

Vegetation Analysis, Species Diversity and Productivity of Revegetated Semi-arid Subtropical Forest in North India

A rehabilitated site in the Gangetic alluvial plain in north India was selected to assess the impact of restoration process. Three forest stands (S1, S2, S3) were selected at Banthra, Lucknow (26°45' N, 80°53' E). Basal area ranged from 26 (S1) to 34 (S3) m²ha⁻¹ in overstory, 7 (S1) to 4 (S3) m²ha⁻¹ in understory vegetation, whereas ground layer had maximum basal cover in S2 stand. Diversity index was greater in S1 stand for overstory (3.99), S2 stand for understory (3.80) and S3 stand for ground layer vegetation (1.76). Biomass value increased from S1 (292.8 Mgha⁻¹) to S3 stand (386.2 Mgha⁻¹) in overstory and vice versa for understory. Stand S2 consisted of predominance of ground layer biomass due to greater basal cover. The forest consisted of 347±27 Mgha⁻¹ biomass and 25±Mgha⁻¹ yr⁻¹ net productions. Annual litter fall estimated as 8.45±0.18 Mgha⁻¹. Fine root biomass (up to 45 cm depth) decreased from S1 to S3 stands with mean value of 532±79 gm². Rainy and summer season contributed 67% of total annual fine root production (233 gm² yr⁻¹) up to 30 cm depth. The rehabilitated forest has achieved up to 70% of the reference forest site of this region.

Key words: Biomass production, Community structure, Diversity indices, Rehabilitated forest, Sodic land.

Introduction

Natural succession remains arrested on sodic lands and does not proceed automatically without anthropogenic interventions. These sites do not have any significant vegetation except sporadic patches of some grasses. Afforestation on sodic land is a critical task due to several soil constraints restricting the growth of plants (Bhojvaid and Timmer, 1998). In India about 20% of the geographical area is under forest in which tropical forests contribute nearly 83% of the forest area (FSI, 2013). However, Yadav (1993) has reported 26.1m ha of salt affected land out of the 174m ha wastelands in the country. Singh and Jha (1990) reported that about 2.5m ha sodic soils in the Indo-Gangetic plains. Of this Uttar Pradesh state alone constitutes about 1.23m ha sodic soil (Dagar and Singh, 1993). The widespread degradation of alluvial soil in the Indo-Gangetic plains affected by sodicity or salinity has received priority attention for afforestation during past few decades. Both exotic and native species may be planted to rehabilitate degraded lands depending on site conditions (Singh *et al.*, 2002; Dutta and Agrawal, 2003; Singh *et al.*, 2004; Shukla *et al.*, 2011). It has been observed that at the stand level mixed species performed well for volume, basal area, biomass and carbon sequestrations in comparison to pure monoculture stands (Piotto *et al.*, 2003 a, b; Alice *et al.*, 2004; Petit and Montazini, 2004). Economically viable and adoptable technology for afforestation of sodic land has been studied (Sharma *et al.*, 1992). Sandhu and Abrol (1981) studied the method of site

Restoration of barren sodic land in a new forest ecosystem has acquired most of the characteristic properties of natural forests of this region.

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