig. S6 Inorganic P (apatite and calcium phosphate) mobilization by OxB strain A17, *Cupriavidus pinatubonensis*.

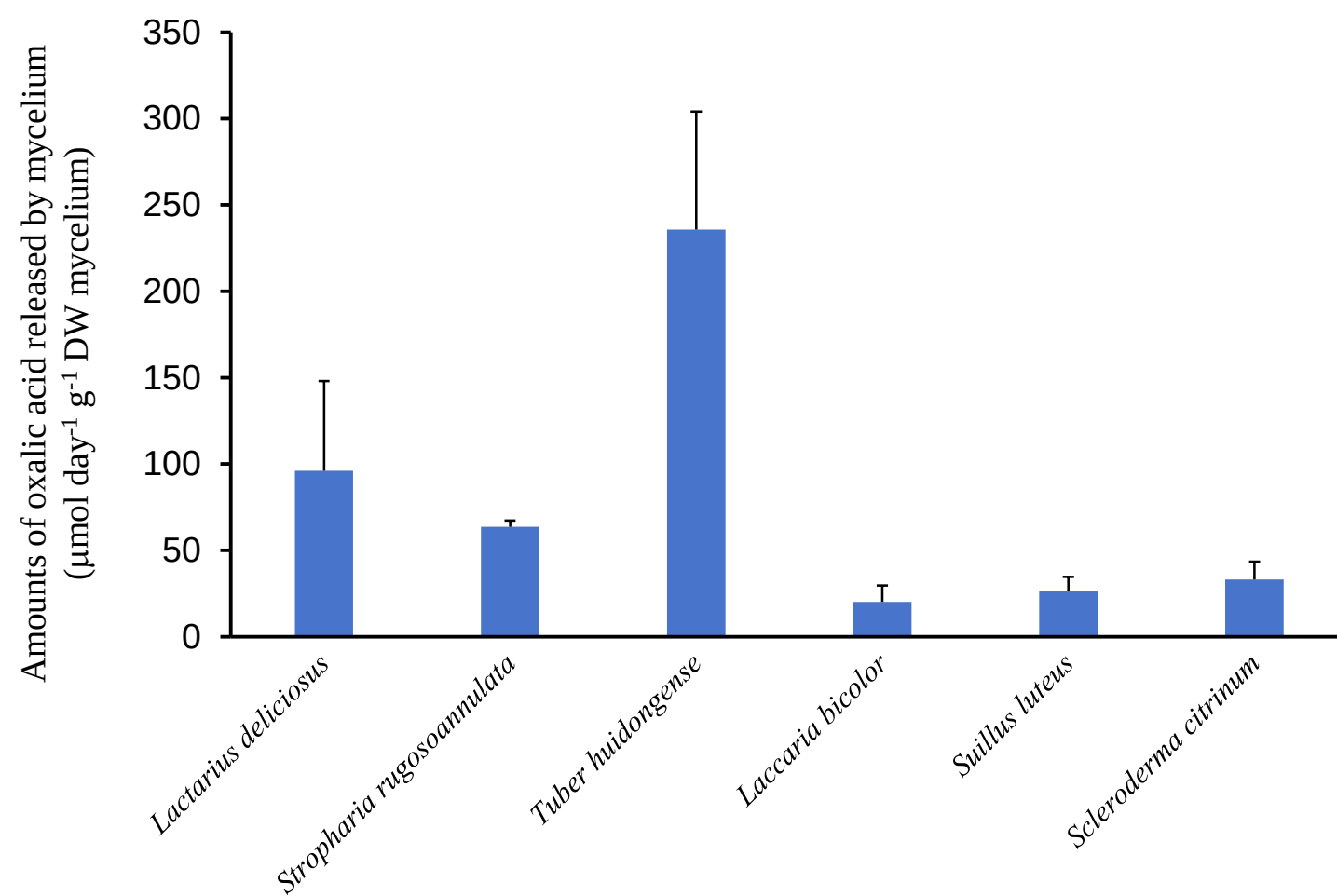


Fig. S7 The amounts of pure-cultured fungal mycelium released oxalate normalized to fungal mycelium biomass.

