

昼ゼミ

LUNCHEON SEMINAR

菅井徹人 Tetsuto Sugai

2015.02.06

TODAY' S PAPER 今日の論文

Effects of elevated atmospheric
CO₂ concentration on the nutrient uptake
characteristics
of Japanese larch (*Larix kaempferi*)

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TAKAYOSHI KOIKE and MITSURU OSAKI

4 TOPICS

- About today's paper
 - Summary
 - Material and methods
 - Results
 - Discussion

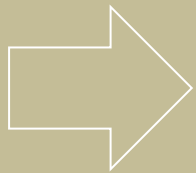
目標時間

About 20min

Summary

Evaluated the response of Japanese larch to elevated atmospheric CO₂ over 2

^{years}…
二ホンカラマツにCO₂を2年間与えると…



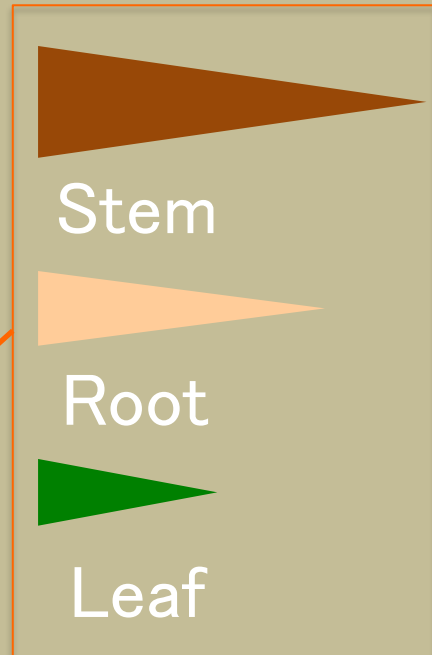
Effects in the second year
differed from those in the first

^{year}
1年目と2年目で効果が異なった

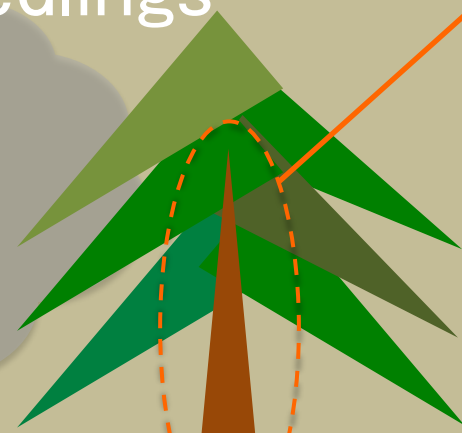
ニホンカラマツ

Larix kaempferi Sie&
Zucc.

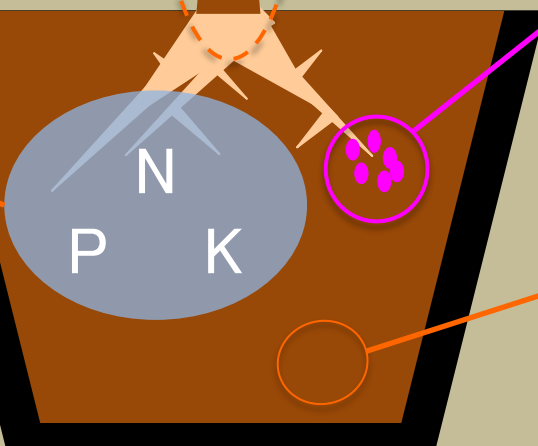
Two-year-old seedlings



CO₂
689 ± 75ppm(2002)
697 ± 90ppm(2003)



2000-fold diluted



Akadama : 4
Kanuma : 1
Volcanic ash :

