



National Agriculture and Food Research Organization

Western Region Agricultural Research Center



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.



Soybean cultivation management technology for controlling the spread of noxious weeds



Smartphone app for recording logs

◆ Division of Lowland Crop Research



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

We develop rice varieties for cultivation in the warm climate of western Japan which have suitable traits for processing and livestock feed. The target traits include high yield, good eating quality, and heat tolerance.

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.



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



'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).

◆ 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.



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



Flightless strain of *Harmonia axyridis*, a natural enemy of aphids

◆ Division of Regional Crop Research



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

We develop soybean and barley cultivars to address the needs of farmers, processors, and consumers in Japan.

We focus on the optimization of cultivation environments such as light conditions and temperatures for growth promotion and quality improvement of local specialty vegetables, and the utilization of field soil microbes to control soil-borne diseases and pests in order to establish a low-cost technology for sustainable vegetable cultivation.

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 (β -glucan) content and shows low level of discoloration after boiling (left).



Sustainable spinach production in the summer season by controlling the removal of shading materials

◆ 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 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 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 to prevent or reduce damage caused by natural disasters in rural areas and farmlands in the hilly, semi-mountainous regions in western Japan.



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



An automated air temperature data acquisition system



A greenhouse with a high-insulation curtain and reinforced by doubling the arched steel pipes for protection against strong winds and heavy snow

◆ 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

Western Region Agricultural Research Center

Director-General

Department of Planning

Department of General Administration

Office of Risk Management

Technical Support Center

Director of Shikoku Research Station

Senior Coordinator of Ayabe 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 Regional Crop Research (Shikoku and Ayabe)

Upland Crop Breeding Group (Shikoku)
Sustainable Vegetable Production Group (Ayabe)
Regional Crop Utilization Group (Shikoku)

Division of Hillside Horticulture Research (Shikoku)

Citrus Production Group
Hillside Vegetable Production Group
Horticulture Environmental Engineering Group
Hillside Disaster Prevention 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

WARC/NARO Research Stations

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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.

<http://www.naro.affrc.go.jp/warc/>

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Front cover: Terraced potato fields in Yusumizugaura, Ehime, Shikoku Island (Photo courtesy of Mr. Hideki Ozeki).