



Contribution of *Populus deltoides* based agroforestry systems in atmospheric CO₂ reduction in northern states of Uttar Pradesh and Uttarakhand

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Received: 5th October, 2021

Accepted: 9th August, 2022

Abstract

The present study aimed at estimating area under poplar plantations and their contribution in reduction of atmospheric CO₂ in Uttar Pradesh and Uttarakhand states. Object-oriented classification technique was applied on high resolution remote sensing data (LISS-IV/ spatial resolution- 5.8 m) for mapping agroforestry/ poplar area in six study districts. Total agroforestry area in six districts was estimated to be 91622.73 ha. Poplar area was found to be the highest in Bijnor district (12840.53 ha) of Uttar Pradesh followed by Haridwar district (8096.25) of Uttarakhand. As % of agroforestry area in district, Haridwar has the highest poplar area (61.2%). Estimated stem, aboveground and total biomass of poplar plantations were found to be the highest in Baghpat district because of high tree density. Muzaffarnagar district has second the highest values of estimated stem, aboveground and total biomass (128.55, 153.89 and 194.80 t ha⁻¹, respectively). Carbon stock was also found to be the highest in Bijnor district (0.909 million tonnes) followed by Muzaffarnagar district (0.813 million tonnes). About 2.795 million tonnes of C-stock in total biomass was assessed in five selected districts of Uttar Pradesh and Uttarakhand. In this way, contribution of these districts in atmospheric CO₂ absorption was to the tune of 10.257 million tonnes in total biomass of poplar plantations. It was concluded that agroforestry systems in general and poplar based systems in particular have significant contribution in reduction of atmospheric CO₂. Hence, they would certainly play an important role in climate change mitigation at state/ regional level.

Keywords: Agroforestry systems, Carbon-di-oxide, Climate change, Object-oriented classification, *Populus deltoides*