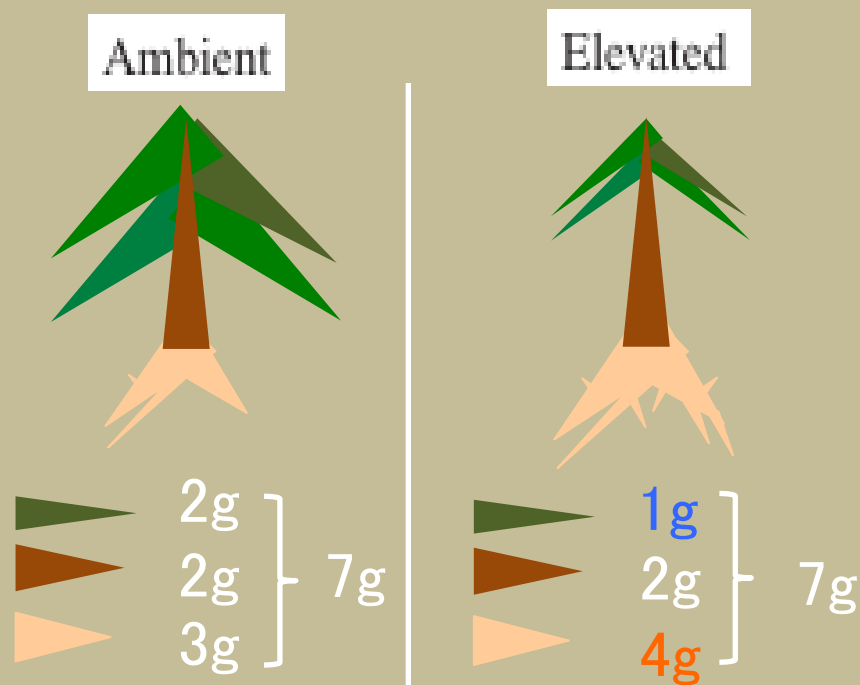
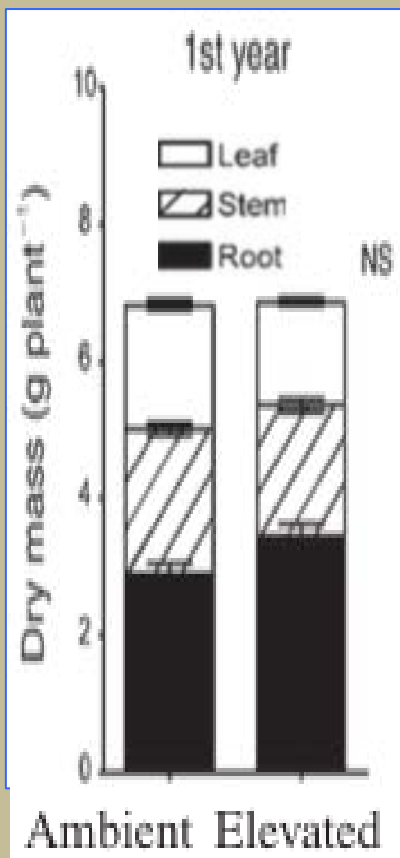
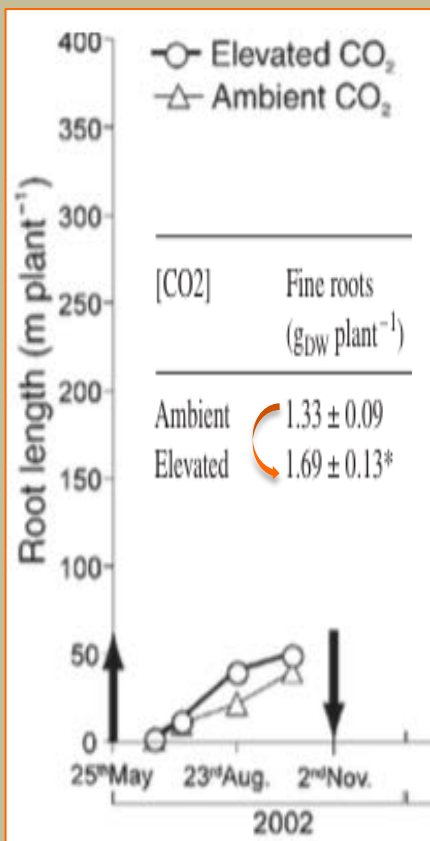
Hyponex
液体肥料

Results of first year (2002)

