

IoP International Symposium

About the WAGRI Agricultural Data Collaboration Platform

Agricultural Data Collaboration Platform Office, Research Center for Agricultural Information Technology, National Agriculture and Food Research Organization (NARO)

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NARO



- Contribute to strengthening industrial competitiveness and achieving the SDGs through the early realization of "Society 5.0" in the agricultural and food sectors.
- Promote the following priority issues with the goals of improving the stable supply of agricultural and food products and their self-sufficiency rate, increasing the global competitiveness of the agricultural and food industries, and strengthening responses to global warming and natural disasters.

[Priority Issues]

- (1) Achieving smart processes for all areas of breeding, production, processing, and distribution
- (2) Building smart food chain systems
- (3) Creating new materials and industries through biotechnology
- (4) Constructing zero-emission smart agricultural production systems
- (5) Agricultural infrastructure technology (gene banks, advanced analysis platforms, food safety and security, diseases and harmful insects, animal health, disaster prevention and mitigation, etc.)
- (6) Leading-edge infrastructure technology (artificial intelligence, data collaboration platforms, food function data, IoT, robots, etc.)

Roles of the Research Center for Agricultural Information Technology



- Established in October 2018 as a research center under the direct control of its president
 Promotion of in-depth application-oriented agricultural AI research
 Full-scale operation of the WAGRI Agricultural Data Collaboration Platform
- Establishment of agricultural information research platforms (supercomputers and databases)
 Development of ICT and digital human resources





Although the application of agricultural ICT is essential for the implementation of databased agriculture, data is not being fully utilized due to a lack of mutual collaboration between data and services, and insufficient organization of various types of data.



A "data platform" must be constructed that can share and utilize various types of data.

[Structure] Outline of the WAGRI Agricultural Data Collaboration Platform



- WAGRI is intended to promote the collaboration of agricultural data and the growth of agriculture based on that data.
- Its usage fee is 50,000 yen per month for data use and provision, and 30,000 yen per month for data provision only.

*When using data provided for a fee, a separate contract with the data provider will be required.



NARO distributes research results through WAGRI

[Features] Basic Functions of WAGRI



Basic Functions of WAGRI				
Use of data and programs	 Utilization of infrastructure data (farmland, agricultural chemicals, fertilizers, weather, etc.) By incorporating farmland data and agricultural chemical data into your own systems, it will be possible to expand services for farmers such as field registration and notation of restrictions on agricultural chemical use. Data from public institutions and private enterprises is provided in the JSON* format, making it possible to reduce development costs. Use of research result programs The results of research such as growth predictions of paddy rice and yield predictions of protected horticulture can be used and incorporated into your own services. 			
Provision of data and programs for a	 Provision of data owned by your company for a fee Various types of data such as weather data and map data owned and collected by your own company can be provided to WAGRI members for a fee (sold). 			
fee (sale)	 Provision of internally-developed programs to other companies <u>for a fee</u> Some programs for your own company's systems, such as data conversion programs, can be provided for a fee (sold) to WAGRI members, with the assurance of security. 			
Data sharing	 Sharing of data with other companies and NARO Data on topics such as joint research and demonstrations can be shared and used mutually among WAGRI members. 			



W	AGRI's Strengths
(1) Strong sense of security since it is operated by public institutions	It was developed in the first stage of the Cabinet Office's SIP project and is operated by NARO, a national research and development corporation.
(2) Implementation of NARO research results and Ministry of Agriculture, Forestry and Fisheries market and statistical data	Research results from NARO will continue to be implemented in sequence. In addition, labor-intensive data such as market data and statistical data from the Ministry of Agriculture, Forestry and Fisheries can be obtained in the easy-to-use JSON format.
(3) Ease of API development	Using a GUI development screen, a feature of the WAGRI system, it is possible to easily develop APIs and quickly respond to specification changes.
(4) Utilization in various demonstration projects and joint research with research institutions	It is expected to be used in various demonstration projects and joint research in the future, in the same way it is used to collect management data in the Smart Agriculture Demonstration Project.
(5) Ongoing functional expansion and future prospects	In addition to agricultural production data, we plan to expand the platform to support "smart food chains" extending through distribution, processing, and consumption.

[Features]

