




## Carbon dynamics and budgets in three upland double-cropping agro-ecosystems in Japan

Hiroshi Koizumi , Youzou Usami, Mitsumasa Satoh

Division of Plant Ecology, National Institute of Agro-Environmental Sciences, Tsukuba Science City, Ibaraki 305, Japan

[http://dx.doi.org/10.1016/0167-8809\(93\)90088-7](http://dx.doi.org/10.1016/0167-8809(93)90088-7), How to Cite or Link Using DOI

 Permissions & Requests

[View full text](#)

### Abstract

Carbon dynamics and budgets were studied in three different double-cropping agro-ecosystems: upland rice-barley (R-B), peanut-wheat (P-W) and dentcorn-Italian ryegrass (C-I). The experiments were carried out in upland fields in Ibaraki Prefecture, central Japan, between June 1985 and May 1988.

The annual amount of carbon fixed by the crops in the cropping systems was 617–627 g C m<sup>-2</sup> for the food crop (R-B and P-W) systems and 1358 g C m<sup>-2</sup> for the forage crop (C-I) systems. The amount of carbon supplied to the soil as organic matter was 338–382 g C m<sup>-2</sup> for the food crop systems and 420 g C m<sup>-2</sup> for the forage crop systems. However, the carbon respired by the heterotrophic respiration (respiration of soil fauna and micro-organisms) was 716–798 g C m<sup>-2</sup> and 1050 g C m<sup>-2</sup> in the respective systems. Therefore, the annual carbon balance was estimated to be -400 g C m<sup>-2</sup> for the food crop systems and -600 g C m<sup>-2</sup> for the forage crop systems.

These results suggest that effective agronomic measures are needed to maintain the carbon balance in prevailing agricultural ecosystems in order to sustain soil fertility, and that the upland agro-ecosystems may contribute to the increase in the carbon dioxide concentration of the atmosphere as the carbon accumulated in the soil is constantly being released into the atmosphere.