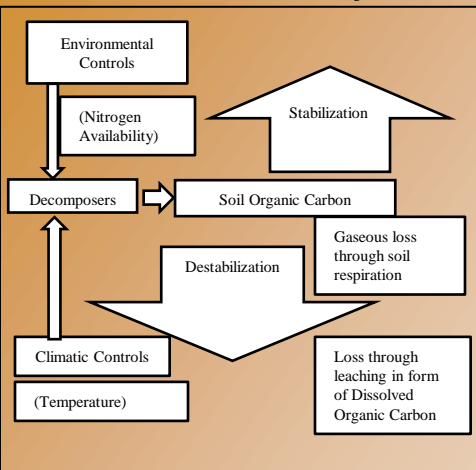
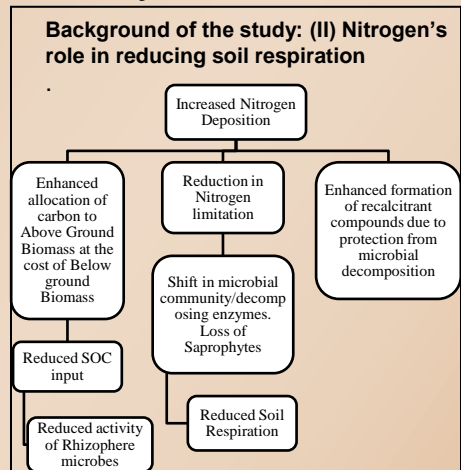
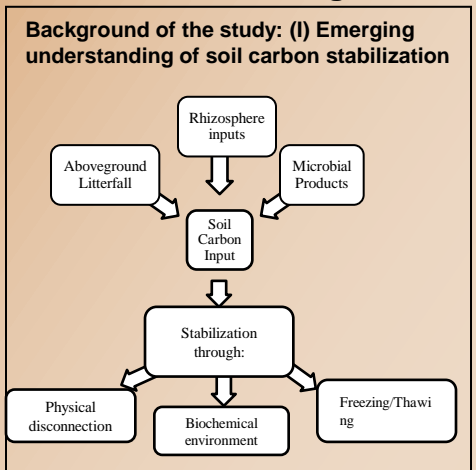




## Overview of the Study



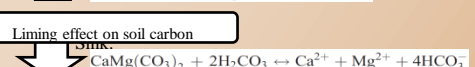
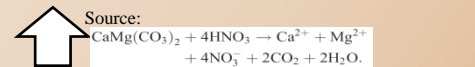
## Background of the Study



## Objective of the Study

- To investigate chemical controls in the form of:
- nitrogen addition and
  - liming
  - Under differential responses of CO<sub>2</sub> efflux and DOC export under elevated temperature in one year soil incubation experiment

### Background of the study: (III) Soil acidity management through liming can enhance or reduce CO<sub>2</sub> production depending on acidic condition



## Materials and Methods

### Sampling Site and Method



- Haeen Basin, Yanggu (South Korea):**
    - Forest site: mixed deciduous forest, ~30 yr old
    - Soil type: Cambisol (FAO Classification) – Dry to slightly moist brown soil
  - Steigerwald Nature Park, Bavaria (Germany):**
    - Forest site: more than 100 yr old
    - Major species: European Beech and Sessile Oak
    - Soil type: Dystric Cambisol (FAO Classification) – Sandy to loamy
- 25 cm X 25 cm plot were laid down to collect the soil samples – organic layer, L1 Layer: 0-10 cm. L2 Layer: 10-20 cm;

### Sampling Method

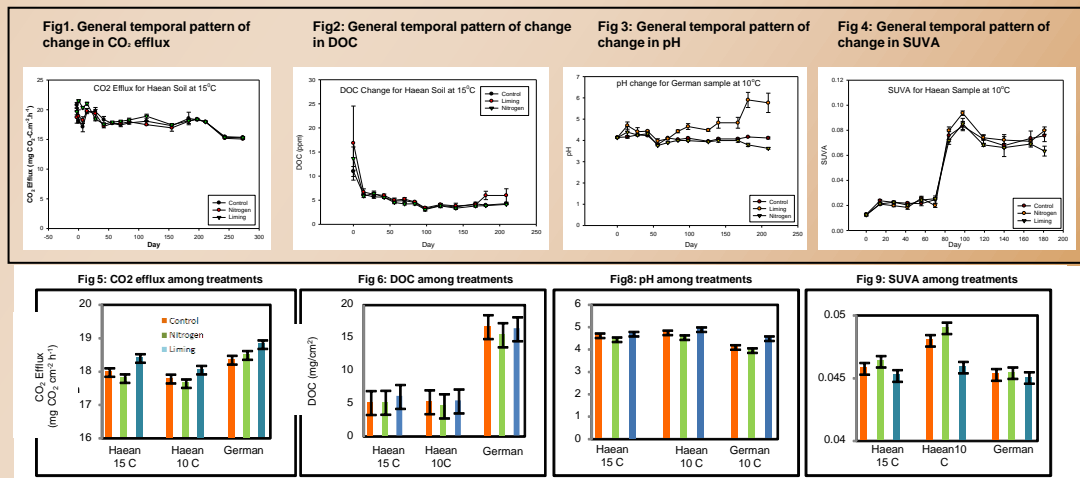


- Soil layers were arranged in cylindrical PVC columns
- Korean soils have been given two temperature treatment: Normal and elevated (+5 C) while German soils have been kept at normal temperature; Duration of Experiment: 1 year
- Simulated Rainfall: 507.4 mL to each column in every 14 days (equivalent to annual average rainfall); Leachates were collected after every event for analysis
- Nitrogen Fertilization: Applied in form of the NH<sub>4</sub>NH<sub>2</sub>O<sub>3</sub>, 3.74 mg equivalent to 40 kg/ha/yr N-deposition after every rainfall simulation
- Liming: applied 500 mg in form of CaCO<sub>3</sub>

### Lab analysis:

- **CO<sub>2</sub> efflux measurement:** carried out with using LICOR LI-820 Infra-red CO<sub>2</sub> Analyser
- **DOC analysis:** conducted with leachates of column filtered through a GF/F filter using TOC-5000A Analyzer (Shimadzu, Japan)
- **UV absorbance:** carried out with leachates collected from biweekly leaching event using Biochrome UV analyzer

## Results and Discussion



## Discussion

- CO<sub>2</sub> efflux increased briefly, but thereafter decreased gradually. In case of Haeen soil, release of CO<sub>2</sub> was higher in case of liming under elevated temperature
- pH increase was observed in case first as well as second liming application;
- The concentration of DOC showed continual decrease in all treatments, however it concentration increased after second liming dose;
- The aromaticity index in the form of SUVA showed sharp increase in leachates, but thereafter it gradually decreased, especially in case of liming treatment;
- These ongoing analysis coupled with analysis of soil at the end of experiment using advanced techniques like NMR, GC-MS and PLFA analysis can give idea about chemical controls on soil carbon stabilization under elevated temperature;

## References

Hamilton, S. K., A. L. Kurzman, et al. (2007). "Evidence for carbon sequestration by agricultural liming." *Global Biogeochem. Cycles* 21(2): GB2021.

Janssens, I. A., W. Dieleman, et al. (2010). "Reduction of forest soil respiration in response to nitrogen deposition." *Nature Geosci* 3(5): 315-322.

Schmidt, M. W. J., M. S. Torn, et al. (2011). "Persistence of soil organic matter as an ecosystem property." *Nature* 478(7367): 49-56.