NARO

Hokkaido Agricultural Research Center, NARO (HARC/NARO)

National Agriculture and Food Research Organization

Land conditions and characteristics of farming in Hokkaido

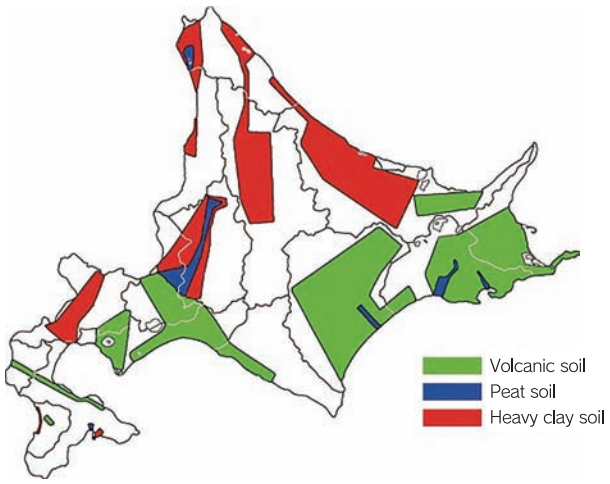
Hokkaido, the northernmost island of Japan, is characterized by natural conditions suitable for large-scale lowland farming, upland farming and dairy farming, including abundant land resources, cool summer season with long days and long hours of sunlight, and a large difference between daytime and nighttime temperatures. As Japan' s premier food production region, it has a total cultivated land area of 1,147,000 hectares representing 25.5% of the nation' s total cultivated lands (2015 data). However, agricultural production is still constantly facing serious problems including the occasional occurrence of cold injury and wet injury, heavy snow and very low temperatures in winter, and the prevalence of unfavorable soil types such as peat soil and heavy clay. Therefore, it is necessary to pursue basic research and develop countermeasures to overcome these unfavorable climatic and land conditions, and to sustain the agricultural production of Hokkaido in the future.

◆Climate of Hokkaido

Japan Meteorological Agency (1981-2010)

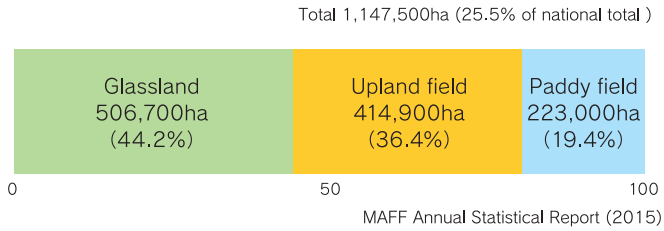
	Sapporo	Obihiro
Mean annual temperature	8.9℃	6.8℃
Mean maximum temperature in August	26.4℃	25.2℃
Mean minimum temperature in January	−7.0℃	−13.7℃
Annual precipitation	1,107mm	888mm
Frosting season	10/25～4/24	10/9～5/15
Snowy season	10/28～4/19	11/7～4/25

◆Distribution of soil type in Hokkaido



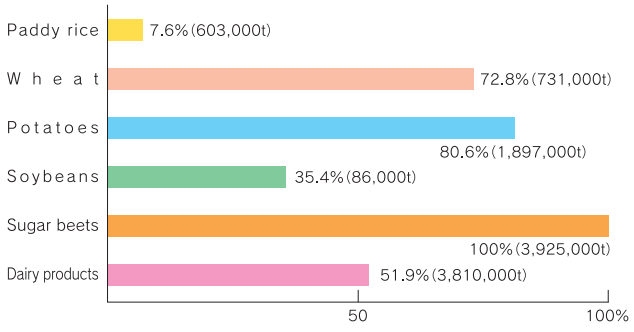
In the central part of Hokkaido particularly the Ishikari River basin area, lowland farming is prevalent and many farms are engaged in cultivation of vegetable crops owing to its proximity to the major city of Sapporo. The eastern and northern parts are typical dairy farming regions with milk and beef from dairy cattle representing a large portion of agricultural production in the Kushiro, Nemuro and Soya areas. Upland crops such as wheat, beans, sugar beet and potatoes, and vegetables including onions are mainly cultivated in the Tokachi and Okhotsk regions. Vegetable and fruit crops as well as lowland crops, upland crops and livestock raising are the main types of farming in the southern part of Hokkaido.

◆Hokkaido' s cultivated land area (2015)



MAFF Annual Statistical Report (2015)

◆Contribution of Hokkaido in Japan' s agricultural output



Hokkaido Annual Report on Agriculture (Hokkaido District Agriculture:2016)

Among various crops produced in Hokkaido, the production of such crops as wheat, sugar beet, potatoes, soybeans, adzuki beans, kidney beans, buckwheat, onions, sweet corn, pumpkins, raw milk and rape seeds is the largest in Japan (as of 2015). The total annual revenue from agricultural products has been about one trillion yen since 1984. Most of the farming households are engaged in full-time large-scale farming; about 70% of the farmers in Hokkaido are full-time farmers, and the average farming area per farming household is 23.4 hectares (as of 2014), 14.6 times larger than the national average excluding Hokkaido.