No effect on **dry mass**

But **root length, fine roots dry mass** increased

根長、細根重量が増加

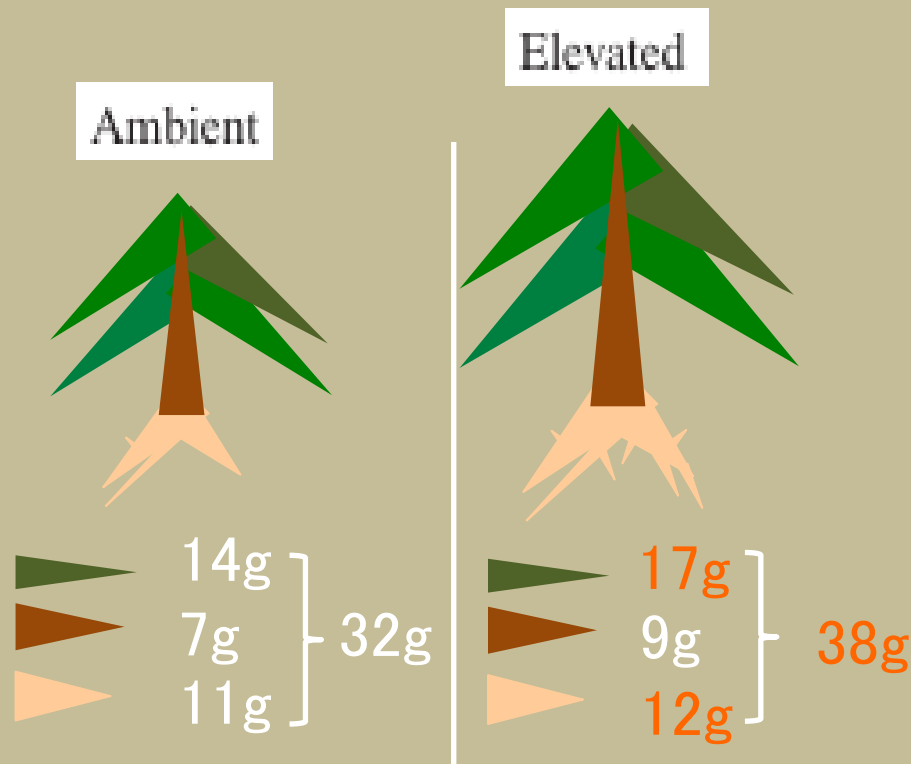
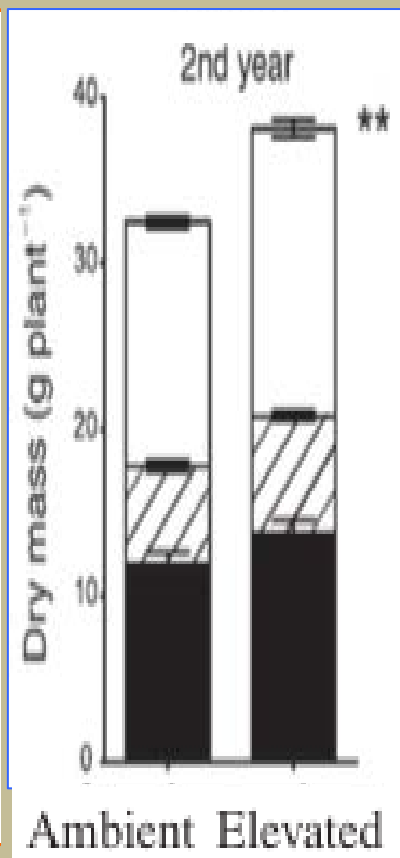
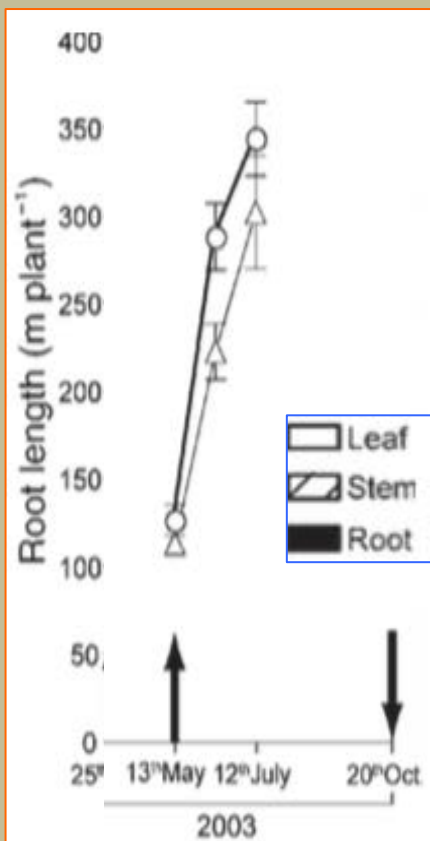


Balance
changed

Results of second year (2003)

