

# Western Region Agricultural Research Center, NARO



WARC/NARO consists of six research divisions promoting research and development that will invigorate agricultural production in the western region of Japan. We are pursuing four research projects with the following missions: (1) development of a highly productive paddy rotation system for large-scale farming in hilly and semi-mountainous areas; (2) development of a labor-saving and profitable citrus production system in hilly and semi-mountainous areas; (3) development of a sustainable and profitable production system in greenhouse horticulture in hilly and semi-mountainous areas; and (4) development of a sustainable Japanese Black Cattle production system for small and medium-scale farming using regional feed resources.

# Division of Farming Systems Research

- We develop stable high-yielding cultivation techniques of soybean, wheat and barley to overcome wet injury, disease and weeds in upland fields converted from paddy fields in hilly and semi-mountainous areas.
- We develop farm mechanization technologies to realize a labor saving and a cost reduction that is suitable for paddy field farming in hilly and semi-mountainous areas. Also, we create technologies that support management and production control of many small fields by utilizing ICT (information and communication technologies).
- We evaluate new agricultural techniques for community-based group farming management. Also, we establish models for high-profitable paddy farming combined with vegetables or livestock suitable for hilly and semi-mountainous areas.



Corn production in a paddy field

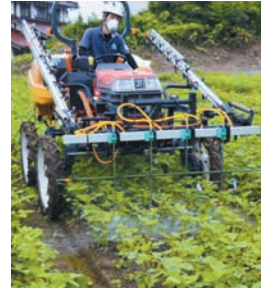


Chisel plow

Improving soil physical properties by plowing for upland cultivation in paddy-upland rotation



Moldboard plow



Soybean cultivation management technology for controlling the spread of noxious weeds



Smartphone app for recording logs

# Division of Lowland Crop Research

- We develop rice cultivars with traits suitable for processing and livestock feed to grow in the warm climate of western Japan. The target traits include high yield, good eating quality, and tolerance to high temperatures.
- We develop high quality wheat varieties suitable for making bread and Japanese noodles that are well adapted for cultivation in the warm climate of western Japan. We also pursue the breeding of durum wheat for domestic pasta production.
- We develop rice production technology that will reduce labor and production costs, while aiming for high yields and maintaining good quality under high temperatures. We also develop technologies for efficient weed management and labor-saving management of levee banks in semi-mountainous areas.



'Koinoyokan' is a rice variety with superior eating quality and tolerance to high temperatures in the summer.

'Koinoyokan' variety of rice (left) shows the reduced occurrence of chalky immature grains at high temperature conditions as compared with the standard 'Hinohikari' variety (right).



'Setokirara' is a high-yielding and high-quality bread wheat variety.



Pasta and seed of Japan's first durum wheat, 'Setodure'.



The Zoysiagrass Net-planting Technique (ZNET) facilitates the development of lawn levee banks.

Manual for growing high-yielding, palatable rice cultivar 'Yamadawara'.



# Division of Agro-Environment Research

- We focus on environmentally sustainable and resource saving crop production through the development of soil management technologies suitable to the geographic and climatic conditions in western Japan. We also create assessment methods for evaluating the effects the crops and fields have on the surrounding environment.
- We focus on the development of environmentally sustainable disease control methods in western Japan, through ecological studies of diseases and development of diagnosis techniques for rotational crops in paddy fields. Our division also works towards establishing biological soil disinfestation methods that utilize regional organic resources to reduce soil-borne diseases.
- We focus on the development of environmentally sustainable insect pest control systems through an augmentative biological control technology using a banker plant system. We also promote the propagation and establishment of indigenous natural enemy pest control systems.



Flightless strain of Harmonia axyridis, a natural enemy of aphids



A solar radiation-dependent drip irrigation system that facilitates labor-saving in irrigation and fertilization (Figure: Asparagus field)



Control of soil-borne diseases by incorporating mustard plants into the soil



Scaevola plants effective for maintenance and propagation of natural enemies

# Division of Field Crops and Horticulture Research

- We develop soybean and barley cultivars to address the needs of farmers, processors, and consumers in Japan.
- We are developing a low-input sustainable horticultural production system in greenhouses using topographical resources of hilly/semi-mountainous areas and a sustainable production system of local vegetables and medicinal plants.
- We introduce new local specialty vegetables and develop low-cost cultivation technologies which optimized light conditions and temperatures for growth promotion and quality improvement of local specialty vegetables.
- We analyze the nutritional values and secondary health effects of crops specifically grown in the western region of Japan, as well as developing technologies for effective utilization of these crops.