Mission of Hokkaido Agricultural Research Center

The Hokkaido Agricultural Research Center, NARO (HARC/NARO) aims to contribute to the development of agriculture and the food industry in Hokkaido. Pioneering research and development and rapid applications of new technologies are being carried out to ensure a stable supply of safe agricultural products to consumers. For the 4th mid-term plan (2016 to 2020), HARC/NARO aims to strengthen the functionalities of regional areas, establish a system that incorporates the ideas of farmers into research plans, and strengthen links with research organizations, administrative bodies, universities and private enterprises in agriculture and other fields.

Japan is currently facing a continuous decline in the number of farmers with an accompanying increase in the scale of farms. There is also the problem of competition with imported agricultural products. In order to resolve these problems, HARC/NARO is collaborating with the reseach centers and institutes comprising the National Agriculture and Food Research Organization in order to develop new technologies that will contribute to reforms in the production system and the enhancement of competitive capabilities, and to facilitate the implementation of such technologies.

Organization

National Agriculture and Food Research Organization

- President, Senior Vice-president, Vice-presidents
- Auditors
- Headquarter
- Agri-Food Business Innovation Center, NARO
- Hokkaido Agricultural Research Center, NARO
- Tohoku Agricultural Research Center, NARO
- Central Region Agricultural Research Center, NARO
- Western Region Agricultural Research Center, NARO
- Kyushu Okinawa Agricultural Research Center, NARO
- Institute of Fruit Tree and Tea Science, NARO
- Institute of Vegetable and Floriculture Science, NARO
- Institute of Livestock and Grassland Science, NARO
- National Institute of Animal Health, NARO
- Institute for Rural Engineering, NARO
- Food Research Institute, NARO
- Institute of Agrobiological Sciences, NARO
- Institute of Crop Science, NARO
- Institute of Agricultural Machinery, NARO
- Institute for Agro-Environmental Sciences, NARO
- Advanced Analysis Center, NARO
- Genetic Resources Center, NARO
- Center for Seeds and Seedlings, NARO
- Bio-oriented Technology Research Advancement Institution, NARO

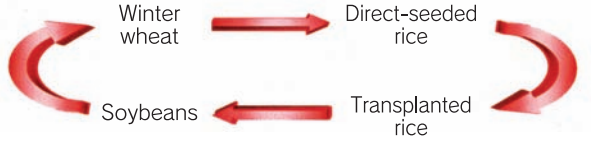
Organization of Hokkaido Agricultural Research Center, NARO (HARC/NARO)

- Director-General
- Department of Planning
  - Planning Section
  - Promotion Section of Industry-Academia Collaboration
- Department of General Administration
  - General Affairs Section (Sapporo, Memuro)
  - Accounting Section
- Office of Risk Management (Sapporo, Memuro)
- Technical Support Center
  - Operations Unit 1 (Sapporo)
  - Operations Unit 2 (Sapporo)
  - Operations Unit 3 (Memuro)
- Director of Northern Field Crop Research (Memuro)
- Division of Lowland Farming Research (Sapporo)
  - Lowland Farm Work Mechanization Group
  - Lowland Crop Rotation System Group
  - Farming Management Evaluation Group
- Division of Dairy Production Research (Sapporo)
  - Feed Production and Utilization Group
  - Grassland Management Group
  - Dairy Cattle Group
  - Livestock Management Group
- Division of Agro-environmental Research (Sapporo)
  - Climate Change Group
  - Soil Management Group
  - Plant Pathology and Entomology Group
  - Plant Nematology Group
- Division of Crop Breeding Research (Sapporo)
  - Rice Breeding Group
  - Forage Crop Breeding Group
  - Horticultural Crop Breeding Group
  - Pre-breeding Group
- Division of Field Crop Research and Development (Memuro)
  - Wheat Breeding Group
  - Potato Breeding Group
  - Sugar Beet Breeding Group
  - Bioresource Crop Group
  - Agri-products Evaluation and Utilization Group
- Division of Farming System Research (Memuro)
  - ICT Farming Group
  - Crop Rotation System Group
  - Meteorological Information Group

