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Carbon balance of plastic greenhouse ecosystems : a case study in China

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Plastic greenhouse vegetable cultivation (PGVC) has played a vital role in increasing incomes of smallholder farmers. A dramatic expansion in PGVC usage has taken place in the last several decades. However, carbon sequestration potential after conversion from conventional open field vegetable cultivation (CVC) to PGVC has been poorly quantified with regards to carbon emissions that will occur due to the intensification in agricultural practices. A full carbon cycle analysis was used to estimate the net carbon flux from PGVC systems based on the combination of data from both field observations and literatures. Carbon fixation was evaluated at two pre-selected locations in China.Results suggest that: (1) the carbon sink of PGVC is 1.21 and 1.23 Mg C ha-1 yr-1 for temperate and subtropical area, respectively; (2) the conversion from CVC to PGVC could substantially enhance carbon sink potential by 8.6 times in the temperate area and by 1.3 times in the subtropical area; (3) the expansion of PGVC usage could enhance the potential carbon sink of arable land in China overall.