Root length, dry mass increased

全乾重量、根長が増加



Dry mass

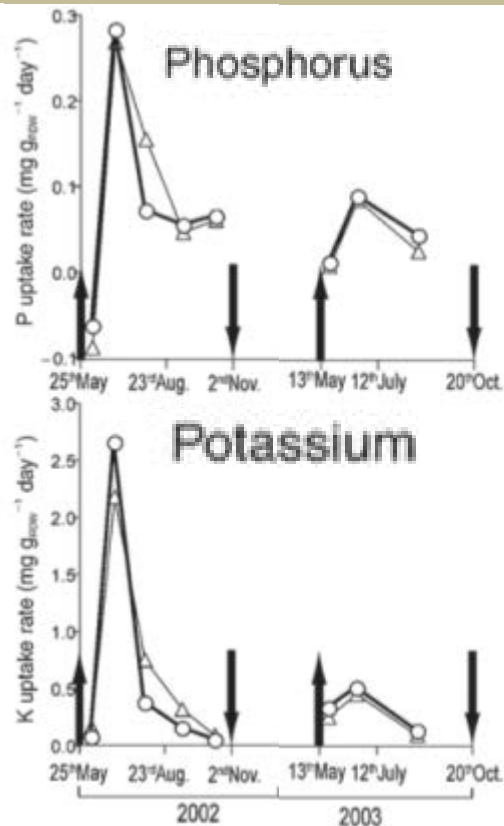
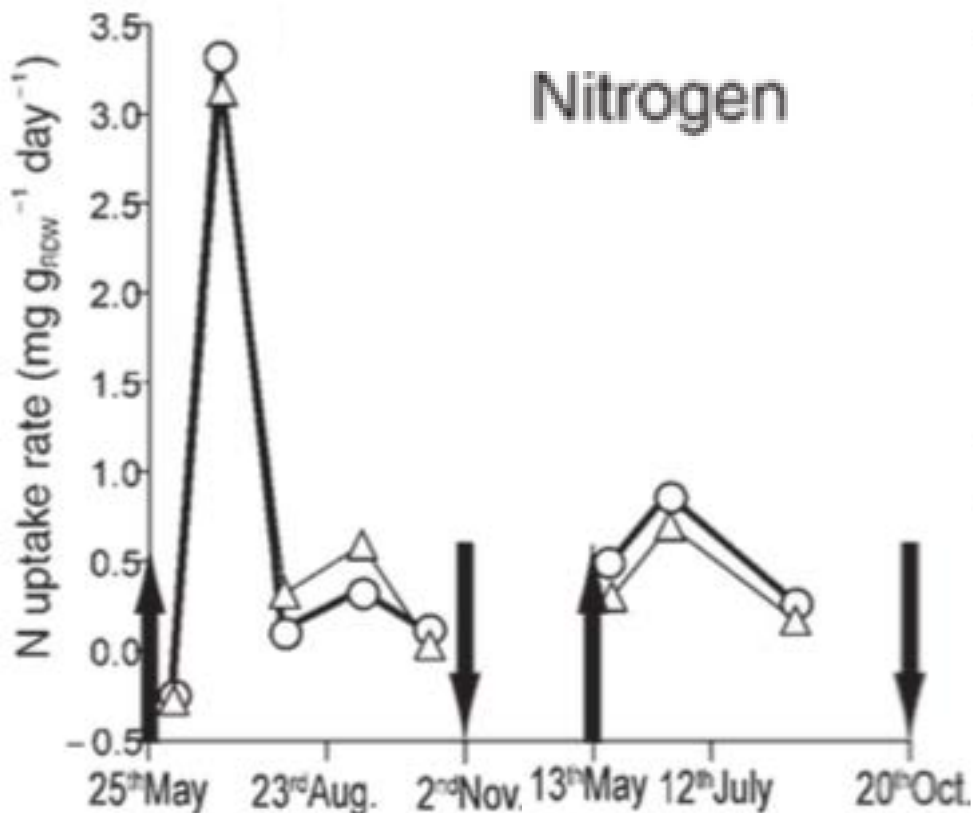
LIP

