

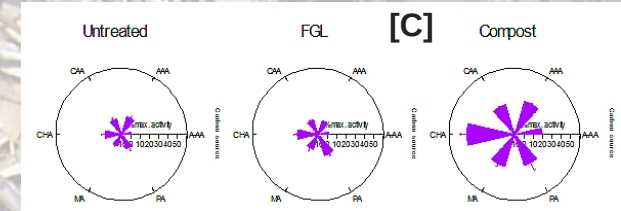
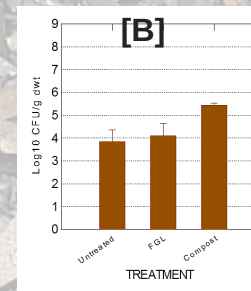
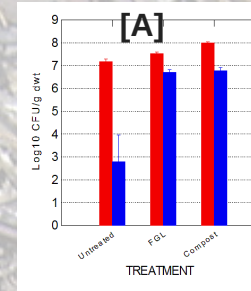
# Microbial indicators of soil and organic matter quality

A soil's microbiology status is a primary indicator of its biological properties and of the overall soil quality. Microbiological changes in soils occur more rapidly than chemical or physical changes and so provide a sensitive means of characterising changes in soil quality.

Many of the functions of the microbial biomass are unaffected by its exact species composition which limits the value of using only taxonomic and molecular approaches to microbial monitoring. We monitor microbes using a combination of isolation and colony counting, together with metabolic fingerprinting of the bacterial and fungal communities through their utilization of different carbon sources. These tests are reliable and cost-effective for routine measurements, yet provide enough information for meaningful insights into the state of a soil's microbiology.

Metrics derived from these measurements include:

- The presence of key microbial indicator species.
- The ratio of actinomycetes to non-filamentous bacterial colonies as a primary bio-indicator of the degree of soil disturbance.
- The proportion of copiotrophic (fast-growing) bacteria as a bio-indicator of the level of labile soil organic carbon.
- Changes in the metabolic fingerprints of bacterial and fungal communities as indicators of change in microbial functional diversity.
- The sum of bacterial and fungal community activities. Higher, stable values over time indicate greater community functional diversity and resilience to stress and disturbance.
- The ratio of the bacterial:fungal community activities. This indicates the relative activities of the bacterial and fungal communities and is influenced by soil water and organic matter levels.



Nine months after treatment the effects of compost mulch on numbers of soil bacteria (red), actinomycetes (blue) [A] and fungi [B] and bacteria+actinomycete [C] and fungal [D] community activities were equal to or better than a fertilizer/ gypsum/ lime (FGL) treatment. Changes in the soil microbial community functional diversity [E] were also observed.

