

**A study of plant adaptation to elevated CO<sub>2</sub>  
using CO<sub>2</sub> springs as a future ecosystem**

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**【Outline of survey】**

Atmospheric CO<sub>2</sub> concentration is increasing and expected to double at the end of this century. Many studies have been conducted to understand plant responses to elevated CO<sub>2</sub>. However, most of previous studies have used current plants that may adapt to current CO<sub>2</sub> concentration. We can expect that elevated CO<sub>2</sub> acts as a selective agent and plants that adapt to elevated CO<sub>2</sub> may evolve in future environments. The aim of the present study is to predict evolution of plants under future high-CO<sub>2</sub> world. We conduct ecophysiological and population-genetic studies for plants growing around CO<sub>2</sub> springs, where high CO<sub>2</sub> concentration has been maintained for long term. Furthermore, we conduct selection experiment to reproduce evolution under high CO<sub>2</sub> conditions.

**【Expected results】**

We will find advantageous and disadvantageous traits of plants under high CO<sub>2</sub> conditions and predict evolution of plants under future environment. This will contribute to prediction of future vegetation change and future ecosystem responses to global environmental change. Furthermore, our study will contribute to modelling of environmental response of plant growth. This model will be useful for understanding of evolutionary significance of plant traits and for improvement of agricultural yield.

**【References by the principal investigator】**

- Onoda Y, Hirose T, Hikosaka K (2007) Effect of elevated CO<sub>2</sub> on leaf starch, nitrogen and photosynthesis of plants growing at three natural CO<sub>2</sub> springs in Japan. *Ecological Research*, 22: 475-484.
- Miyagi KM, Kinugasa T, Hikosaka K, Hirose T (2007) Elevated CO<sub>2</sub> concentration, nitrogen use, and seed production in annual plants. *Global Change Biology*, 13: 2161-2170.

**【Term of project】** FY2008– 2012

**【Budget allocation】**

**80,100,000 yen** (direct cost)

**【Homepage address】**

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