About nutrient uptakes

Elevated CO₂ had no effect on nutrient uptake rates

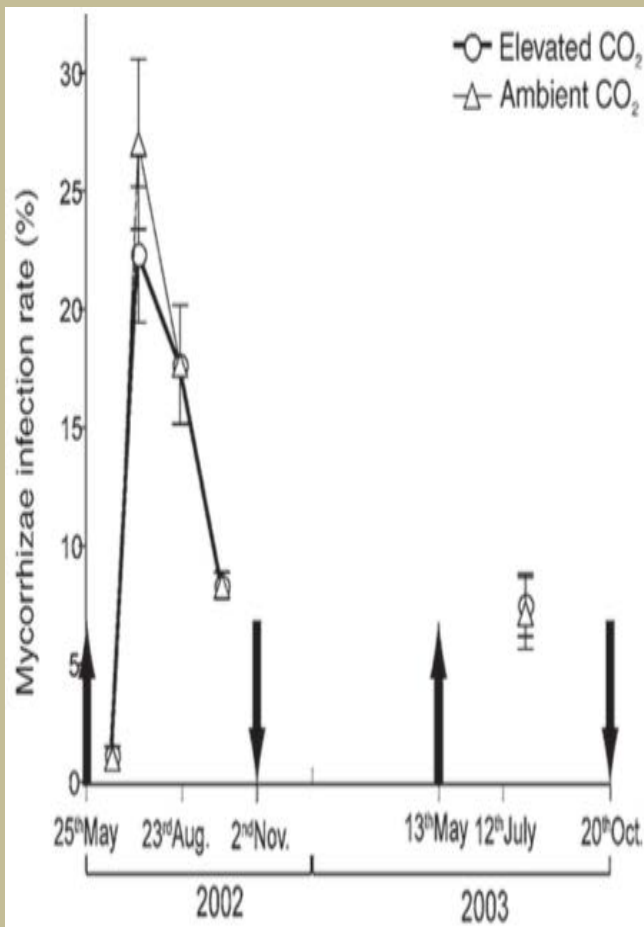
2年間とも栄養吸収率に影響はない

$$U = \frac{W_2 - W_1}{R_2 - R_1} \times \frac{\ln R_2 - \ln R_1}{t_2 - t_1} \quad (\text{mg g}^{-1} \text{ root DW day}^{-1})$$



No significant differences in ECM colonization were observed

外生菌根菌の活着にも影響がない



Elevated CO₂ increases ECM colonization (Godbold et al.1997)

樹種・菌種によって反例も

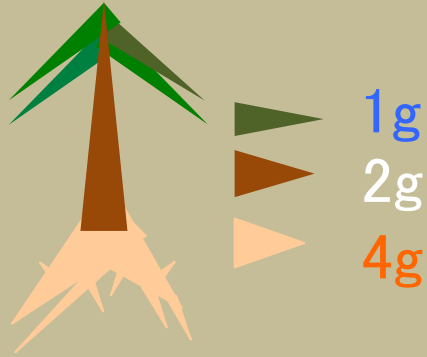
Discussion

Discussion: Effects of CO₂ on dry mass

CO₂によって乾重量が増加した理由

No effects

(2002)



Balanc

e

change

d

Rhizosphere

根圏の増加

Root length

Fine root

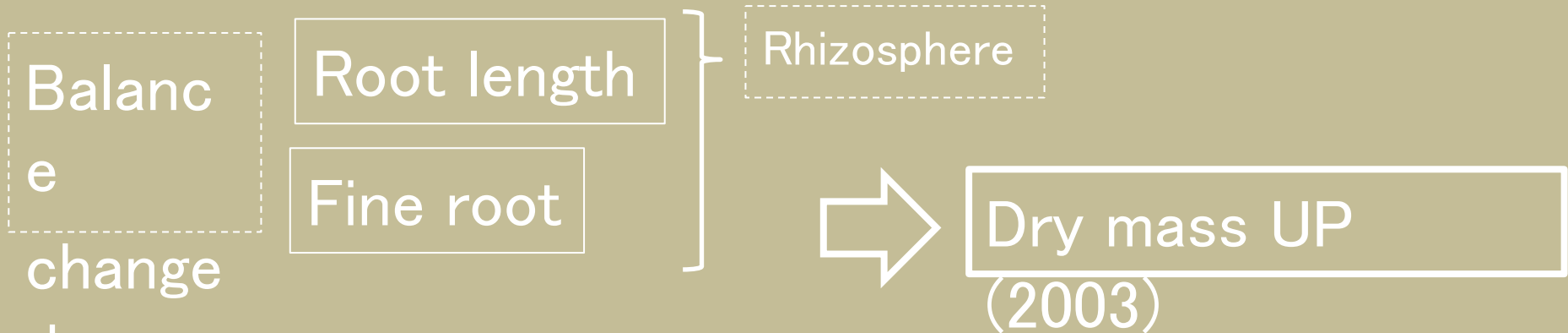
Dry mass UP

(2003)



Discussion: Effects of CO₂ on **nutrient uptake**

乾重量が増加した、もう一つの理由



Two reasons



- Increase areas of uptaking (biomass) ← Fine root Root length
- **Activation uptake function (activity)** 栄養吸収効率は？

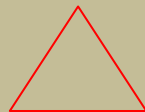
Discussion: Effects of CO₂ on **uptake function**

Regardless of the CO₂ treatment, _____

Nutrient uptake rates correlated with relative growth rate (RGR)

Dry mass UP

increased root biomass



increased root **activity**

CO₂は関係なし、吸収効率は相対成長率と正の相関