Impact of prescribed fire on nitrogen mineralization in three different ecosystems of the north-western Himalaya: an insurance to wildfire-prone ecosystems

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To understand the dynamics of nitrogen pools in response to prescribed fire, a study was carried out with four land uses, viz. chir pine forest (*Pinus roxburghii*), grassland, scrubland and non-fire site in chir pine (control) at three soil depths (0–5, 5–10 and 10–15 cm) for a period of one year. The results revealed that ammonification rate increased initially for few months post-fire up to the rainy season and then showed a declining trend in all the burnt land uses, and decreased with increasing soil depth. The nitrification rate was almost the same as pre-fire levels in the initial few months after fire, and then started increasing from August onwards till the end of the study period. Post-fire, the net nitrogen mineralization was found higher in all the burnt land uses over control. Prescribed fire accelerates the rate of net N mineralization which contributes to ecosystem productivity.

Keywords: Ammonification, chir pine forest, grassland, nitrogen mineralization, prescribed fire, scrubland.

37,059 active forest fire events occurred during 2018, indicating a 1.5 times increase in forest fires compared to the year 2012. In India, wildfires wreak havoc in nearly 3.73 million hectares (m ha) of forest area each year[8]. Forest fires significantly impact terrestrial habitats, resulting in serious casualties and economic losses[9,10]. Plants and surface soil N are consumed by wildfires, resulting in the contraction of the N pool in a flamed forest[11] and a subsequent drop in N mineralization rate[12].

The fire impacts on a region are dependent on the intensity and duration of the fire[13]. Fire can be a destructive force or a management tool, depending on how we define it. Recently, the use of prescribed fires has been gaining popularity as a tool to reduce the occurrence and impact of wildfires by reducing fuel availability. Prescribed fire is the systematic, planned use of fire of low intensity under predetermined weather, fuel and topographic parameters to achieve the defined objectives[14,15]. Prescribed burning affects the structure and productivity of an ecosystem and