

Does the biomass of waterlogged soil adapt to anaerobic conditions?



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Aims

Our aims were to see if soil microbes in paddy (i.e. waterlogged) soils demonstrate better adaptation to waterlogged conditions than upland soils. We did this by comparing the changes in biomass C, biomass P and ATP under aerobic and waterlogged conditions in paddy and upland soils.

Materials and Methods

Six pairs of Chinese upland and paddy soils, two UK soils, Broadbalk arable and IGER grassland, were used. Portions of moist soil were incubated aerobically at 40% water-holding capacity or anaerobically up to 30 days. Biomass C, biomass P and ATP were determined. Measurements of microbial community structure were also made but are not yet available.

Results (An example is shown)

- There was little consistent change in biomass C in any of the soils during aerobic incubation. In contrast, biomass C declined when the soils were incubated anaerobically. It fell by 50% in paddy soil and by 55% in upland soil after 30 days incubation (Figure 1).
- Biomass P increased a little after 2 days aerobic incubation and then was constant in both soils. Biomass P declined under waterlogged conditions. It fell by 77% after 30 days in paddy soil, but there was no significant difference under anaerobic and aerobic incubation in upland soil (Figure 2).
- ATP declined during anaerobic incubation in contrast to aerobic incubation. The ATP of paddy and upland soils fell by 40% and 59% respectively (Figure 3).