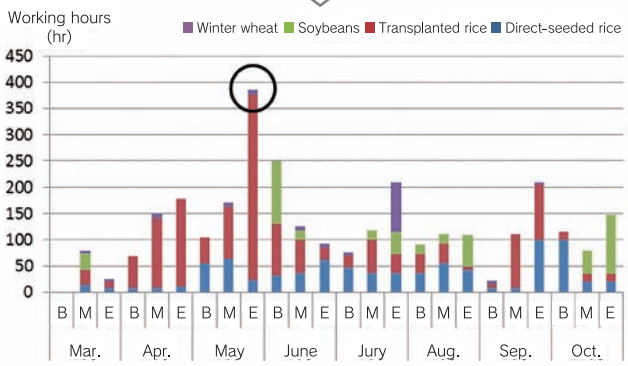
Division of Lowland Farming Research

Main research targets

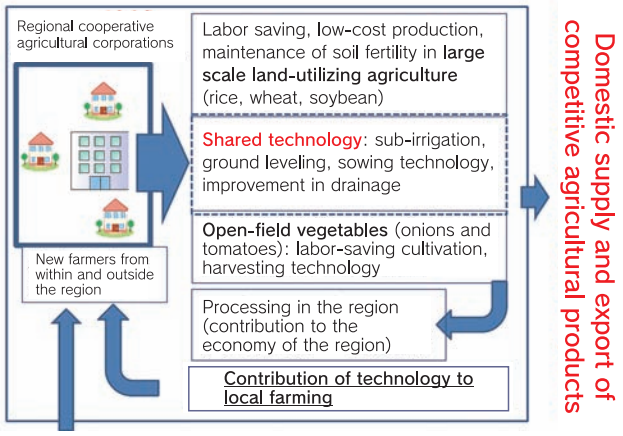
- Lowland Farm Work Mechanization Group : Development of new technologies to reduce the workload during the spring season by conducting ground leveling in the previous year and direct sowing of rice in well-drained paddy fields, and to facilitate the establishment of a large-scale lowland farming system particularly in Hokkaido with limited cropping season
- Lowland Crop Rotation System Group : Development of a lowland crop rotation system in converted fields to enable both labor saving and improvement in the yield of rice and crops such as wheat and soybeans
- Farming Management Evaluation Group : Evaluation of the effect of newly introduced technologies in improving farm management in order to accelerate their extension. Formulation of a farming model with high profitability via cultivation of open-field vegetables such as onions in large-scale lowland farming



Assumed large-scale lowland crop rotation system (70 hectares)



Maximum working time in spring reduced to less than 400 hours with the implementation of new technology (more than 900 hours for entirely transplanted rice)



Conceptual scheme of the expected ripple effect of the development and introduction of new technology on regional economy

Main research results

- A system of ground leveling in the previous year for direct sowing and cultivation of rice in well-drained paddy fields has been developed and its effectiveness for reducing working hours in spring has been demonstrated.
- Technology for stabilizing seedling establishment using a sub-irrigation control system (such as FOEAS or Hokkaido-style sub-irrigation) for direct sowing and cultivation of rice in well-drained paddy fields has been developed.
- A guidebook explaining the main features and strategies for each type of farming has been made available to support new farmer' s supporters.

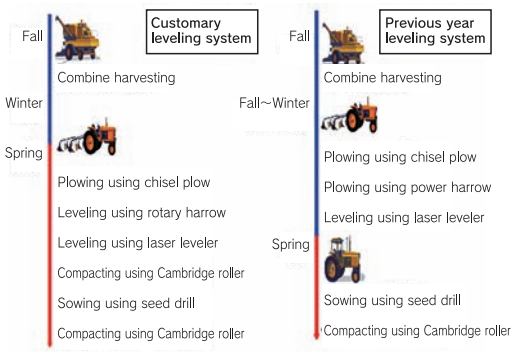
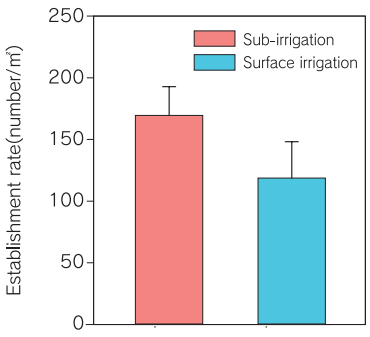


Diagram showing the concept of customary and previous year ground leveling systems in rice paddy field for direct sowing cultivation

(Preceding crop : wheat, Example of working contents & farm working machines)



The use of sub-irrigation increased the establishment of direct sowing in well-drained paddy fields

(2010-2013 HARC trials)

Guidebook for supporters of new farmers

(Guidance & Tools･Case study)

Division of Dairy Production Research

Main research targets

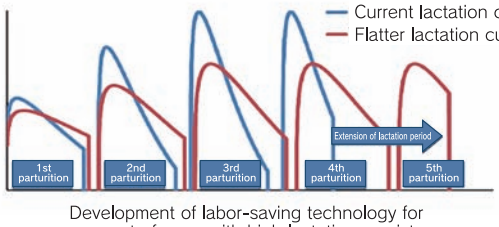
- Feed Production and Utilization Group : Development of technology for low cost production and utilization of domestically produced concentrate feed such as corn grain
- Grassland Management Group : Establishment of a labor-saving grassland management system using information and communication technology for improving the quality of self-sufficient roughage
- Dairy Cattle Group : Development of labor-saving dairy cattle management system that also promotes health maintenance of cows for increased lifetime productivity
- Livestock Management Group : Development of a labor-saving livestock management system such as grazing and characterization of milk produced from cows fed with grass or domestic concentrate feed

Establishment of a system for low-cost production and utilization of corn grain silage such as high-moisture shelled corn and corn cob mix.

Development of technology to discriminate milk from grass fed cows and ear-corn silage fed cows.

Development of labor-saving and efficient grassland management systems using information and communication technology.

Lactation curve

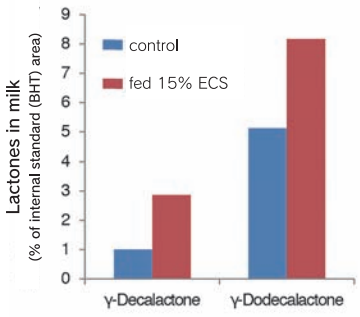


Development of labor-saving technology for management of cows with high lactation persistency.

