Agricultural Data Collaboration Platform

WAGRI

* WAGRI is a coined word for the agricultural data platform combining “WA (which means circle in Japanese)” that links various data and services and “WA (which means harmony in Japanese)” that promotes further harmonization of various communities, resulting in expectation for innovation in the agricultural field (WA + AGRI).
Future image of agriculture that utilizes data

To **dramatically increase the productivity** at agricultural sites, it is essential to improve the environment where **data can be fully utilized**.

Various data is aggregated and integrated.

- Market condition data
- Soil data
- Farmland data
- Weather data
- Past yield data

By fully utilizing the data, it is possible to realize **a dramatic increase in the productivity and stable production of high-quality agricultural products**, which had been difficult in the past.

By utilizing various data, work efficiency improvement and cost reduction can be realized.

Data obtained during work is fed back to improve the future work efficiency.

- **Work plan optimum for the agricultural business style**
  - Maximization of work efficiency and profits
- **Automation of agricultural work**
  - Significant improvement in work efficiency
- **Growth check from smartphones**
  - Pinpoint pesticide spraying and variable rate fertilization
  - Significant reduction in work time and effort
  - Significant reduction in material cost
- **Harvest in optimal time**
  - Stable shipping of high-quality agricultural products
  - Significant increase in profits

Formulation of work plan

Tillage / sowing / transplantation

Growth management

Harvest
Although the use of ICT is essential to practice agriculture based on data, **data is not being fully utilized** because **there is no mutual collaboration of data and services and various data is scattered.**

There is no mutual collaboration of data and services.

Data is scattered, and the formats are not integrated.

A data platform that allows sharing and utilizing of various data is necessary.
○ To solve the issues of ICT and to create an environment where business farmers can work toward improving productivity and management by using data, a data platform (Agricultural Data Collaboration Platform: WAGRI) having data collaboration, sharing, and providing functions was constructed. The operation started in April 2019 by the National Agriculture and Food Research Organization (NARO).
○ A service utilizing WAGRI for farmers was developed and provided by a private operator.

Three functions of WAGRI

Data collaboration function
The function allows data collaboration of various agricultural ICTs, agricultural machinery, and sensors beyond the vendors and manufacturers.

Data sharing function
Data can be shared under certain rules, enabling provision of data comparison and service that leads to productivity improvement.

Data providing function
Various data including soil, weather, and market conditions is managed, and useful information is provided to farmers.

The productivity and management can be improved by utilizing various data.
Agricultural Data Collaboration Platform (WAGRI)

- The WAGRI server has been built as a collaboration platform of private companies that provide agricultural ICT services.
- Through WAGRI, data and systems on climate, farmland, geographical information, etc., are provided which promote evolving new services by private companies to help farmers select and utilize advanced services.

**Structure of WAGRI**

- **Data and system providers**
  - Private company
  - Private group
  - Private company
  - Private company
  - Private company
  - NARO
  - Government

- **Provides data/system through WAGRI**

- **Public data**
  - Various data such as weather, land, and map information is provided (may be charged).

- **Agricultural Data Collaboration Platform (WAGRI)**
  - Develop new agricultural services by utilizing data and services through WAGRI

- **Data and system users**
  - Agricultural machinery manufacturer A
  - Agricultural machinery manufacturer B
  - ICT vendor C
  - ICT vendor D
  - Farmers, etc., select and utilize related services based on their business style, etc.

*API: Application Programming Interface. Coding conventions that stipulate programs necessary for connecting (linking) several applications.*
<table>
<thead>
<tr>
<th>Data/systems</th>
<th>Description</th>
<th>Provider</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fertilizer</td>
<td>Information on registered fertilizer brands</td>
<td>Food and Agricultural Materials Inspection Center (FAMIC)</td>
</tr>
<tr>
<td>Pesticide</td>
<td>Information on pesticide registration</td>
<td>Food and Agricultural Materials Inspection Center (FAMIC)</td>
</tr>
<tr>
<td>Map</td>
<td>Image data such as maps and aerial photographs</td>
<td>NTT InfraNet</td>
</tr>
<tr>
<td>Farmland</td>
<td>Section information of farmlands (parcel polygon)</td>
<td>MAFF</td>
</tr>
<tr>
<td>Farmland</td>
<td>Farmland place and lot number, land category, area, type of lease right, etc. (farmland pin data)</td>
<td>National Chamber of Agriculture</td>
</tr>
<tr>
<td>Weather</td>
<td>Weather information of the next 3 days maximum (1-km mesh)</td>
<td>HALEX CORPORATION</td>
</tr>
<tr>
<td>Weather</td>
<td>Weather information of the next 26 days maximum (1-km mesh)</td>
<td>Life &amp; Business Weather Inc.</td>
</tr>
<tr>
<td>Weather</td>
<td>Weather information of wide areas such as prefectures</td>
<td>Japan Meteorological Agency</td>
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<tr>
<td>Growth prediction</td>
<td>Growth prediction system for paddy rice, wheat, and soy</td>
<td>VisionTech Inc.</td>
</tr>
<tr>
<td>Growth prediction</td>
<td>Growth prediction system for vegetables grown outdoors</td>
<td>NARO</td>
</tr>
<tr>
<td>Soil</td>
<td>Soil map that shows types and distribution of soil</td>
<td>NARO</td>
</tr>
</tbody>
</table>

