Y-A+S is the new YAS: Updating microbial life history tradeoffs with comparative genomics - SI

Supplementary Figures

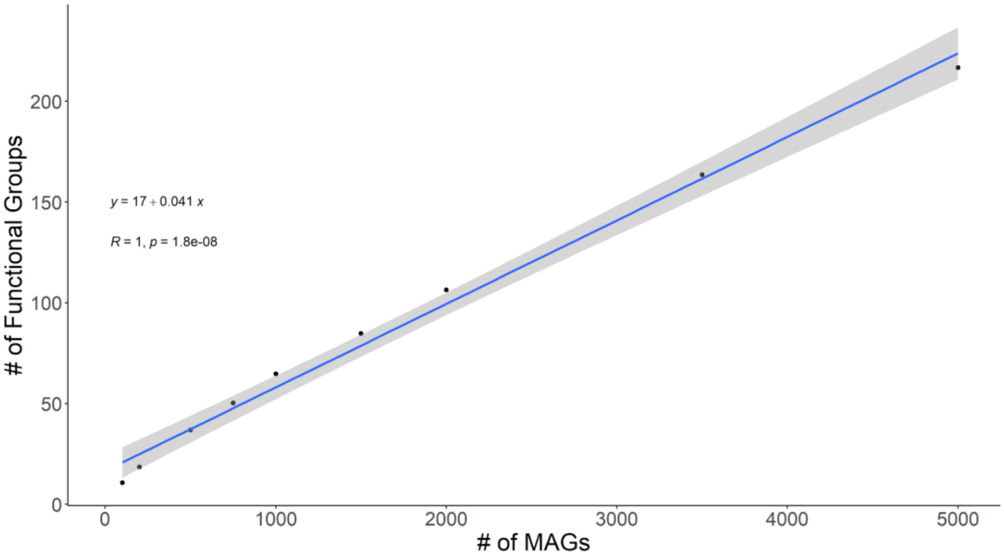

Figure S1. Curve to extrapolate the potential FGs for the entire MAG-to-genes matrix of 27214 MAGs and isolates. We randomly selected 100, 200, 500, 750, 1000, 1500, 2000, 3500, and 5000 MAGs to obtain the maximum number of FGs for each sample size. We repeated the process with 12 different samples per sample size and used the mean value of their FGs to fit a linear model.

