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Carbon and nitrogen changes affected by elevated temperature and CO₂ under the open top chamber environment in rice paddy

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Elevated temperature and CO₂ concentration of atmosphere can change the cycle of carbon and nitrogen in rice paddy. To understand the changes of carbon and nitrogen, as an agricultural resource, forced by climate change are important to develop the adapting technology in agricultural sector. The change of carbon and nitrogen were evaluated by elevated temperature and CO₂ concentration in rice paddy of South Korea. In order to control the elevated temperature and elevated CO₂ concentration, we set up the open top chamber (OTC) facility of 2m(W)×2.5m(H) with three replication and rice seedlings were transplanted inside its plot. The treatments consisted of elevated temperature (ambient+1~3°), elevated temperature plus elevated CO₂, and open paddy as a control. Concentrations of TOC, COD and the COD/TOC ratio of flooded surface water (oxidation layer) increased by elevated temperature. On the other hand, the concentrations of TOC, COD, and the COD/TOC ratio of percolating water of soil depth of 50 cm (reduction layer) showed decreasing trend. Furthermore, elevated temperature and CO₂ treatment increased the concentration of TOC in surface water. The content of soil T-N and TOC were higher than those of the control. Elevated temperature significantly increased the culm length, culm weight of rice plant but the panicle number, panicle weight of rice did not show significant differences. These results imply that elevated temperature and elevated atmospheric CO₂ concentration can increase carbon and nitrogen export from rice paddy. Therefore, the carbon and nitrogen cycle of rice paddy could be changed under future climate change environment.

Biography

Seung-Chang Hong has completed his PhD from Chungbuk National University of South Korea. He has been serving as an Agricultural Researcher at National Institute of Agricultural Sciences, RDA, Republic of Korea. He works in response to climate change and agricultural environment.

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