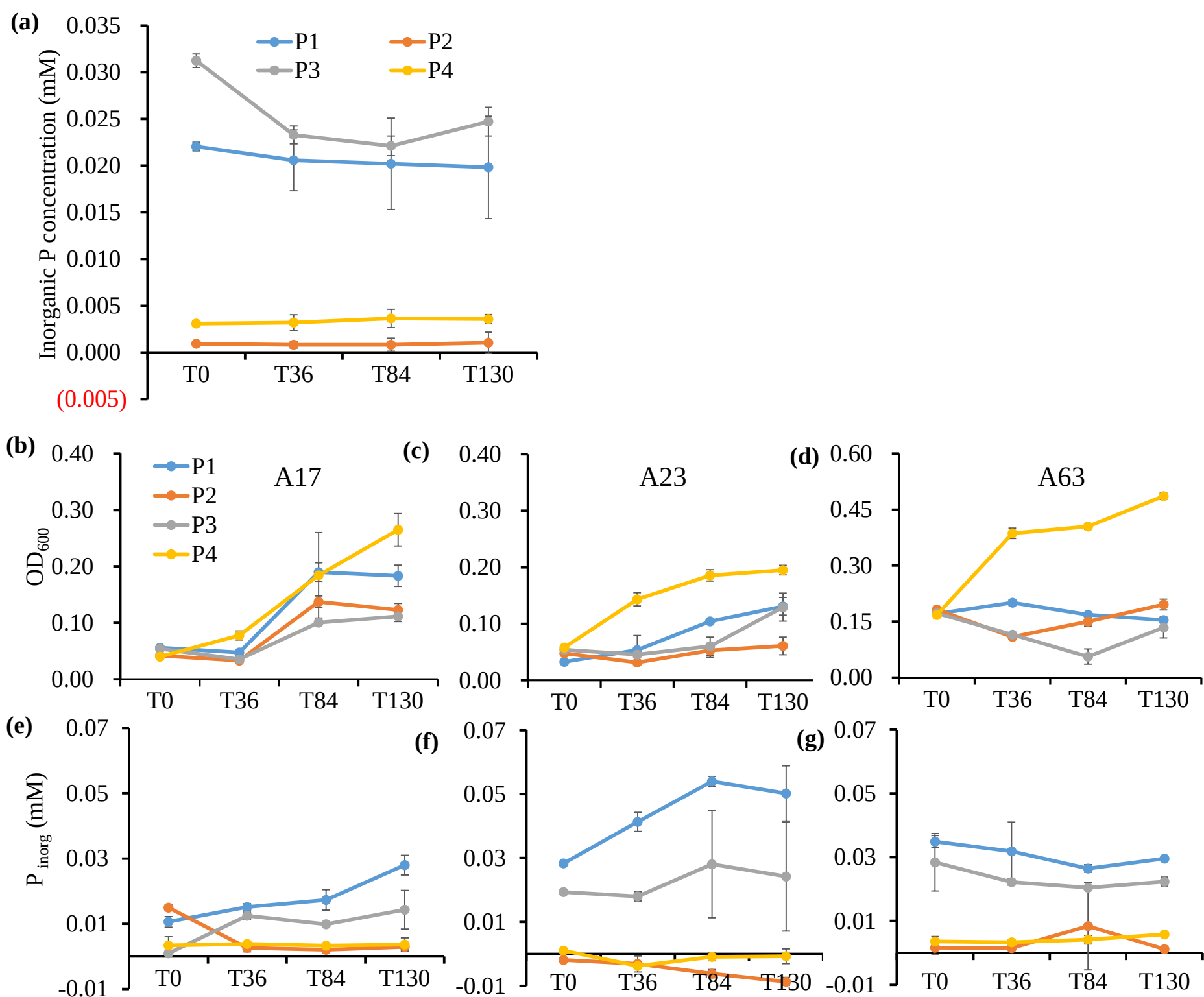


Fig. S8 Organic P sources utilized by bacterial strains A17 (b, e), A23 (c, f) and A63 (d, g), with (a) showing the inorganic P concentration in the liquid media without any bacteria which were set as the blank controls. P1, Glycerophosphoric acid; P2, Adenine phosphate; P3, D-glucose 6-phosphate dipotassium salt; P4, Herring sperm DNA. A17, *Cupriavidus pinatubonensis*; A23, *Cupriavidus* sp. UR 7-04; A63, *Sphingomonas* sp. MY-CA111. A23 can use oxalate as a sole C source, while A17 and A63 can use oxalate as an additionally C source.