*Data and systems that can be acquired from WAGRI can be checked from the website of WAGRI Council (https://wagri.net/).
To provide an environment of safe data collaboration and sharing, terms of use between the WAGRI users and operators (terms of use for data provision) and an agreement between the WAGRI users and farmers, etc., were developed based on “Guideline on Contracts Regarding Utilization of AI and Data in Agricultural Sector” established by MAFF.

**Agreement**
(signed between users and farmers, etc.)
- The WAGRI operator and users will use the platform within the range agreed by farmers, etc.

**Terms of use for WAGRI data utilization, etc.**

**Terms of use for data provision**
(signed between WAGRI operators and users)
- The data is basically private but can be disclosed to the selected subject.
- Agreement is necessary for providing data of farmers, etc.
- Users will strictly control the data of farmers, etc. Operators will take security measures.
- Users will delete the collected data from their systems when cancelling WAGRI.
Example of utilization by private enterprise
- “NEC farming guidance support system” from NEC Solution Innovators, Ltd. -

○ “NEC farming guidance support system*” that utilizes parcel polygons, pesticide information, and estimated weather information of 1-km mesh on WAGRI is provided.
* A system that allows information sharing and guidance based on the growth goal by collecting farming data and grasping the situation of work and growth on maps.

By the utilization of WAGRI:
- Display parcel polygon on map
  Work plans, pesticide spraying condition, and growth situation are displayed in a certain color for each field.
- Warning display of restricted number of uses and period prohibited to use pesticide
- Display of weather information near the field in a calendar or a graph
  Accumulated temperature and precipitation is displayed to support cultivation management in accordance with weather.
- Support the correct pesticide spraying for the entire production area!
- We can check the work plan, pesticide spraying condition, and growth situation for each field!
- It is possible to make work plans and manage cultivation by checking the weather.
- Planning work will be easier if we know the weather conditions.
- I want to be able to check the amount of pesticide use...

Check and give advice on the status of growers and production areas
Check and share info. on the situation of fields and work
Check and share info. on the situation of growths and production areas
It would be more convenient for growers if work plans and growth situations of each field are displayed on the map!
Example of utilization by private enterprise - “AgriLook” for VisionTech Inc. -

- **By linking weather data on WAGRI and satellite images and growth prediction models of VisionTech Inc., “AgriLook” allows detailed cultivation management including fertilization and measures against pests in accordance with the growth stage.**

I want to manage cultivation in more detail using various data.

**WAGRI**

- Weather data
- Growth prediction

**AgriLook**

- It is possible to check growth information and pest information that combine and use satellite data and weather data.

**Additional fertilizer analysis**

By combining weather data with AgriLook, farmers can manage cultivation in detail such as fertilization and measures against pests.
○ To practice agriculture based on data, **formation of a virtuous cycle of data accumulation and utilization is promoted** through WAGRI.

Data and content enhancement

- Public organizations, private companies, etc.
- Weather data
- Soil data
- Farmland data
- Fertilizer/pesticide data
- Growth prediction system
- Market condition data
- Past yield data
- Machine sensing data
- Work record data
- Harvest data
- Management data

API connection

- Private (closed) data
- Data reduction and analysis by the recipient
- Collaboration through WAGRI
- Farmers can utilize improved and increased services.

WAGRI

- Public data
- Various APIs
- Private companies (IT vendors), etc.

Farmers, etc.
The functions of the agricultural data collaboration platform (WAGRI) will be expanded to create a smart food chain that allows mutual use of data including production to processing, distribution, and consumption.

Construction of “Smart food chain system” that allows mutual use of data including production to processing, distribution, and consumption

Things that are realized by the construction of the smart food chain system

- Planned production/shipping without waste loss
- High-precision shipping/demand prediction
- Production/work plan support based on consumer behavior analysis
- Optimum collection/shipping route based on information on production, receiving/placing orders, and inventories