

B-6 Clarification of Carbon Cycling Processes in the Terrestrial Ecosystems

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The objectives of the study were to clarify quantitative carbon cycle in a vegetable field, a paddy field, a pasture, an agro-forest, a warm-temperate forest, a cold-temperate forest and a regional agro-ecosystem.

1. Carbon budgets of a sweet potato (*Ipomoea batatas*) - chinese cabbage (*Brasica rapa*) double-cropping field and an abandoned field were -168 and -187 $\text{gC/m}^2/\text{yr}$, respectively. The carbon budgets suggest that croplands act as a source of carbon dioxide.
2. Carbon cycle through solid phase or liquid phase was measured in a paddy field. About $90\text{gC/m}^2/\text{yr}$ was assumed to be accumulated in the system. Carbon dioxide flux measured in paddy fields by the alkaline absorption method was appeared to be overestimated compared with IR analysis and chamber methods.
3. Net carbon absorptions of forest ecosystems from atmosphere in a managed agro-forest, an abandoned agro-forest and a 50 years old deciduous natural agro-forest were 3.7, 2.2, 3.9 tC/ha/year , respectively. The results show that both a agro-forest and a natural deciduous forest perform as a carbon sink.
4. CO_2 gas fluxes in grazing pastures were measured directly by the eddy correlation method. The amounts of CO_2 absorbed by grassland were larger than CO_2 emitted to atmosphere per diem at fine days (e.g., $0.86\text{gCO}_2/\text{m}^2/\text{day}$ excess). A mathematica model simulation showed that CO_2 budget in a pasture ecosystem was black of $326\text{gCO}_2/\text{m}^2/\text{yr}$.
5. We made a map of annual carbon flux in croplands at the regional scale using Landsat TM data and a simple carbon cycle model. the annual flux varied from -493 to $+40$ $\text{gC/m}^2/\text{yr}$ with an average of $-151\text{gC/m}^2/\text{yr}$.
6. A large spacial variation of carbon budget data was obtained from measurments in a cool-temperate deciduous forest.
7. A model of carbon cycle in a warm-temperate deciduous forest was constructed according to results from field surveys and analyses. Simulations showed a carbon budget was balanced before cutting but the large minus was observed just after cutting. The balance, however, change from minus to plus in 10 years after cutting. Nearly the same amount of carbon as that stocked in the timbers before hervesting accumulated in 70-80 years after the cutting. These results indicate the possibility of soils in terrestrial ecosystems as the main sink of atmospheric CO_2 .