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Multistoried Fruit Production Model for High Carbon Sequestration: A Climate Change Mitigation Approach in Bangladesh

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Abstract: The globe is now mostly concerned about climate change and its impacts on lives. The highly dense population and geographical location make Bangladesh most vulnerable to climate change. Concerning the issue, it's a big challenge making the agriculture sector adapt as well as sequestering more carbon from the atmosphere to mitigate climate change. To address climate change impacts, the study aimed to assess carbon sequestration potentials in different fruit production models developed by the Department of AFE, Bangabandhu Sheikh Mujibur Rahman Agricultural University. The study was arranged in a single-factor randomized complete block design. The treatments were open field (T_1), aonla (*Phyllanthus emblica*) (T_2), carambola (*Averrhoa carambola*) (T_3), lemon (*Citrus limon*) (T_4), aonla + carambola (T_5), aonla + lemon (T_6), and aonla + carambola + lemon (T_7). The vegetation data, soil data, and canopy data were collected to determine carbon sequestration and its response to the drivers. The study revealed that treatment T_7 had the highest biomass sequestration rates both above and below ground, as well as the total carbon content (64 tons/ha) which was followed by T_5 and T_6 treatments compared to T_2, T_3, and T_4 single strata treatments. The findings revealed that the total amount of carbon content showed a positive significant response to photosynthetically active radiation leaf area index (R^2 = 0.8591), total soil nitrogen content (R^2 = 0.9351), canopy coverage (R^2 = 0.9821) and litter fall (R^2 = 0.9606). This study also explores the role of agroforestry in carbon sequestration using the multistoried fruit production model, contributing to sustainable climate change strategies, land use management, environmental resilience, and policy making.

Keywords: Carbon sequestration, Environmental resilience, Land use management, Multistoried agroforestry model.