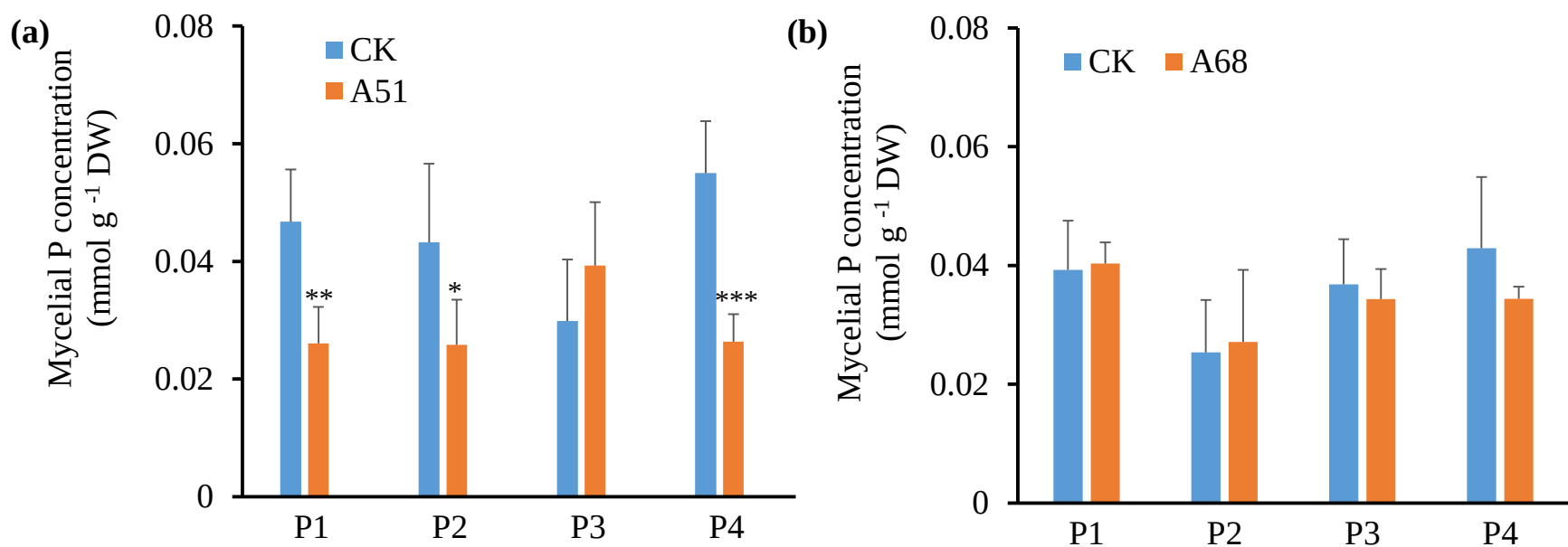


Fig. S9 Mycelial total P concentration affected by bacterial strains A51 and A68 in liquid medium supplied with organic P forms. P1, Glycerophosphoric acid; P2, Adenine phosphate; P3, D-glucose 6-phosphate dipotassium salt; P4, Herring sperm DNA. A51, *Ancylobacter rudongensis*; A68, *Variovorax paradoxus*. A51 uses oxalate as a sole C source, while A68 uses oxalate as an additionally C source. n=5-7; * $P < 0.05$, ** $P < 0.01$, *** $P < 0.001$, by Student *t*-test.