

## EFFECT OF SHIFTING CULTIVATION CYCLES AND DIFFERENT LANDUSES ON SOIL MICROBIAL PROPERTIES

Nongmaithem Leindah Devi<sup>1\*</sup>,

### ABSTRACT

This study examines the relationships between length of fallow cycles (0-1, 3-4, 5-7, 8-10 and 12 years), different improved/ alternate land use practices (e.g. intermittent agriculture, agro forestry and abandoning jhum land) and soil microbial properties in shifting cultivated areas of Chandel district of Manipur. Results revealed that in all the land uses practiced, short term fallow cycle (3-4 years) resulted in deterioration of soil microbial biomass carbon (SMBC), dehydrogenase activity (DHA) and basal respiration (BR). With increase in post burn fallow cycles from 5-7 years onward revealed increase of soil microbial biomass carbon, dehydrogenase activity and basal respiration except in intermittent agriculture where irregular crop-fallow rotation was practiced. Among the land uses, abandoned jhum lands (under pastures) for 5-7 or more years were relatively stable in restoring soil health due to efficient surface coverage, internal regulation and lack of anthropogenic intervention. Agro-forestry system of 8-10 years old, dominated by soil enriching pulse crops (*Vigna spp.*, *Cajanus spp.*, *Glycine max*) and deep rooted nitrogen fixing trees (*Parkia*, *Alnus*, *Albizia etc.*) restored the soil health most remarkably and rapidly, even better than 25 years old undisturbed secondary *Pinus kesiya* dominant forest ecosystems. Thus, adoption of appropriate land uses in conjunction with optimum fallow cycles, preferably 5-7 or more years and proper combination of soil enriching crops and trees have the potential to restore the soil health and sustain the productivity in degraded jhum land of north-eastern region of India.

Key words: Shifting cultivation cycles, landuses, soil microbial properties

### CONCLUSION

In all the land uses, shrunk of fallow cycles to 3-4 years was most detrimental to soil microbial parameters. In intermittent, agricultural system, shifting cultivation (jhum) cycle of 2-3 years significantly deterioration of soil microbial biomass carbon, dehydrogenase activity and basal respiration. While in agroforestry system, with the increase in post burning fallow periods from 3-4 years to 8-12 years, soil microbial properties restoration progressed appreciably and consistently. Like agroforestry practices, in abandoned jhum land, with the increase in post burning fallow cycles from 3-4 years to 8-12 years, constant improvement in soil microbial parameters were registered. However, microbial biomass carbon, dehydrogenase activity and basal respiration were severely deteriorated in short term fallow cycle (3-4 years). Nevertheless, considerable recuperation in soil microbial properties started from 5-7 years onward and reached peak at 8-10 years fallow cycle. Over 90% increase in microbial biomass carbon compared to 3-4 years. Similarly, increase in enzymatic activity (>10%) was observed. Therefore, adoption of proper improved landuses or agro forestry system with shifting fallow cycle more 5-7 or more years is better option to sustain the soil microbial parameters in the shifting cultivated area.

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