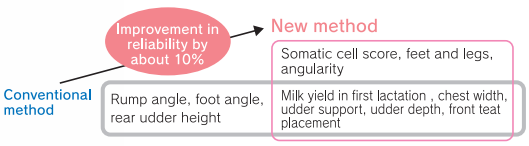
Main research results

- Technology for production and utilization of domestic concentrate feed using ear-corn silage has been developed, and an application manual has been made available.
- The effects of grazing and feeding ear-corn silage on profile of volatile components in milk have been clarified.
- Methods for more accurate estimation of the breeding value for herd life and conception rate of dairy cattle, and shortening the dry period of dairy cows have been developed.
- Labor-saving and easy methods for estimating herbage yield and distribution of nutrients have been developed.

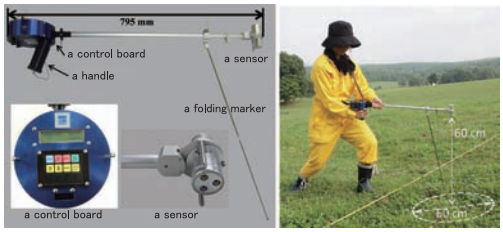
Second edition of a manual for production and utilization of ear-corn silage

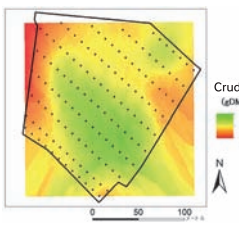


Lactone content in milk from cows fed with ear-corn silage



Accurate estimation of the breeding value for herd life of dairy cattle





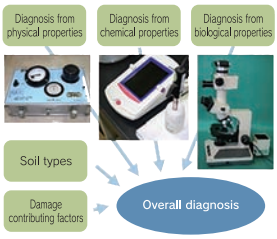
Scatterplot of the crude protein amount in pasture (right) obtained using a portable device to measure the amount of growth (left)

Division of Agro-environmental Research

Main research targets

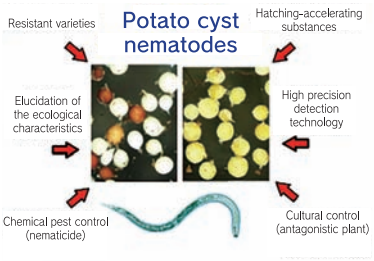
- Climate Change Group : Research for the development of an information decision-support system for agriculture corresponding to climate change in Hokkaido and the development of technology to support the introduction and stable production of new crops
- Soil Management Group : Research to develop soil management and diagnosis technology to support labor-saving and stable production
- Plant Pathology and Entomology Group : Research to develop technology for prevention of plant damage caused by diseases and insect pests
- Plant Nematology Group : Research to develop technology for control of nematodes

Agriculture meteorological alert system and regional expert assistant system



Development of technology for soil management and diagnosis

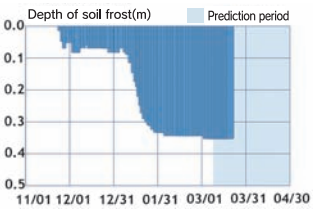
Disease and insect damage control technology



Technology for control of nematodes

Main research results

- A method for controlling volunteer potato tubers by soil frost control has been developed and is being used in Tokachi and Okhotsk regions.
- Use of phosphate fertilizer has been reduced by utilizing effective microorganisms in soil (arbuscular mycorrhizal fungi).
- Identification of a new bacterial strain in blackleg in potatoes that has not been reported in Japan before.
- A method for simple identification of harmful nematodes in the field (root lesion nematodes and root-knot nematodes) with accompanying manual was developed.



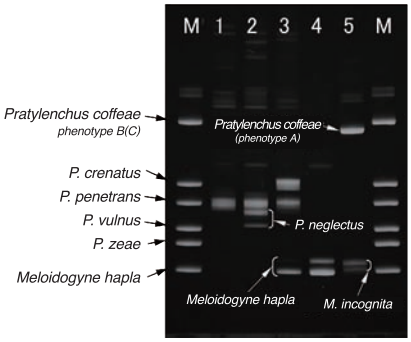
Development and application of a method for controlling volunteer potato tubers by soil frost control

Identification of a new strain of blackleg bacteria in Japan
(*Pectobacterium carotovorum* subsp. *brasiliense*)

Use of phosphate fertilizer can be reduced by utilizing indigenous mycorrhizal fungi.

Where to get pamphlets
http://www.naro.affrc.go.jp/publicity_report/publication/pamphlet/tech-pamph/054611.html

Development of a method for utilizing indigenous mycorrhizal fungi



Where to get manuals
http://www.naro.affrc.go.jp/harc/contents/nematode/index.html

Development of a method and acompanying manual for identifying harmful nematodes

Division of Crop Breeding Research

Main research targets

- Rice Breeding Group : Breeding of rice varieties for industrial use, processing, and animal feed in the Hokkaido region ; Development of high-yielding rice lines with direct seeding adaptability, and assessment of the suitability of rice with high amylose content for processing
- Forage Crop Breeding Group : Breeding of corn with a high grain yield for forage, orchardgrass with a high sugar content, festulolium with good aptitude for grazing, galega with good aptitude for mixed seeding, and alfalfa with machine trampling tolerance
- Horticultural Crop Breeding Group : Breeding of early maturing onion varieties that can be easily processed ; Breeding of pumpkin varieties with high storage stability and good aptitude for processing
- Pre-breeding Group : Development of breeding materials and selection markers for accelerating the breeding of rice varieties suitable for direct seeding ; Development of selection indices for storage stability of pumpkin

