



Title of Project : Integrated Analysis of Strategies for Plant Survival and Growth in Response to Global Environmental Changes

Term of Project : FY2010-2014

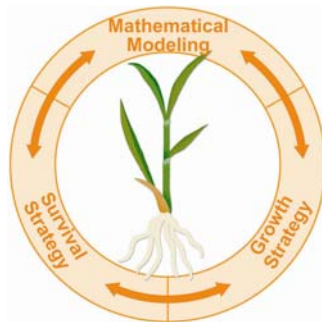
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【Purpose of the Research Project】

Plants have developed strategies to adapt to various environments during long evolutionary process. The objective of this project is to systemically elucidate “the power of plants to overcome environment” at the molecular level and to comprehensively understand the molecular networks involved by bringing together researchers from different fields. The outputs from this project will contribute to protecting the global environment and ensuring sustainable food production through breeding plants (crops) with enhanced stress tolerance.

【Content of the Research Project】

This project consists of three work packages including “Survival Strategy”, “Growth Strategy” and “Mathematical Modeling”. In the “Survival Strategy” group, the focus will be on elucidating the responses of plants to individual stress (soil acidification, nutrient starvation, high temperature, drought, etc) and multiple stresses at the molecular level. Cross talk between different stresses will also be investigated. The “Growth Strategy” group will examine the molecular mechanisms controlling plant growth including cell division and cell elongation under various environmental stresses. This work package will also unravel the network controlling cell growth in response to environmental changes. The “Mathematical Modeling” group will establish a theoretical framework for plant growth mechanisms and their responses to different environments by developing mathematical models. Furthermore, computer simulation will also be



performed on future environmental changes such as flood, drought, rise in temperature and nitrogen cycle and the results will then feedback to other groups. Through these integrated and collaborative researches among the three groups, we aim to elucidate the network of genes which can be exploited to achieve high crop productivities under unfavorable environmental conditions.

【Expected Research Achievements】

The outcome of this project will be a better understanding of the mechanisms involved in the “power of plants to overcome stress environment” as a whole system. Novel genes involved in stress tolerance will be identified and the signal transduction mechanisms and their network will be elucidated. Furthermore, multiple genes or traits will be pyramided in crop plants to enhance their tolerance to multiple stresses. This project will contribute to ensuring global food security by increasing crop productivities in the face of the anticipated global environmental changes.

【Key Words】

Modeling: There is an increasing demand to apply mathematical and computational models for comprehensive and integrated understanding of mechanisms underlying diverse biological processes such as gene regulatory networks, development and pattern formation. These theoretical approaches enable to draw predictions about how do biological system behave in response to global environmental changes.

【Homepage Address】

<http://bsw3.naist.jp/JFM/>