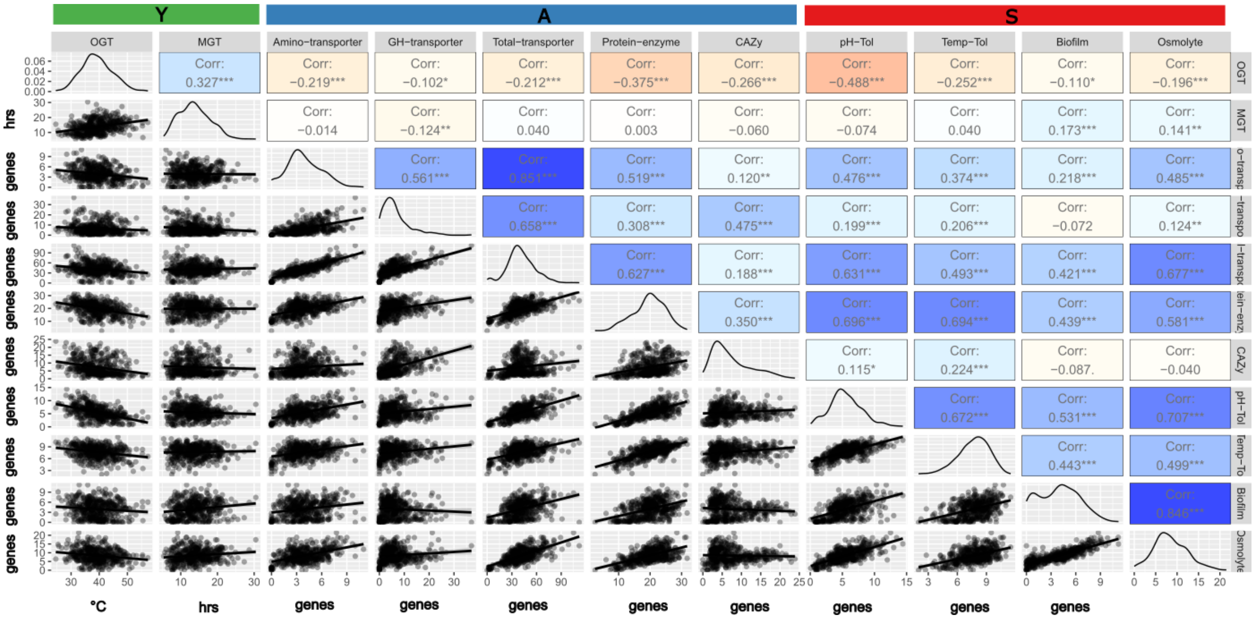

Figure S2. Trait tradeoffs among traits representative of the YAS framework using soil MAGs grouped by FGs. We used the minimum generation time (mgt) (considering mgr above 5 hours (slow-growing bacteria) and optimal growth temperature (ogt) to represent the Y traits. Because of this cut in mgr and some NA due to the quality of the MAGs, we are only plotting 464 FGs that fulfill these characteristics.

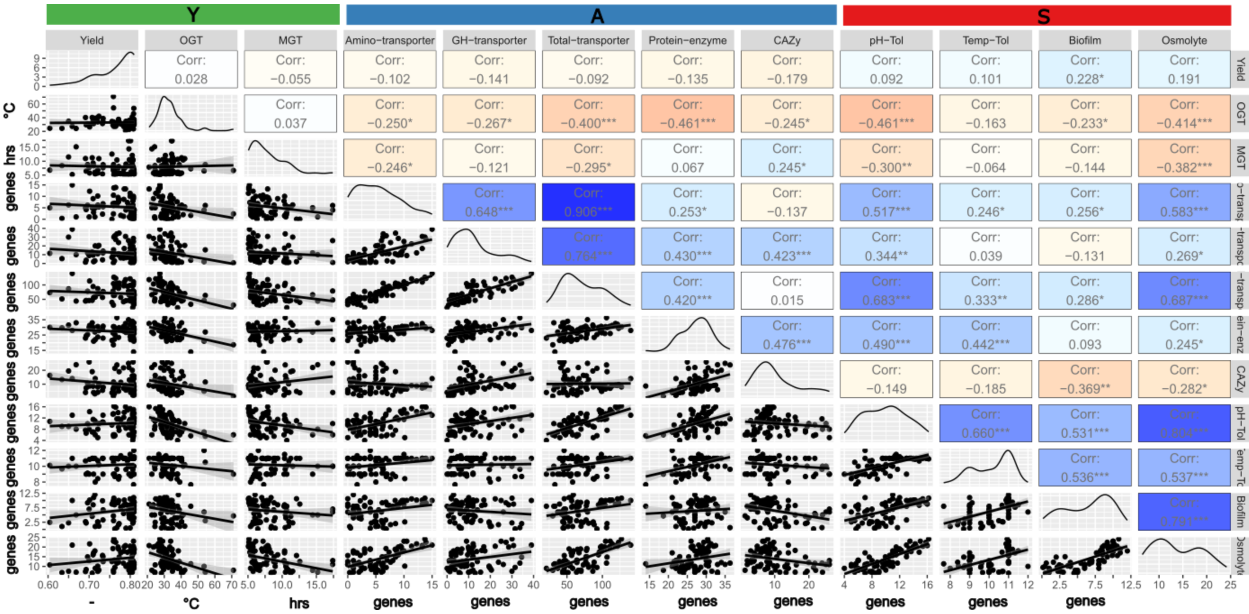

Figure S3. Trait tradeoffs among traits representative of the YAS framework using soil isolates grouped by FGs. We used the minimum generation time (mgt) (considering mgr above 5 hours (slow-growing bacteria) and optimal growth temperature (ogt) and estimated yield to represent the Y traits. Because of this cut in mgr and some NA due to the quality of the MAGs, we are only plotting 75 FGs that fulfill these characteristics.

