

【Grant-in-Aid for Scientific Research (S)】

Biological Sciences (Biology)



Title of Project : Biological Synchronization in Natural Environments

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Research Area : Ecology

Keyword : Molecular Ecology

【Purpose and Background of the Research】

Synchronizations between individuals in biological responses are often observed under natural seasonal conditions. Synchronized flowering within a plant species is necessary for successful mating.

This project aims to understand functions of mechanisms that underlie synchronization of plant reproduction, especially in natural fluctuating environments. Based on the time-series analyses on seasonal transcriptome data, we will conduct following three studies.

1. Identification of genes that control termination of reproduction.
2. Understanding of function of gene regulatory networks under complex natural conditions.
3. Estimation of internal and external plant environments using transcriptome data.

【Research Methods】

Based on the time-series analyses on seasonal transcriptome data, we will apply following three approaches (Fig. 1).

1. Growth experiments and mutant hunting for genes that control reproductive termination.
2. Functional analyses of histone modification under complex natural conditions.
3. Modeling of internal and external plant environments from transcriptome data.

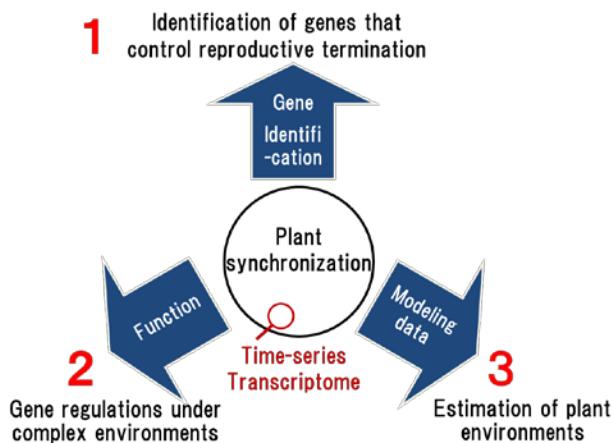


Fig. 1. Three approaches in the project.

【Expected Research Achievements and Scientific Significance】

Conventional study of reproductive timings of plants has been analyzed them as developmental events. Here, we aim to analyze reproductive timings as synchronizing events on calendar day in the natural seasonal environments (Fig. 2).

Following achievements are expected.

1. We will identify genes that determine the timing of reproductive termination.
2. Role of histone modifications as an environmental memory will be evaluated.
3. Modeling methods that estimate plant environments will be developed.

Studying biological synchronization in nature

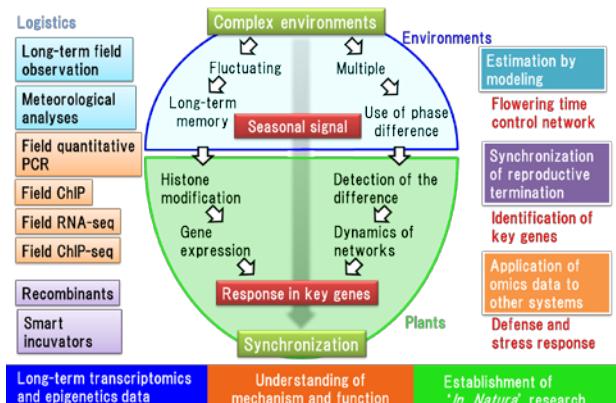


Fig. 2. A schematic diagram of the project.

【Publications Relevant to the Project】

Kudoh H, Nagano AJ (2013) Memory of temperature in the seasonal control of flowering time: an unexplored link between meteorology and molecular biology. Pontarotti P ed. *Evolutionary Biology: Exobiology and Evolutionary Mechanisms*, Springer : 195-215.

【Term of Project】 FY2014-2018

【Budget Allocation】 150,100 Thousand Yen

【Homepage Address and Other Contact Information】

<http://www.ecology.kyoto-u.ac.jp/~kudoh/index.html>