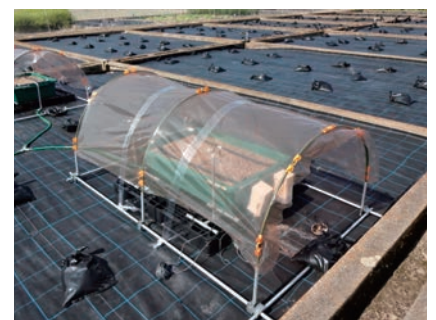
The waxy naked barley cultivar 'Kiririmochi' has a high dietary fiber ( $\beta$ -glucan) content and shows low level of discoloration after boiling. Boiled pearled barley incubated at 70°C for 18h. Left: Kiririmochi; Right: Ichibanboshi.



New soybean cultivar 'Akimaro' suitable for production of miso or soybean paste



The greenhouse developed in the research can be built at a low cost from mass-produced scaffold materials, making a sturdy structure.



The development of light adjusting film for vegetable growth.

# Division of Hillside Horticulture Research

We are developing an advanced drip irrigation and fertigation system combined with plastic mulch and water-stress control for citrus orchards in order to achieve stable production and long periods of continued supply of high-quality fruit.

We develop systems for meteorological sensing and monitoring, tools to support cultivation, predictive models of the cultivation environment, and labor saving technologies for hillside horticultural production.

We are developing practical technologies, especially flood analysis models for reservoirs as a core technology, to prevent or reduce damage caused by natural disasters in rural areas and farmland in the hilly, semi-mountainous regions of western Japan.

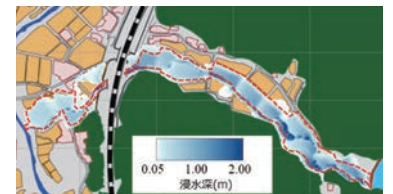
We are developing technologies to sustainably manage biodiversity in the hilly, semi-mountainous regions and to contribute to agricultural promotion through the use of ecosystem services.



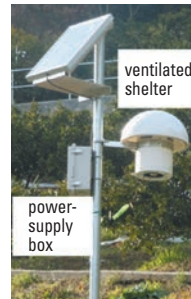
A drip irrigation and fertigation system in a citrus orchard with plastic mulch



Field survey of plant diversity in paddy fields and levees.



Improvement of flood analysis simulation model for reservoirs.



An automated air temperature data acquisition system

# Division of Japanese Black Cattle Production and Wildlife Management Research

We are developing a feeding technology using regional feed resources for cows and heifers to improve the reproduction and growth ability in Japanese Black Cattle.

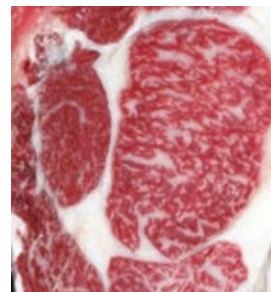
We are developing a low cost beef-fattening production technology based on characteristic traits of Japanese Black Cattle by multi-feeding using regional resources.

We are developing an advanced grazing system of Japanese Black Cattle utilizing ICT and AI to improve productivity and to save labor costs.

We are developing a comprehensive countermeasure technology for wildlife damage in accordance with existing environmental conditions and ways to reduce potential damage to wildlife.



Utilization of rice whole crop silage as feed for Japanese Black cattle



Beef produced using regional feed resources



Working with local communities to prevent wildlife damage

Survey of grazing land by drone (unmanned aerial vehicle, UAV)



## Director-General

### Department of Regional Strategy

- Business Promotion Office
  - Coordinator, Industry-Academia Collaboration
  - Communicator, Agricultural Technology
- Research Promotion Office
  - Coordinator, Smart agriculture

### Department of Administration for Western Area · Technical Support Center of Western Region

#### Administrative Headquarters

##### Department of Administration for Western Area

- General Affairs Section
- Accounting Section
- Safety and Health Management Office
- Administration Section for Shikoku Station

##### Department of Technical Support

##### Technical Support Center of Western Region

- Western Region Operation Unit 1
- Western Region Operation Unit 2
- Western Region Operation Unit 3

## Director of Shikoku Research Station

### Division of Farming Systems Research (Fukuyama)

- Farm Management Group
- Farm Mechanization and Information Systems Group
- Field Crop Production Group

### Division of Lowland Crop Research (Fukuyama)

- Rice Breeding Group
- Wheat Breeding Group
- Crop Physiology and Management Group