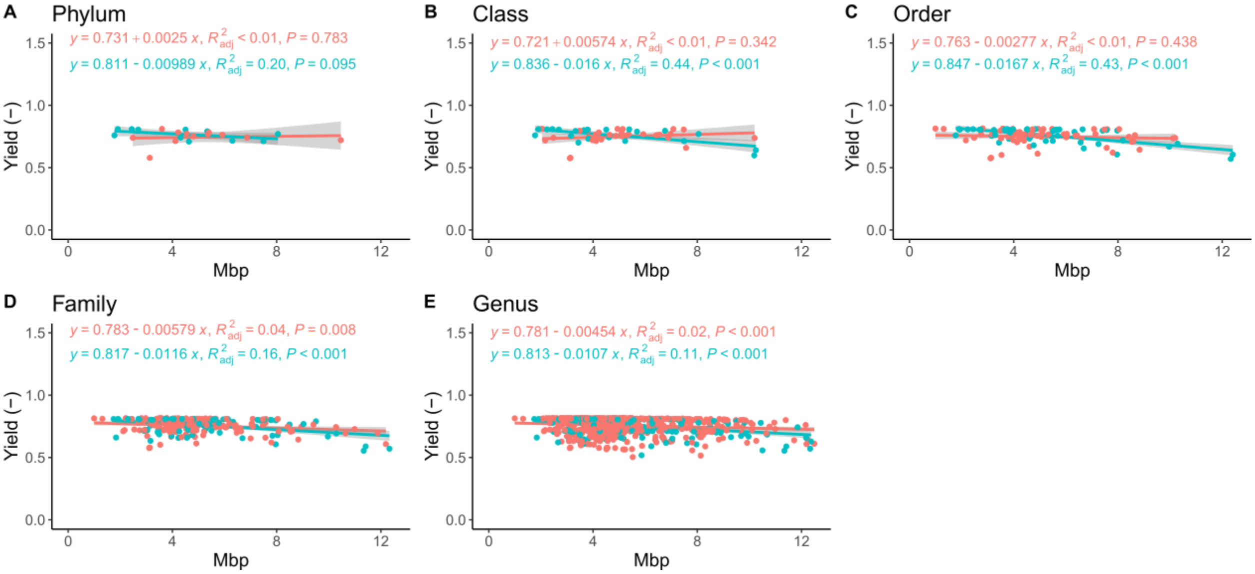

Figure S4. Estimated CUE using the DEBmicrotrait model [1] grouped by different taxonomic levels. Red regressions correspond to fast-growing bacteria, and blue regressions correspond to slow-growing bacteria.