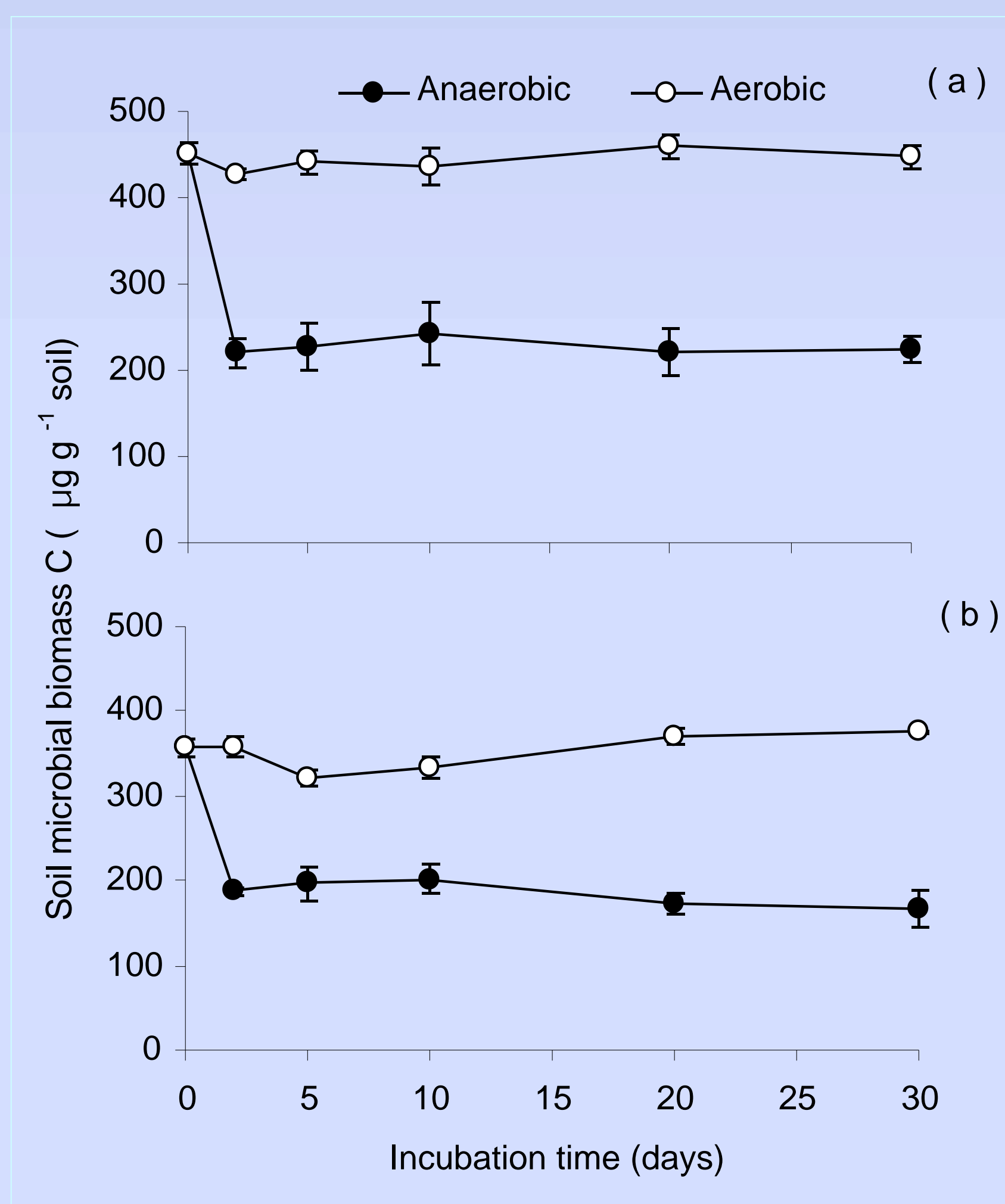


Figure 1 Changes in biomass C during aerobic or anaerobic incubation of (a) paddy and (b) upland soils.

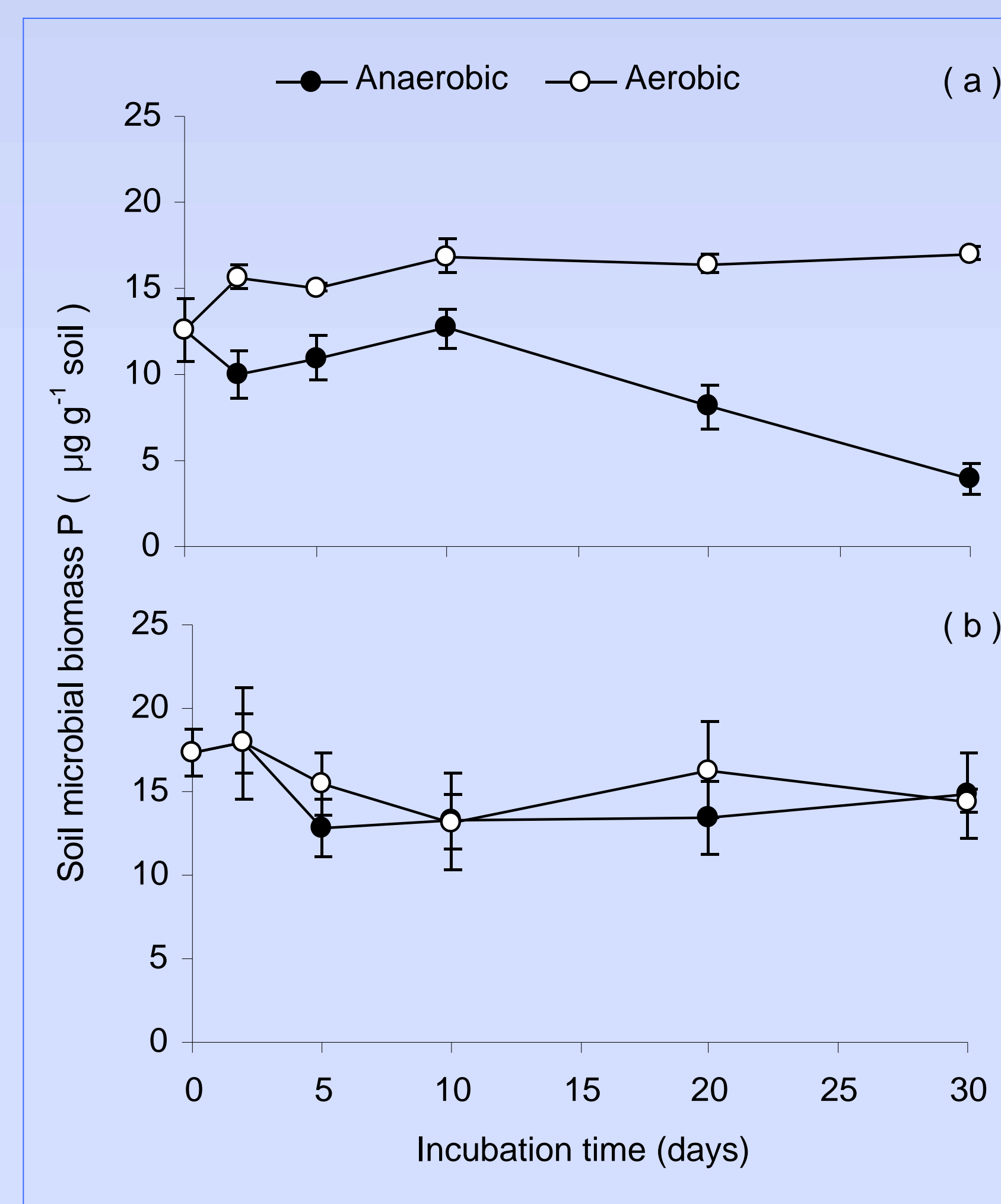


Figure 2 Changes in biomass P during aerobic or anaerobic incubation of (a) paddy and (b) upland soils.