Breeding of rice varieties

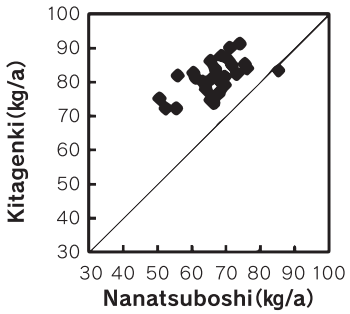
Breeding of forage crops with high nutrient contents

Breeding of onions and pumpkins for processing

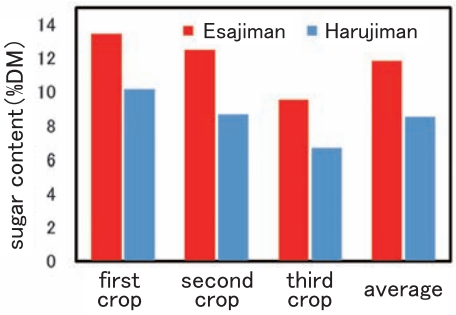
Development of breeding materials to improve the adaptability to direct sowing of rice

Main research results

- Development of high-yielding rice variety 'Kitagenki', high sugar content orchardgrass variety 'Esajiman', and pumpkin variety 'JejeJ' that maintains good quality after storage.
- We have succeeded in greatly improving the seedling vigor of rice under cold conditions by genetically enhancing the cold insensitivity.

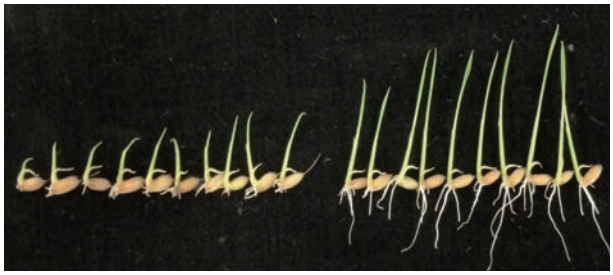


A comparison of the brown rice yield between varieties 'Kitagenki' and 'Nanatsuboshi'
(performance tests for recommended varieties in 2014 and 2015)



Sugar content of the orchardgrass variety 'Esajiman'
(average of measurements at 4 sites in 3 years)

The pumpkin variety 'JejeJ' retains good quality after storage
(released by cooperative breeding with a private sector)



Rice with enhanced cold insensitivity (right) shows good seedling vigor
(comparison at 15 ℃)

Division of Field Crop Research and Development

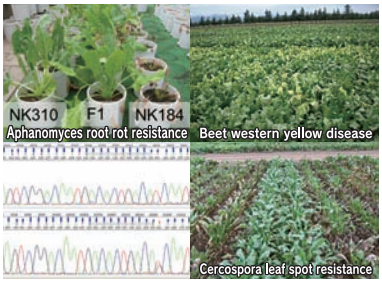
Main research targets

- Wheat Breeding Group : Development of wheat varieties with agricultural traits such as pre-harvest sprouting resistance, and suitable for making bread, Chinese noodles and confectionery
- Potato Breeding Group : Development of varieties with resistance to pests and diseases, and suitable for processing as potato chips and French fries
  Development of potato varieties for new application
- Sugar Beet Breeding Group : Development of sugar beet varieties with resistance to diseases occurring under high temperature and high moisture conditions
- Bioresource Crop Group : Development of buckwheat varieties to support 6th sector industrialization, and technology for cultivation of medicinal crops
- Agri-products Evaluation and Utilization Group : Development of processing and storage technology, new utilization of agricultural products, and evaluation method for functional components

Yellow mosaic disease symptoms (susceptible variety) | Healthy plants (resistant variety)

Development of wheat varieties with resistance to wheat yellow mosaic virus and suitable for making bread and Chinese noodles

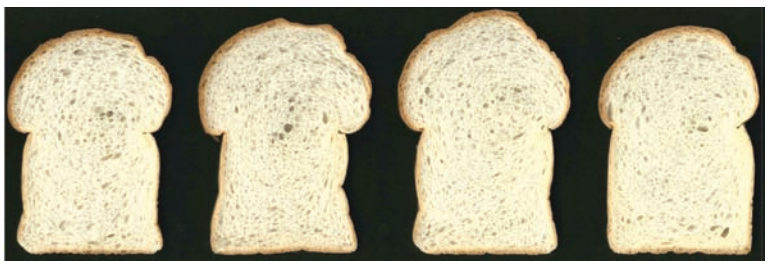
Development of potato varieties with resistance to potato cyst nematodes and late blight



Development of new sugar beet varieties with disease resistance using genomic information

Main research results

- We released a hardy new variety of winter wheat 'Yumechikara' with extra dough strength suitable for making high-quality bread by blending with medium-strength flour.
- We released a new potato variety 'Haruka' suitable for various food products and a new variety, 'Pearl Starch' , that will lead to an increase in starch onsumption.
- We released a new Tartary buckwheat variety, 'Mantenkirari' , that will lead to revitalization of soba producing regions and a new sugar beet highly disease-resistant variety, 'Hokkai-mitsuboshi' .
- A new method using ethylene for long-term storage of potatoes for processing has been developed.



Foreign-grown wheat | Yumechikara | Yumechikara 50% Kitahonami 50% | Kitahonami

Puffy bread can be made by blending high-strength flour from 'Yumechikara' and medium-strength flour from 'Kitahonami' .