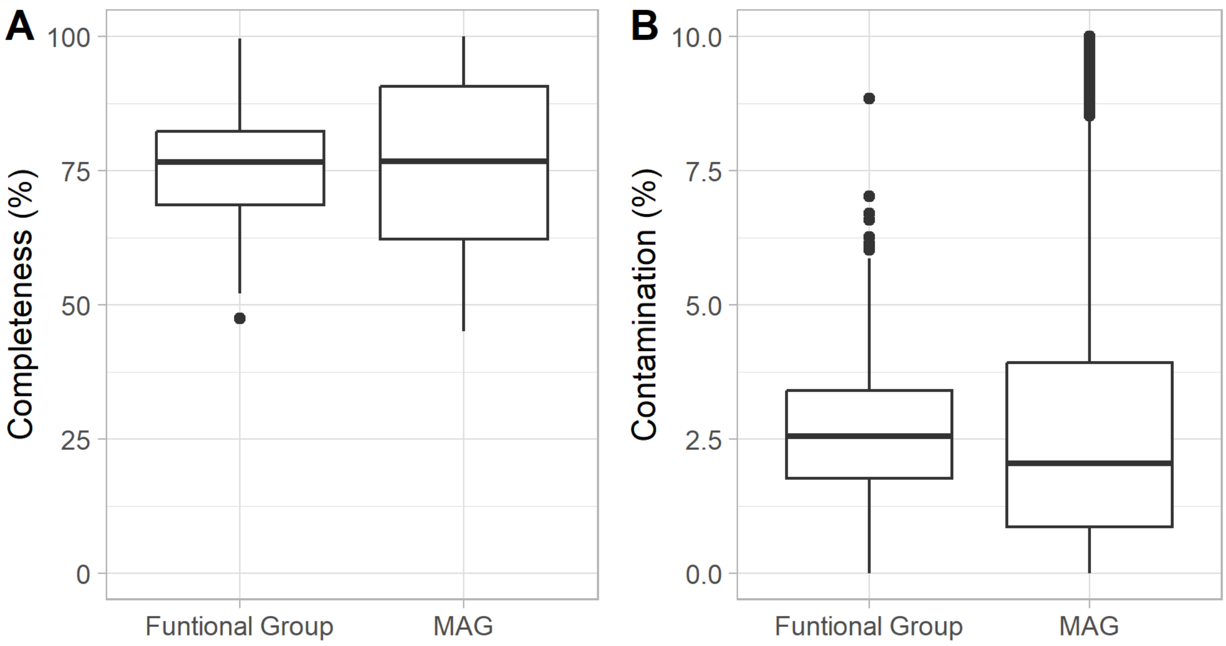

Figure S5. Summary statistics of MAGs and functional group quality regarding completeness and contamination. All isolates used in this study were of high quality.

Supplementary Tables

Table S1. Publicly available whole-genome sequences from soil isolates from the JGI-IMG portal https://img.jgi.doe.gov/m

Table_S1.xlsx

Table S2. Key for microTrait genes encoding for carbohydrate degradation enzymes

Table_S2.xlsx

Table S3. Key for microTrait genes encoding for protein degradation enzymes

Table_S3.xlsx

Table S4. Key for microTrait genes encoding for transporters

Table_S4.xlsx

Table S5. Key for microTrait genes encoding for osmolytes

Table_S5.xlsx

Table S6. Key for microTrait genes encoding for biofilms

Table_S6.xlsx

Table S7. Key for microTrait genes encoding for high-temperature resistance

Table_S7.xlsx

Table S8. Key for microTrait genes encoding for pH tolerance

Table_S8.xlsx

Table S9. Correlations among traits for fast-growing MAGs FGs

Table_S9.xlsx

Table S10. Correlations among traits for slow-growing MAGs FGs

Table_S10.xlsx

Table S11. Correlations among traits for fast-growing soil isolate FGs

Table_S11.xlsx

Table S12. Correlations among traits for slow-growing soil isolate FGs

Table_S12.xlsx

Table S13. MAG microTrait output and metadata from the JGI-IMG portal https://img.jgi.doe.gov/m

Table_S13.csv

Table S14. microTrait output using MAGs from Nelson et al. [2]

Table_S14.csv

Table S15. microTrait output using MAGs from Malik et al. [3]

Table_S15.csv

Table S16. microTrait output from isolates

Table_S16.csv

Table S17. Selected genes to perform functional grouping

Table_S17.xlsx

Table S18. Functional groups per MAGs

Table_S18.csv

Table S19. Functional groups per isolate

Table_S19.csv

Table S20. Aggregate traits for slow-growing MAGs

Table_S20.xlsx

Table S21. Aggregate traits for fast-growing MAGs

Table_S21.xlsx

Table S22. Aggregate traits for slow and fast-growing isolates

Table_S22.xlsx

Table S23. Estimations of CUE for soil isolates

Table_S23.csv

References

1. Marschmann, G. L. *et al.* Predictions of rhizosphere microbiome dynamics with a genome-informed and trait-based energy budget model. *Nat. Microbiol.* **9**, 421–433 (2024).
2. Nelson, A. R. *et al.* Wildfire-dependent changes in soil microbiome diversity and function. *Nat. Microbiol.* **7**, 1419–1430 (2022).
3. Malik, A. A. *et al.* Bacterial population-level trade-offs between drought tolerance and resource acquisition traits impact decomposition. *ISME J.* wrae224 (2024) doi:10.1093/ismejo/wrae224.