### Division of Agro-Environment Research (Fukuyama)

- Soil Management Group
- Plant Disease Management Group
- Insect Pest Management Group

### Division of Field Crops and Horticulture Research (Shikoku)

- Upland Crop Breeding Group
- Protected Vegetable Production Group
- Vegetable Production Management Group
- Regional Crop Utilization Group

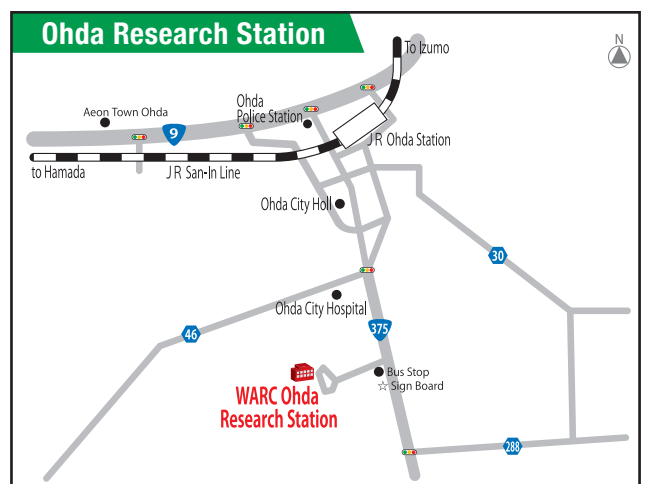
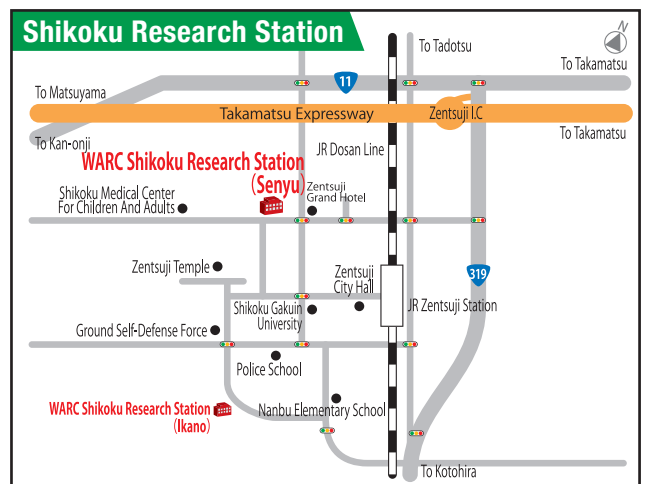
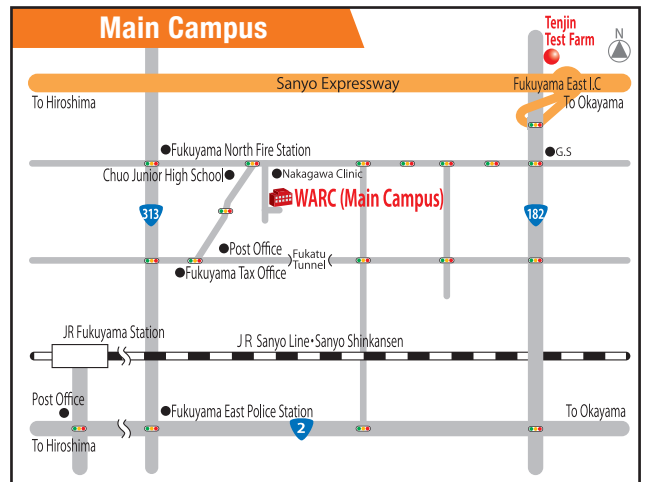
### Division of Hillside Horticulture Research (Shikoku)

- Citrus Production Group
- Horticulture Environmental Engineering Group
- Hillside Disaster Prevention Group
- Biodiversity Utilization Group

