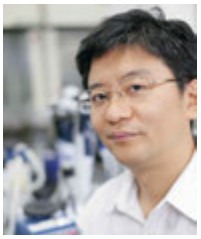
Department of Agrobiological Resources

Laboratory of Plant Molecular Genetics

STAFF	Professor Atsushi MORIKAMI
TEACHING	Biological Chemistry Cell Biology Molecular Biology Advanced Molecular Genetics (MC)



Professor
Atsushi MORIKAMI

Research

Exploration of genes involved in plant production

Plants contain tens of thousands of genetic blueprints called “genes” involved in the biological processes that contribute to the growth of plant cells. Coordinated application of blueprints allows plants to grow, mature, and produce seeds at the end of their life cycle. Fully developed plant organs, such as tuberous roots, stems, leaves, and seeds, are used as food sources. Individual plants have their unique set of blueprints, which partially differ among plants. Whether a blueprint is associated with good farm productivity depends on the information contained in the blueprint of each plant.

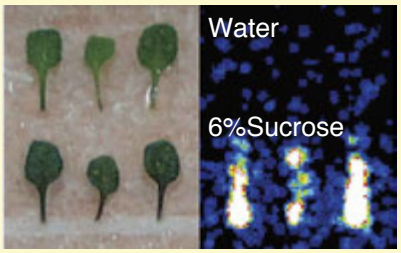
The recent progress in molecular biology and genetics has led to the introduction of techniques to decode the information contained in a gene. The techniques yield information about the product of a genetic blueprint, the part of the plant in which the product performs its functions, the chief function of the product, and the capacity of the product to carry out its functions. Depending on the information, a plant with superior traits and an ideal combination of genes could be selected to increase the agricultural output.

In the future, the population and demand for energy are thought to increase worldwide. We think that studies on plant production are needed to solve these problems. Therefore, we study the functions of individual genes in plants in an attempt to search for useful genes.

Research projects

1 Regulation of plant gene expression by sugar

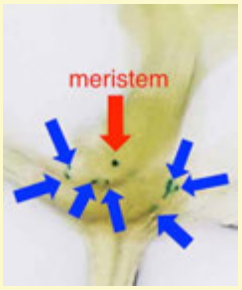
The main aim of agricultural production is to develop foods containing starch, lipids, and proteins. Thus, clarification of the mechanisms underlying the accumulation of these products in seeds or tuberous organs is very important. To address this problem, we focus on the analysis of plant genes whose expression was regulated by different concentrations of sugar.



Emission of light by leaves of a transgenic plant under conditions of high sugar concentrations.

2 Transcription factors involved in the control of shoot branching

Each plant has a unique shape by which the species of the plant can be classified; the shape of a plant is governed by a strict control of gene expression that determines the timing and direction of cell divisions. The shape of a plant affects crop productivity and efficiency of works on the farm. Therefore, in our laboratory, shoot branching is studied using molecular methods. In addition, we analyse other genes involved in plant development, such as the size of seeds and root structure.



Ectopic shoot meristems at the axils of leaves of *chestnut* seedlings

Recent publications:
• Morikami, A et al (2005) Two cis-acting regulatory elements are involved in the sucrose-inducible expression of the sporamin gene promoter from sweet potato in transgenic tobacco. Mol Gen Genomics 272: 690–699
• Inagaki S et al (2006) *Arabidopsis* TEBICHI with Helicase and DNA Polymerase Domains is Required for Regulated Cell Division and Differentiation in Meristem. Plant Cell 18, 879-892