Major Data and Programs which can be Obtained from WAGRI



Category	Contents	Features	Provider Notes 1), 2)
Fertilizer	Registered fertilizer brand information	Brand information on roughly 20,000 types of fertilizer registered by the Minister of Agriculture, Forestry and Fisheries	WAGRI (FAMIC)
Agricultural chemicals	Agricultural chemical registration information	Registration information on roughly 7,400 types of agricultural chemicals	WAGRI (FAMIC)
Vocabulary	Dictionary of vocabulary on agriculture activities and crops (CAVOC)	Information on 482 terms related to agricultural activities, and 1,514 terms related to crops	NARO
Maps	Map data and aerial photograph image data	Japan's most accurate and comprehensive spatial data content	NTT InfraNet
33	Digital soil maps	Information on nationwide soil types and distribution	National Agriculture and Food Research Organization
Farmland	Farmland plot information (parcel polygons)	Information on roughly 31 million farmland plots nationwide	Ministry of Agriculture, Forestry and Fisheries
33	Latitude and longitude information for farmland (farmland pin data)	Pin data for farmland in 1,595 out of 1,724 municipalities nationwide	National Chamber of Agriculture
**	Integrated farmland information	Provision of integrated nationwide data on farmland plots, farmland pins, and soil was started in FY2020	NARO
Weather	Weather information by hour, for up to three days ahead (1-km meshes)	Weather information prepared by creating meshes for data published by the Japan Meteorological Agency, and then adding our independent correction processing to it	Halex
23	Weather information by day, for up to 26 days ahead (1-km meshes)	1-km mesh long-term prediction information, which seamlessly connects 14 types of finalized, predicted, and average values	Life & Business Weather (NARO)
Growth predictions	Growth prediction programs for paddy rice, wheat, and soybeans	Utilizes a model for a cultivation management support system researched and developed in collaboration with NARO	VisionTech (NARO)
33	Growth prediction programs for vegetables grown outdoors	Harvest date prediction programs for lettuce	NARO
"	Growth and shipment prediction programs for fruits and vegetables	A program developed by NARO to predict the growth of protected horticulture crops began provision in FY2020	NARO

Note 1) The organizations that developed and provided the original data are shown in parentheses. Note 2) Bold text indicates fee-based API.

[Features] Farmland Plot Information (Parcel Polygons)



- Information possessed by the Ministry of Agriculture, Forestry and Fisheries on roughly 31 million parcels of farmland plots (parcel polygons) across the country is provided in JSON format (provided by: WAGRI Administration Office).
- "Parcel polygons" consist of farmland plot information created by dividing the land throughout Japan into plots of 200 meters square (the area of Hokkaido is 400 meters square) with no gaps, according to the shape of each parcel based on satellite images and other resources.
- An 18-digit number is assigned to each of them as a unique ID.
- They can be incorporated into geographical information systems to display the farmland plots of farmers as basic data for farming management.



Display of farmland plot information (parcel polygons) on a geographic information system (NARO demonstration site)



Display of farmland plot information overlapped with aerial photograph from a geographic information system (NARO demonstration site)

[Features] Growth and Yield Predictions of Protected Horticulture



- This is a program developed by NARO to predict the growth and yield of protected horticulture crops.
- Its target crops are tomatoes and sweet peppers.
- For these predictions, it will be necessary to provide facility information such as cultivation area and facility transmittance, environmental information such as temperature, solar radiation and CO₂ concentration in the facility, and cultivation information such as planting density and individual leaf area.
- It can also be used as an auxiliary tool for determining cultivation policies with reference to simulation results such as environmental control settings and leaf area management.
- This program is provided only through WAGRI.



[Application] Examples of Services Provided by Private Enterprises Hitachi Solutions, Ltd.



- The "GeoMation Agriculture Support Application" is provided for managing farmland and soil in association with maps.
- The system displays data on farmland, soil, and weather and growth prediction models obtained from WAGRI, to improve work efficiency and demonstrate improvements in the quality of wheat for bread.



Source: Examples of application of agricultural data collaboration platform on WAGRI website



- The "NEC Farming Guidance Support System*" is provided to support cultivation management and farming guidance based on growth targets, by understanding work records and growth information shown on maps.
- It supports appropriate agricultural chemical spraying in accordance with chemical use restrictions by utilizing parcel polygons and agricultural chemical information obtained from WAGRI.



*Software that allows guidance and information sharing to be carried out based on growth targets by collecting farming data and identifying work and growth conditions on maps.

Source: Ministry of Agriculture, Forestry and Fisheries, "Construction of an Agricultural Data Collaboration Platform"

[Future Prospects] Construction of Data Aggregation Systems for Disease and Harmful Insect Diagnosis



- NARO will establish a system for collecting image data while providing AI diagnosis services for diseases and harmful insects through WAGRI, and will demonstrate mechanisms for continuously enhancing its services (PRISM).
- Investigations will be made on the scope for sharing and using image data collected by NARO (public release, sharing and use within the consortium) and related rules.



Source: Partially-modified excerpt of lecture materials from 2019 Tsukuba Conference

[Future Prospects] Agricultural Equipment Data Collaboration (Open API Development)



- The Ministry of Agriculture, Forestry and Fisheries has begun considering the development of open API for agricultural equipment data (Study Group for Open API Development in Agricultural Sectors).
- It will develop a mechanism (open API) such that when farmers use agricultural equipment which obtains data such as locations and work records, that data can then be used in farming management software created by any vendor. Implementation of this API in WAGRI will also be considered.



[Future Prospects] Strengthening Japan's Export Capabilities by Sharing Data among Production Areas



By using WAGRI to promote data sharing among agricultural production areas, it is anticipated that those production areas will be able to work together to secure annual export volumes and reduce distribution costs in order to acquire overseas markets for agricultural products.



[Future Prospects]



Currently, the coordination of data related to production is being promoted on WAGRI. In the future, we will strengthen this process (expansion of data and target items), and create smart food chains which can enable the mutual use of data extending from production to distribution, processing and consumption, in strong collaboration with fields such as distribution, food production, and export promotion, in order to realize Society 5.0 (a super-smart society) in agriculture.



Source: Based on the Ministry of Agriculture, Forestry and Fisheries "Construction of an Agricultural Data Collaboration Platform", with partial modifications.



Thank you very much for your attention.

Research Center for Agricultural Information Technology