A new variety 'Haruka' with multiple uses

A new Tartary buckwheat variety 'Mantenkirari' with high yield and high quality

A new sugar beet multi-combined disease resistant variety 'Hokkai-Mitsuboshi'

Control | Ethylene treatment

Ethylene treatment allows storage for seven months from the end of October.

Division of Farming System Research

Main research targets

- ICT Farming Group : Development of a system for large-scale and labor-saving production management using information and communication technology (ICT)
- Crop Rotation System Group : Development of a cropping system and production technology to increase the profitability of large-scale crop rotation
- Meteorological Information Group : Development of a system for agro-meteorological information that can achieve stable and labor-saving production

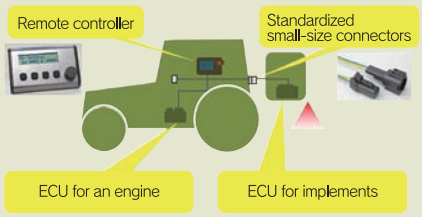
Labor saving in agriculture achieved using data obtained by ICT, predictions and production management

Comprehensive identification of disease-resistant potatoes using a camera drone

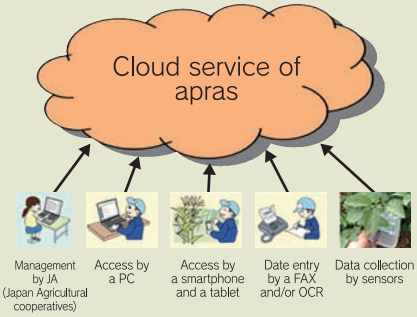
Main research results

- Standardized communication technology for agricultural machines and a production management cloud service (apras) have been developed.
- A new large-scale crop production system using variable-rate application of fertilizer and introduction of vegetables for processing has been developed and its effectiveness has been demonstrated.
- A numerical model for estimating snow depth on agricultural land in 1-km grids using data obtained by AMeDAS has been developed.

Standardized communication technology for agricultural machines

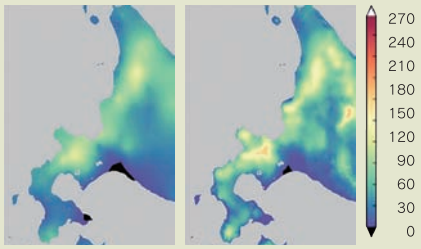


Production management cloud service(apras)



Production system for processed vegetables and variable-rate application of fertilizer

Numerical model for estimating snow depth on agricultural land in 1-km grids



Conventional model　Newly developed model

Control of the soil frost depth by using meteorological data and by appropriate snow compaction practice and frost-kill of volunteer potatoes

Department of Planning, Department of General Administration, and Office of Risk Management

Department of Planning

Planning Section (Coordinator for Communications, Planning Team, Fund Management Team)

Management and assessment of research themes; preparation and allocation of budget, correspondence with administrative sections and the Headquarters of the National Agriculture and Food Research Organization; implementation of measures to strengthen information security; management of catalogued materials; and promotion and support of research projects.

Promotion Section of Industry-Academia Collaboration (Coordinator for Industry-Academia Collaboration, Communicator for Agricultural Technology, Collaboration Coordination Team, Communications Team)

Strengthening regional functionalities; gathering information on needs for research, promotion of R&D collaboration with producers, research institutes, organizations through which new technology will be made available, universities, and private businesses; providing access to results of research; preparation of contracts for collaborative research; management of intellectual property; and promotion and support of advertising activities.

Department of General Administration

General Affairs Section (General Affairs Team, Memuro Administration Team), Accounting Section (Accounting Team)

Duties are related to general affairs, welfare, personnel management, accounting, inspections, procurement of supplies, and asset management.

Office of Risk Management

Memuro Risk Management Coordinator, Coordinator for Risk Management, Coordinator for Safety Management

These departments and offices are also involved in the promotion of compliance and strengthening of risk management for the prevention of unlawful acts in research activities and unlawful use of research funds and for the management of experimental research with legal restrictions, drugs and controlled substances.

Technical Support Center

Duties include cultivation of forage for livestock and agricultural crops for research, various measurement operations to gather research data, and on-site verification tests of new varieties and technologies.

Operations Unit 1 Sapporo

Support for the production and evaluation of ear corn and other types of self-supplying concentrates, development of a labor-saving herd management system for dairy cattle and a labor-saving system for management of and obtaining high yields from grasslands, and verification of a system for production of milk and meat with added value using self-supplying concentrate for feeding cattle.

Milking parlor

Operations Unit 2 Sapporo

Support for the development of new varieties of rice for various purposes and new varieties of vegetables and other crops with new properties, development of methods for enhancement of nutrient uptake and prevention of diseases using biofunctions, development of new methods for cultivation management using meteorological phenomena, and verification of large-scale lowland farming system incorporating new technologies including ICT.

Weeding operations on an experimental farm

Operations Unit 3 Memuro

Support for verification of large-scale crop rotation system using vegetables for processing and industrial use, demonstration of large field crop rotation system utilizing ICT such as robot technology, development of new varieties of crops including potato varieties that can be supplied year-round, wheat for bread and Chinese noodles, and high yielding sugar beet with strong resistance to diseases.