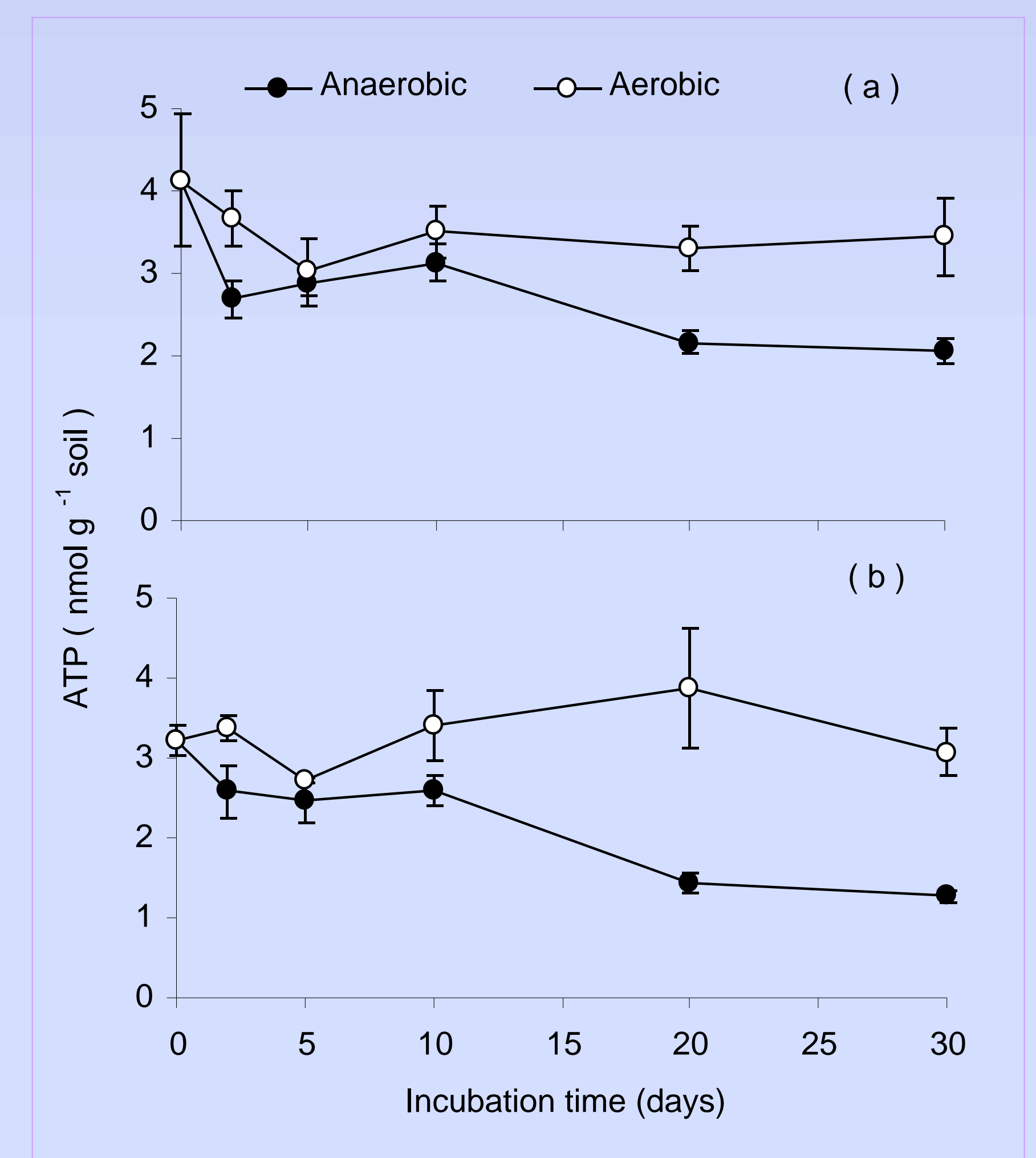


Figure 3 Changes in ATP during aerobic or anaerobic incubation of (a) paddy and (b) upland soils.

Conclusions

The results indicate that there was no significant adaptation of the microbial biomass to waterlogged conditions in soils subjected to regular waterlogging under field condition.

References

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