Technologies for Creating Next-generation Agriculture, Forestry and Fisheries

Creating Agro-Innovation

Making Agriculture, Forestry and Fisheries into a Growth Field Using Big Data, IoT and AI

The goal of this program is to establish a uniquely Japanese system of production, creating a smart, eco-friendly, ultra-laborsaving and highly productive agriculture model. The success of this program will result in intellectual property and standardization that may be adopted throughout the world. Moreover, this program will establish a globally competitive Japanese brand of agricultural, forestry and fishery products that are healthy and delicious, securing Japan's status for these products in overseas markets. Another goal of this program is to derive new materials from unused resources, advancing a value-adding strategy to create new regional industries. To achieve these objectives, this program is pursuing an all-Japan approach, transcending the boundaries of ministries, industries, and fields of specialization. Ultimately, this program intends to turn the agriculture, forestry and fishery industries into a growth sector.

Program Director

NOGUCHI Noboru

Hokkaido University Graduate School of Agriculture

Professor, Research Faculty of Agriculture

* The affiliation and title of PD shall be as of the end of the 1st period (the end of FY2018).

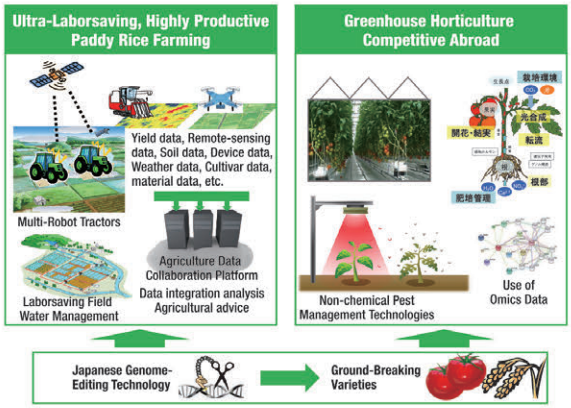
Profile

Professor NOGUCHI Noboru was awarded a Ph.D. from the Hokkaido University Graduate School of Agriculture in 1990. He took a post as an assistant in the Hokkaido University Faculty of Agriculture the same year, becoming an Assistant Professor in the Research Faculty of Agriculture in 1997. He assumed his current post in 2004. Prof. NOGUCHI served as a Council Member of the Science Council of Japan from 2005 to 2014, remaining an associate member as of 2015. He was named president of the Japan Association of International Commission of Agricultural and Biosystems Engineering in 2006, Vice-chairman of the Japanese Society of Agricultural Informatics in 2007, and Chairman of the Japan Society of Agricultural, Biological and Environmental Engineers and Scientists in 2011. In 2014, Prof. NOGUCHI was named Sub-program Director for Technologies for Creating Next-generation Agriculture, Forestry and Fisheries. He became the Program Director in 2016.

Research and Development Topics

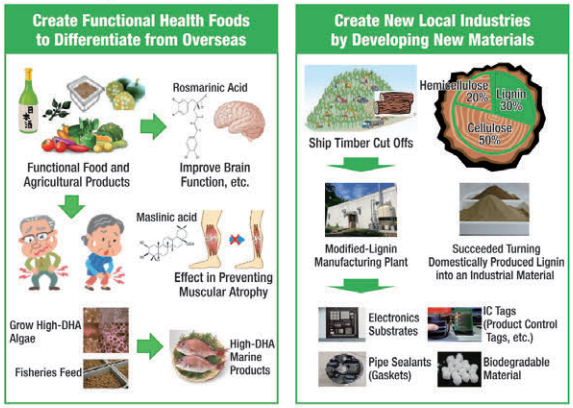
1. Incorporate robotics, ICT, genome and other leading-edge technologies to produce a uniquely Japanese smart, ultra-laborsaving, and highly productive agriculture models

Incorporate robotics, ICT, AI, genome-editing and other leading-edge technologies to produce an environmentally sound, ultra-laborsaving and highly productive agriculture



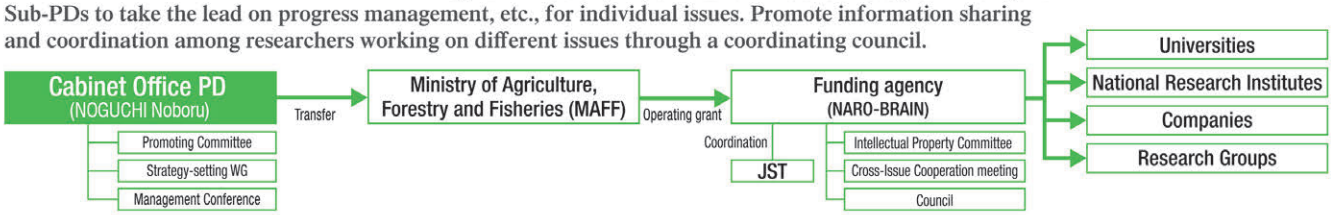
2. Enhancing the value of agricultural, forestry, and fishery products by developing new materials and offering distinct, functional foods for health, etc. by making use of techniques of medicine and engineering