Harvesting in a wheat breeding test field

History

1901 : Establishment of the Hokkaido Agricultural Experiment Station of the Ministry of Agriculture and Commerce in the Second Farm of Sapporo Agricultural College.
1906 : Establishment of the Tsukisappu Cow Breeding Station of the Ministry of Agriculture and Commerce in Toyohira Village, Sapporo.
1908 : Name changed to Tsukisappu Breeding Station of the Ministry of Agriculture and Commerce.
1916 : Termination of the operations of Tsukisappu Breeding Station and establishment of the Hokkaido Animal Research Station of the Ministry of Agriculture and Commerce.
1919 : Establishment of the Tsukisappu Sheep Breeding Station in Hokkaido Animal Research Station.
1925 : Name changed to Sheep Breeding Station; construction of a new building for Hokkaido Agricultural Experiment Station in Kotani started.
1931 : Name changed to Sheep Breeding Station.
1942 : Merger of the Hokkaido Agricultural Experiment Station, Breeding Station of Hokkaido Government, and Sheep Breeding Station of Hokkaido Government, and establishment of the Hokkaido National Agricultural Experiment Station.
1946 : Termination of operations at the Sheep Breeding Station and establishment of the Tsukisappu Breeding Station of the Ministry of Agriculture and Forestry.
1949 : Termination of the operations at the Tsukisappu Breeding Station, transfer of land ownership to Hokkaido National Agricultural Experiment Station after demolition of the station, and establishment of the Tsukisappu Experiment Field.
1950 : Separated into Hokkaido National Agricultural Experiment Station and Hokkaido Prefectural Agricultural Experiment Station.
1959 : Establishment of the Upland Farming Research Division of Hokkaido Agricultural Experiment Station in Memuro.
1966 : Transfer of Hokkaido Agricultural Experiment Station from Kotoni to its present location in Hitsujigaoka.
1978 : Name changed to Hokkaido National Agricultural Experiment Station under the Ministry of Agriculture, Forestry and Fisheries.
1993 : Addition of a research laboratory to a part of the Upland Farming Research Division and reorganization to Upland Farming Research Center (in Memuro).
2001 : Reorganized as the National Agricultural Research Center for Hokkaido Region under the National Agriculture Research Organization (Independent Administrative Agency).
2003 : Reorganized as the National Agricultural Research Center for Hokkaido Region under the National Agriculture Bio-oriented Research Organization (Independent Administrative Agency).
2006 : Reoganized as the Hokkaido Agricultural Research Center (HARC) under the National Agriculture and Food Research Organization (Independent Administrative Agency).
2015 : Reorganized as the Hokkaido Agricultural Research Center (HARC) under the National Agriculture and Food Research Organization (National Research and Development Agency).
2016 : National Agriculture and Food Research Organization
*Integrated with the National Institute of Agrobiological Sciences, National Institute for Agro-Environmental Sciences, and National Center for Seeds and Seedlings.

Number of staff

Appointed staff	1	(0)
Administrative staff	41	(7)
Technical staff	54	(15)
Research staff	124	(37)
Total	220	(59)

Number in parenthesis indicates research staff in Memuro.

Premises

Unit:ha

Location	Buildings	Upland field	Paddy field	Grazing land	Mountain, forest, etc	Total
Hitsujigaoka (Sapporo)	37.2	138.7	6.5	200.8	439.8	823.0
Memuro Upland Farming Research Station	10.1	91.0	–	–	1.6	102.7
Bibai Lowland Test Field	0.9	2.3	1.7	–	50.0	54.9

(Staff and premises as of Jan. 2018)

Sapporo

1, Hitsujigaoka, Toyohira-ku, Sapporo, Hokkaido
062-8555, JAPAN
Tel:011-851-9141

Access information

★ Sapporo Station — Subway Toho Line, 13 min. → Fukuzumi Station — Chuo Bus, 4 min. → Tsukisamu-Higashi1-jo 19-chome — Walk, 15 min. → HARC

★ New Chitose Airport — Chuo Bus/Hokuto Kotsu Bus, 48 min. → Tsukisamu-Higashi1-jo 19-chome — Walk, 15 min. → HARC

