

## Effects of surface drip irrigation and fertigation managements on biomass production and carbon storage in a poplar plantation on sandy soil in northern China

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**Abstract:** Management approach may influence biomass production as well as carbon contents in plant components and soil of a forest. The integrative effect of water and nitrogen management on the allocation of biomass and carbon within the poplar plantation remains unclear. This study aimed to evaluate the effect of irrigation and fertigation managements on biomass production and carbon storage in a poplar plantation. A field experiment was conducted at a plantation of hybrid poplar clone in sandy soil. The comparative experiment included (1) surface drip irrigation and fertigation (SDIF) in growing season with application of N fertilizer and (2) furrow irrigation in spring and unfertilized as control (CK). Biomass production (BP), plant organic carbon contents (POCC), plantation carbon density (PCD), soil organic carbon contents (SOCC) and soil organic carbon density (SOCD) were calculated. The results showed that: (1) Biomass production in the plantations measured in one and two years of the experiment varied significantly between management approaches. Total biomass in SDIF treatment was 52% and 75% higher than that in CK treatment after one and two years of the experiment, respectively. Production of the support components of the poplar plantations (i.e. leaf, branch, trunk and coarse root) was significantly influenced by management approaches, and this phenomenon did not change among the two years of experiment. However, the biomass of fine roots was not significantly different between management approaches in the second year of experiment. In addition, total biomass production was significantly increased in the second year of experiment. The percentage of biomass increment in tree components in the year 2013 compared between management approaches. Significant differences were observed for the percentage of biomass increment in leaves, trunks, roots and total biomass between management approaches. SDIF yielded higher yearly increment in trunks and total biomass. In contrast, the percentage of biomass increment in leaves and roots were significantly higher in CK than SDIF-treated plantation.