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IMPACT OF FIRE ON MICROBIAL DIVERSITY AND COMMUNITY STRUCTURE IN MALAYSIAN PEATLANDS

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Microbial communities of regional peatlands are poorly known. We used 16S rRNA gene sequencing to assess impacts of fire and degradation on microbial diversity and community structure in peatlands in Peninsular Malaysia. We analysed microbes in surface peat samples from a relatively pristine peat swamp forest (North Selangor PSF) and compared them with surface peat samples from actively burning, degraded peat on the west coast (near Pekan PSF). We then analysed samples from the burning site after we dried them in an oven for 24 hrs at 60 C to determine the effects of further heating and drying (as would be expected to happen to peat near a fire). We also measured environmental parameters such as peat pH, organic carbon, nitrogen and phosphorus. Next Generation Sequencing results indicated that in surface PSF peat Proteobacteria was the dominant phylum, followed by Acidobacteria. The microbial community composition was significantly impacted by fire and also by laboratory heating and drying. Degradation and burning caused a marked decrease in most Acidobacteria, apart from Koribacteraceae. But Koribacteraceae were almost eliminated by laboratory burning and drying. Burning resulted in a significant increase in relative abundance of Actinomycetales, Acidimicrobiales and Crenarchaeota (but the latter two groups were then strongly negatively impacted by laboratory heating and drying). Further heating caused a decrease in Rhodospirillaceae (Proteobacteria), but an increase in relative abundance of Micrococcaceae (Actinobacteria) and also *Bacillus* and *Alicyclobacillus* (Firmicutes). *Bacillus* endospores have been shown to be highly resistant to heat and desiccation in extreme terrestrial environments. Similarly *Alicyclobacillus* are soil-dwelling bacteria that are tolerant of acidity (pH 2.0 to 6.0) and high temperatures (up to 70 °C). Changes in microbial communities caused by peat fires will impact the functioning of microbes with respect to litter decomposition, soil nutrient cycling and greenhouse gas emissions.

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