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# EFFECTS OF CO2 CONCENTRATION AND pH ON THE PROPERTIES OF A THERMOPHILIC CYANO-BACTERIUM Sachio MIYAIRI (Natl. Inst. Biosci. Human-

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The thermophilic cyanobacterium, *Synecho-coccus elongatus*, has proved to grow under CO<sub>2</sub> of a wide range concentration from 0.04 to 100%. Growth rate is lowered under very high CO<sub>2</sub> probably due to pH lowering of the medium. Contents of photosynthetic pigments and activity of the photosynthetic oxygen-evolution varied among the cells grown under different CO<sub>2</sub> conditions.

To study effects of low pH made by very high CO<sub>2</sub>, properties of the cells grown under low CO<sub>2</sub> and low pH were compared with those grown under CO<sub>2</sub> of various concentrations.

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Monitoring of the genes induced by salt stress in rice Yoshiyuki TANAKA, Atsunori FUKUDA, <sup>1</sup>Atsuko NAKAMURA; Natl. Inst. Agrobiol. Res., Ibaraki 305-8602,<sup>1</sup>Biol.Sci. Tsukuba Univ. Ibaraki 305.

Recently, a large-scale monitoring system of gene expression, microarray, have been developed, that is, more than 1,000 DNA fragments are spotted on a slide glass and hybridize with cDNA synthesized using poly A+ RNA from control or inductive tissues as a template and difference of signals between them indicate the responsibility to the stress. In rice, the bank of EST clones is constructed in Rice Genome Research Program. Therefore, we monitored the salt-inducible clones in this bank by microarray assay. Rice, Oryza sativa, Nipponbare, were grown for 7 days in hydroponic culture, then, treated with NaCl for appropriate periods. The total RNA was prepared from the roots by phenol/SDS method and poly A+ RNA was isolated by oligodT cellulose column chromatography. The first strand of cDNA was synthesized from the poly A<sup>+</sup>RNA as a template, in the presence of a fluorescent reagent and hybridized with PCR products from the EST clones. The intensity of fluorescence correlated linearly with dosage in the internal standard DNA. The intensity of the spot in the hybridization with poly A<sup>+</sup> RNA from the plant treated with NaCl was over two times than the case of no treatment in more than ten clones. The intensity increased immediately and decreased after 5 hr of the treatment in three clones.

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SODIUM TAKES THE APOPLASTIC PATHWAY TO INTRUDE INTO XYLEM VESSELS IN RICE PLANTS UNDER SALINE CONDITIONS

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When 14-d-old rice (IR36) seedlings were subjected to 100 mM NaCl salinity, the Na+ concentration in the leaf blade increased in a time-linear manner up to 72 h of the salt application. The uptake rates were not affected by the light conditions, but increased when the pH of the rooting medium decreased from 6 to 4 and when the ambient Ca2+ concentration decreased from 0.5 mM to 0.05 mM. A dye Calcoflour stained the root tip meristematic cells and the xylem vessels when it was applied with 100 mM NaCl, even though it did not stain the meristematic cells without NaCl. These results suggests that Na+ takes the apoplastic pathway to intrude into the xylem vessels in rice roots under saline conditions. An intensive survey of compounds to decrease the Na+ uptake in rice plants revealed that ethylene glycol derivatives (EG) is effective. Addition of EG to 40 mmol NaCl salinized soil (1 kg) substantially alleviate the damage. The EG may bind to cell walls in the root tips.

#### 347(F448)

DISTRIBUTION, MOBILITY AND COMPARTMENTA-TION OF AL IN AN AL-ACCUMULATING PLANT, FAGOPYRUM ESCULENTUM MOENCH Renfang SHEN, Jian Feng MA; Fac. Agr., Kagawa Univ., Miki-cho, Kita-gun, Kagawa 761-0795

Buckwheat (Fagopyrum esculentum Moench, cv Jianxi) accumulates high Al in the leaves. Long-term (28-d) exposure to Al resulted in a gradient decrease in the Al concentration from the lower leaves to the upper leaves. While a short-term (1-d) exposure to Al showed a homologous distribution in the leaves. When the forth leaf was wrapped with a transparent plastic bag to suppress the transpiration, the Al concentration in this leaf was only 1/4 of that in the leaf without wrap. These results indicate that the Al accumulation in the leaves is controlled by transpiration. The mobility of Al among leaves was studied by firstly exposing to Al for a certain time, followed by a -Al treatment. The Al content in the two new developed leaves was very low and that in the old leaves did not decrease but increased. The Al content in the root decreased significantly, but the total Al in the plant remained unchanged. The Al concentration in the xylem sap was about 50 µM at 24 h after removal of Al. These results suggest that the increase of Al in the old leaves was from the Al storing in the roots and the Al is not mobile once accumulated. Protoplasts and vacuoles from the leaves were isolated. It was found that Al in the leaves was present in the vacuoles.