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Development of Substrate Induced Respiration (SIR) Method Combined with Selective Inhibition for Estimating Fungal and Bacterial Biomass in Humic Andosols

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Abstract: A substrate-induced respiration (SIR) method combined with selective inhibition for estimating the fungal and bacterial biomass of volcanic ash of Kanto Loam type (Humic Andosols) was developed. The optimum time for CO₂ measurement was 2-4 hr after glucose application and the amount to be applied was 2000 ppm on a soil dry weight basis. CO₂ evolution from the soil correlated with the amount of microbial biomass carbon estimated by the chloroform fumigation extraction (CFE) method and a linear relationship, biomass C (μg g⁻¹ dry soil) = 81.9 x CO₂ (μl g⁻¹ dry soil hr⁻¹), was obtained between them. Cycloheximide (1000-8000 ppm) and chloramphenicol (500-2000 ppm) effectively inhibited SIR but streptomycin (500-2000 ppm) did not. The combination of 2000 ppm cycloheximide and 1000 ppm chloramphenicol showed the best additivity and enabled the measurement of the proportions of fungal and bacterial biomass. The SIR method combined with the selective inhibition technique was applied to soil samples from a maize field. The total microbial biomass was higher in the soil where green manure had been incorporated. The fungal-to-bacterial ratio increased from 1.1 at the time of maize sowing to 1.4 at the time of maize harvest.

Keywords: [Andosols](#), [Chloramphenicol](#), [Cycloheximide](#), [Green manure](#), [Microbial biomass](#), [Selective inhibition](#), [Substrate induced respiration](#)



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