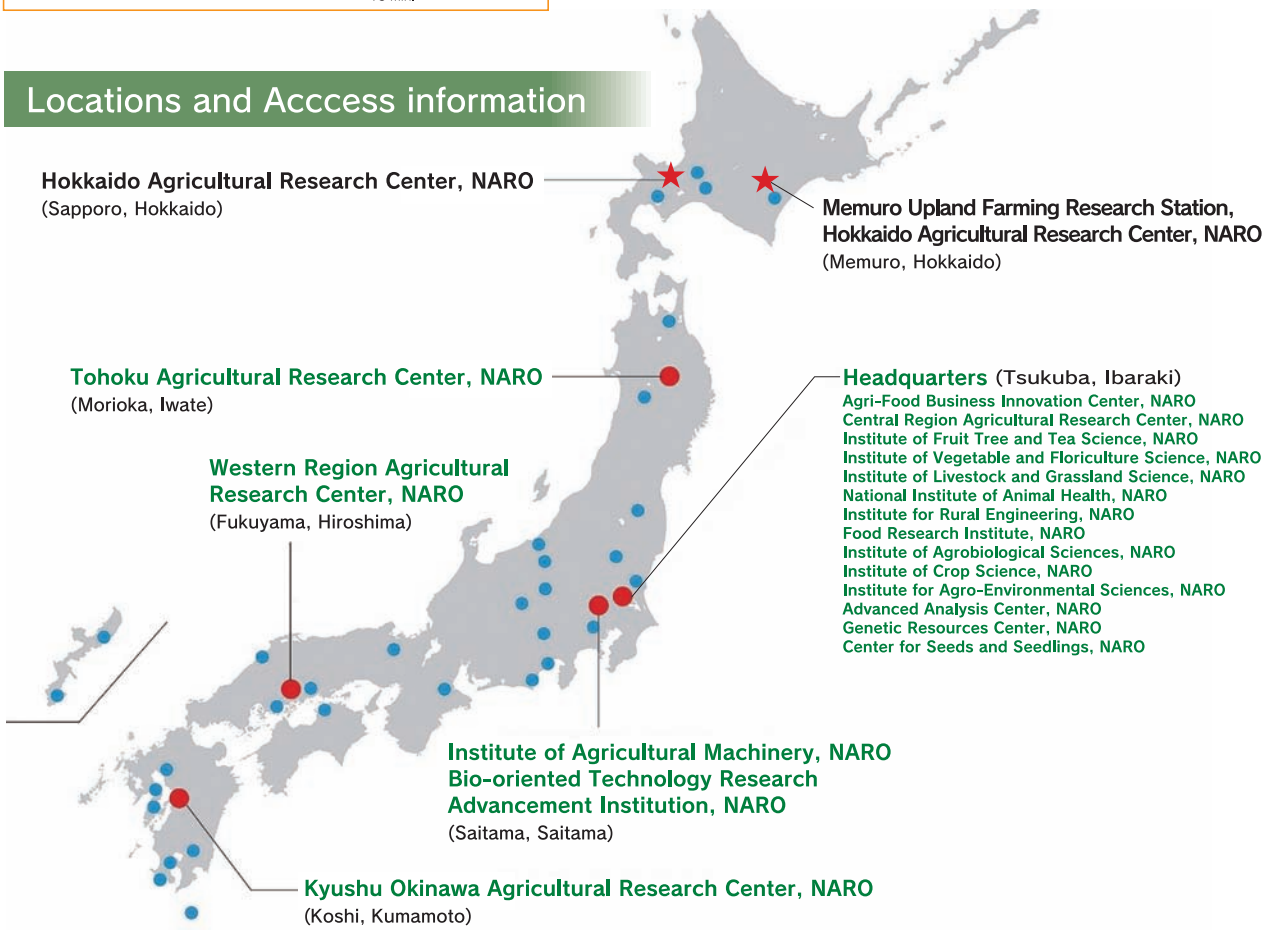
Memuro Upland Farming Research Station

9-4, Shinsei-minami, Memuro-cho, Kasai-gun, Hokkaido
082-0081, JAPAN
Tel:0155-62-2721

Access information

★ Tokachi-Obihiro Airport — Tokachi Bus (25km), 40 min. → JR Obihiro Station — JR (13.6km), 20 min. → JR Memuro Station — Car (4.5km), 10 min. → Memuro Upland Farming Research Station

Locations and Acccess information



Hokkaido Agricultural Research Center, NARO
(Sapporo, Hokkaido)

Memuro Upland Farming Research Station, Hokkaido Agricultural Research Center, NARO
(Memuro, Hokkaido)

Tohoku Agricultural Research Center, NARO
(Morioka, Iwate)

Western Region Agricultural Research Center, NARO
(Fukuyama, Hiroshima)

Headquarters (Tsukuba, Ibaraki)
Agri-Food Business Innovation Center, NARO
Central Region Agricultural Research Center, NARO
Institute of Fruit Tree and Tea Science, NARO
Institute of Vegetable and Floriculture Science, NARO
Institute of Livestock and Grassland Science, NARO
National Institute of Animal Health, NARO
Institute for Rural Engineering, NARO
Food Research Institute, NARO
Institute of Agrobiological Sciences, NARO
Institute of Crop Science, NARO
Institute for Agro-Environmental Sciences, NARO
Advanced Analysis Center, NARO
Genetic Resources Center, NARO
Center for Seeds and Seedlings, NARO

Institute of Agricultural Machinery, NARO
Bio-oriented Technology Research Advancement Institution, NARO
(Saitama, Saitama)

Kyushu Okinawa Agricultural Research Center, NARO
(Koshi, Kumamoto)

Contact

Communications Team,
Promotion Section of Industry-Academia Collaboration, Department of Planning

TEL (011) 857-9260
http://www.naro.affrc.go.jp/harc/

Jan. 2018

Explanations of photos on the cover
Snow-breaking as countermeasure against volunteer potatoes (Memuro-cho, Kasai-gun, Hokkaido), Robot tractor (unmanned)for agricultural operations,
Experimental research on sustainable livestock production system
'Tachijobu' rice variety for livestock feed, 'Sutoraipupepo' pumpkin variety with edible seeds,
Experimental field with underground irrigation for direct sowing of rice on a well-drained paddy field (Moseushi-cho, Uryu-gun, Hokkaido)
New hardy winter wheat variety 'Yumechikara' with flour suitable for making bread by blending with medium-strength flour ,
Main building, New high-yielding potato variety 'Haruka' for various uses