- Differentiate Japanese foods by finding health functionality
- Create regional industry by new materials from unused resources



Implementation Structure

Establish a strategy-setting working group (WG) under the Program Director (PD) and determine exit strategies. Arrange for Sub-PDs to take the lead on progress management, etc., for individual issues. Promote information sharing and coordination among researchers working on different issues through a coordinating council.



* It shows the structure and organization at the end of the 1st period (the end of FY2018).

Incorporate robotics, ICT, genome and other leading-edge technologies to produce a uniquely Japanese smart, ultra-laborsaving, and highly productive agriculture models

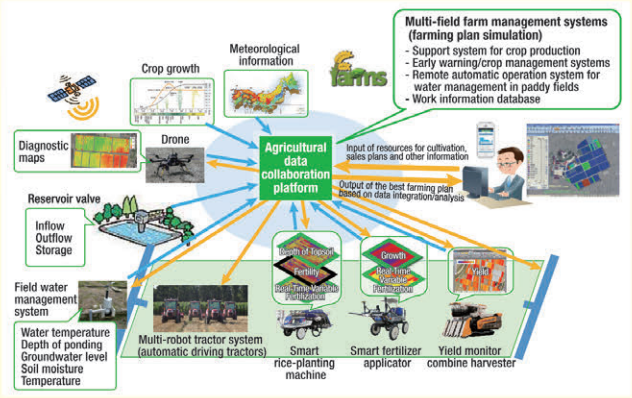
In Japanese agriculture, farmland liquidity has occurred mainly due to the retirement of aged farmers, while farmland consolidation to core farmers of regional agriculture has progressed dramatically. These farmers are required to manage fields dispersed over extensive areas with the expansion of the management scale, and it has been pointed out that future production management will be extremely difficult with the conventional agricultural production system.

Therefore, a robot work system (tractors, rice-planting machines, combine harvesters, fertilizing machines) for rice cultivation was constructed to establish a robot-based ultra-labor-saving production technology system; peripheral technologies (e.g., quasi-zenith satellite receiver, multi-field farm management system) were concurrently developed. A system that can remotely or automatically control water supply/drainage of fields was also developed to reduce the time for water management, which accounts for majority of the working hours for rice cultivation.

In addition, a data platform that enables data linkage, sharing, and provision (Agricultural Data Collaboration Platform: WAGRI) was constructed to provide an environment where farmers can practice agriculture based on weather, farmland, soil, cultivation, and other data. In protected horticulture, a tomato cultivation management system based on plant in-vivo information was developed, and the target yield was achieved in a demonstration test. A number of new plant protection technologies/systems were also developed.

With regard to genome-editing technology which has attracted worldwide attention, domestic genome-editing technology was developed, and breeding stocks with epoch-making characteristics were created by making use of genome-editing technology.

•Agricultural Data Collaboration Platform (WAGRI)



•Robot tractor

•Genome-edited tomatoes

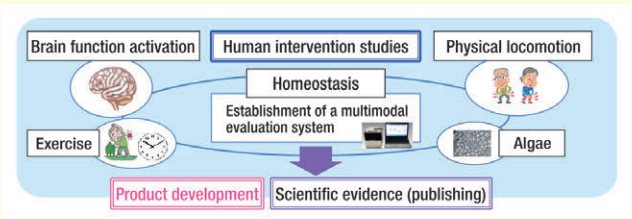
Enhancing the value of agricultural, forestry, and fishery products by developing new materials

Value-adding strategies, such as food production by taking advantage of the tastes, functions, and other advantages of domestic farm products and new materials from unused resources, were promoted.

The development of food items, meals, and exercise recipes for the maintenance and improvement of brain, physical locomotion, and other health functions was promoted, and a device for evaluating homeostasis and other factors was developed.

In addition, a modified lignin, which plays a key role in domestic forest biomass, was successfully developed. Efforts were made to develop highly functional industrial products using the modified lignin, which is resistant to heat, easy to process, and environment-friendly, and to commercialize the resulting products using forest scraps.

•Development of health functional foods



•Production of modified lignin and Automotive parts made of it