

# Interaction of physiology, ecology and cultivation technologies of crops for high yield and quality

**H**igh-yield and high-quality wheat production in eastern Japan

In the warm and rainy climate of western Japan, wheat is cultivated in fields that are temporarily converted from paddy fields for lowland rice production. Due to the poor drainage in these fields, wheat is often subjected to temporal waterlogging or overwetting of the soil. We investigate the physiological responses of wheat to overly wet soil and agronomical management to alleviate the loss of grain yield and quality.

High-quality rice in eastern Japan

During high-temperature years, the quantity of white immature grains increases. It is known that poor grain filling is responsible for white immature grains. Adding nitrogen is considered detrimental to rice crops as it reduces the white grains. We investigate nitrogen uptake and rice metabolism in reproductive stages.

Improving rice production in Tanzania

Water is a major factor restricting rice production in Africa. We aim to improve water use efficiency through increasing yield levels in irrigated areas. In rain-fed areas, we have performed trials to identify the most effective technology for obtaining a high yield. These activities are performed in cooperation with Japan International Cooperation Agency.



Investigating limiting factors for the high yield of rice in Tanzania

## *About Researcher*



**ARAKI Hideki, Ph.D.**

Ph. D., 2002 Nagoya University

# Protected Cultivation: Production Technologies of Vegetables in Greenhouses and Plant Factories

**P**rotected cultivation, such as in greenhouses and plant factories, allows for the stable production of vegetables with a high yield and high quality by controlling environmental conditions including temperature, humidity, light quality and intensity, and carbon dioxide concentration. The mission of our laboratory is to develop new technologies for environmental control to achieve vegetables with higher yields and higher quality in greenhouses and plant factories. Therefore, we determine relationships between plant physiology and environmental conditions using methods to measure plant physiological information and environmental conditions.

Research interests include the following:

- Responses of ion absorption by plant roots to environment conditions.
- Production of value-added vegetables by applying environmental stresses to roots in a soil-less culture.
- Improvement in plant productivity by preventing tipburn development on butterhead lettuce.
- Utilization of unused resources from other industries for crop production.



The actual condition of experiments in demonstration facilities for plant factories at the Yamaguchi University

## *About Researcher*

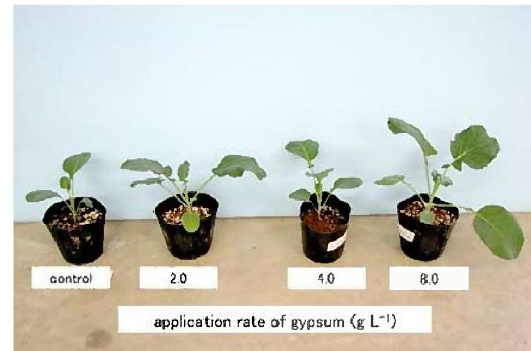


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Ph.D., 2010, Kyushu University

## Establishment of agricultural uses of by-product gypsum

**I**n our Environmental Soil Sciences Laboratory, we study the relationships between soil and agricultural environments, specifically focusing on the improvement in nutrient supplies to crops and the amelioration of soil conditions for crop production and natural vegetation. One of our main research topics is the establishment of agricultural uses of by-product gypsum. Gypsum ( $\text{CaSO}_4 \cdot 2\text{H}_2\text{O}$ ) has been used in agriculture for many years as a soil conditioner and ameliorant for sodic soils and as a nutrient source of Ca and S for plant growth. Recently, the utility of gypsum has been extended to acidic and infertile soils as an ameliorant for subsoil acidity. Two types of gypsum, mined gypsum and industrial by-product materials, are used. The production of by-product gypsum is increasing, although it is mostly limited to industrial uses such as wall boards and cement. These industrial uses are relatively unstable because of the economic situation. Therefore, establishing the agricultural uses of by-product gypsum is important. In our laboratory, we are currently researching the effects of by-product gypsum as a nutrient source of Ca and S for various crops on both crop yield and quality.



The effect of by-product gypsum on broccoli seedlings

### *About Researcher*



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