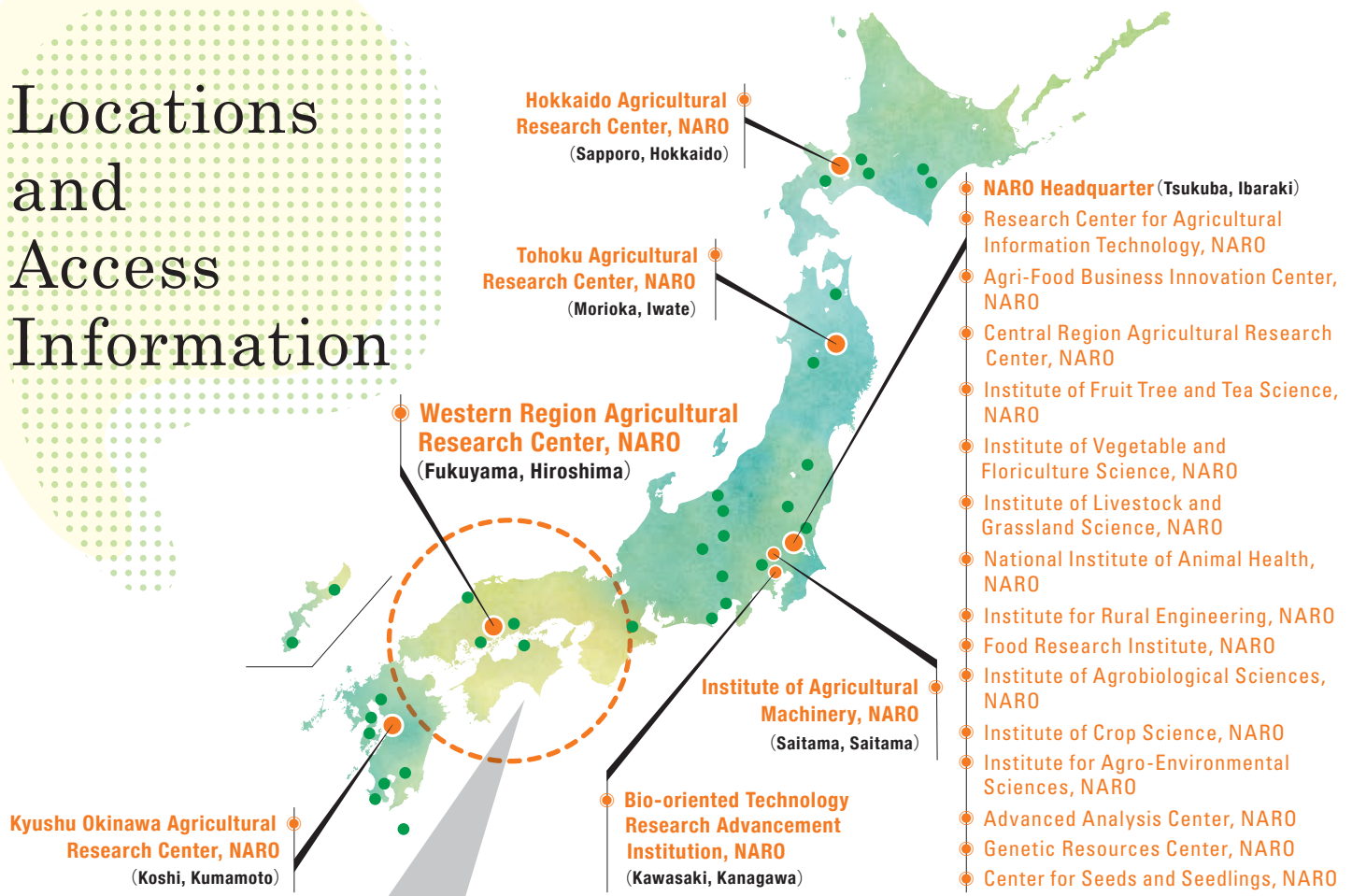
### Division of Japanese Black Cattle Production and Wildlife Management Research (Ohda)

- Reproductive Management Group
- Beef Production Group
- Advanced Grazing Management Group
- Wildlife Management Group

## Map of Research Stations



# Locations and Access Information



## WARC / NARO Research Stations

### Ohda Research Station

60 Yoshinaga, Ohda-shi,  
Shimane, 694-0013 Japan  
+81-854-82-0144 (Main line)  
Nearest station :  
Ohdashi Station on the JR San-In Line

### Main Campus

6-12-1 Nishifukatsu-cho,  
Fukuyama-shi,  
Hiroshima, 721-8514 Japan  
+81-84-923-4100 (Main line)  
Nearest station :  
Fukuyama Station  
on the JR Sanyo Line  
JR Sanyo Shinkansen,  
and JR Fukuen Line



### Shikoku Research Station

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## Contact

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WARC/NARO research achievements, information on events, and publications such as brochures and technical manuals are available from our website. Please visit our website.



Front cover : Nishi-Awa Steep Slope Land, designated as a Globally Important Agricultural Heritage System in 2019 (photo courtesy of Mr. Hideki Ozeki).

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