

# Hokkaido Agricultural Research Center, NARO (HARC/NARO)



# Land conditions and characteristics of farming in Hokkaido

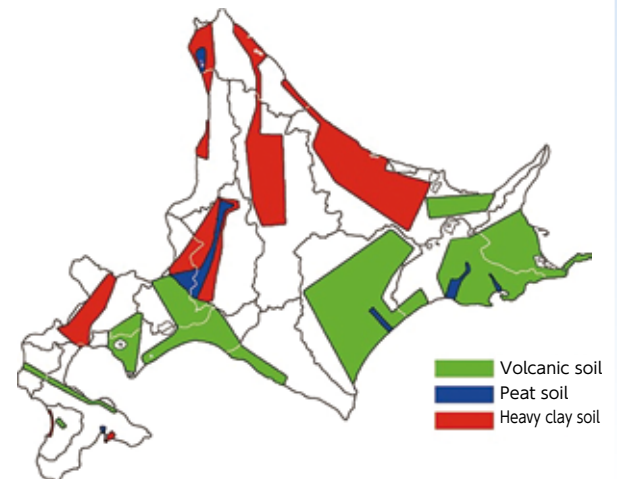
Hokkaido, the northernmost island of Japan, is characterized by natural conditions suitable for large-scale lowland farming, upland farming and dairy farming, including abundant land resources, cool summer season with long days and long hours of sunlight, and a large difference between daytime and nighttime 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	Tokyo
Mean annual temperature	8.9°C	6.8°C	15.4°C
Mean maximum temperature in August	26.4°C	25.2°C	30.8°C
Mean minimum temperature in January	-7.0°C	-13.7°C	0.9°C
Annual precipitation	1,107mm	888mm	1,529mm
Frosting season	10/25~4/24	10/9~5/15	12/20~2/20
Snowy season	10/28~4/19	11/7~4/25	1/3~3/11

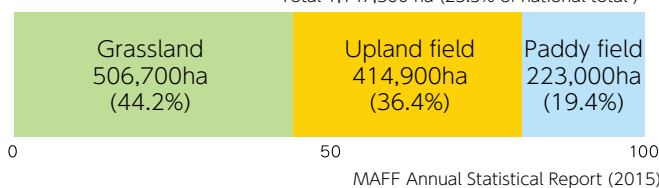
## ◆ Distribution of soil types in Hokkaido



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.

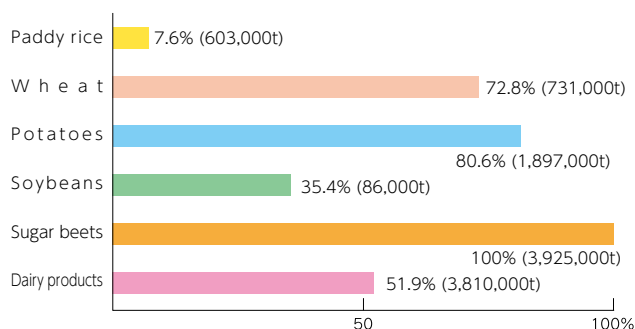
## ◆ Hokkaido's cultivated land area (2015)

Total 1,147,500 ha (25.5% of national total)



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.

## ◆ Contribution of Hokkaido in Japan's agricultural output



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

# Mission of Hokkaido Agriculture Research Center

The Hokkaido Agriculture 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.

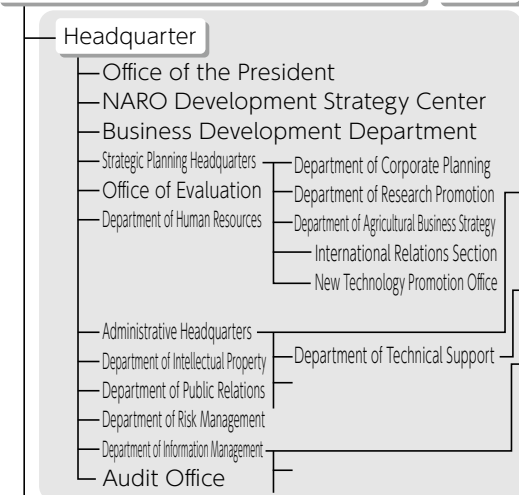
For the 4th mid-term plan (2016 to 2020), HARC/NARO aims to promote social implementation, in order to maximize development impact, we will work in partnership with research institutions, government agencies, universities, private companies, etc. in agriculture and other fields.

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 research 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 (Sapporo, Memuro Station)

Department of Administration for Hokkaido Area

- General Affairs Section (Sapporo, Memuro)
- Accounting Section
- Safety and Health Management Office (Sapporo, Memuro)

Technical Support Center of Hokkaido Region

- Hokkaido Operation Unit 1 (Sapporo)
- Hokkaido Operation Unit 2 (Sapporo)
- Hokkaido Operation Unit 3 (Memuro)

Manager, Information Promotion

(Reside in Department of Administration for Hokkaido Area)

### Hokkaido Agricultural Research Center, NARO (HARC/NARO)

Director-General

Department of Regional Strategy

- Business Promotion Office
- Research Promotion Office

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

Research Center for Agricultural Information Technology, NARO

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

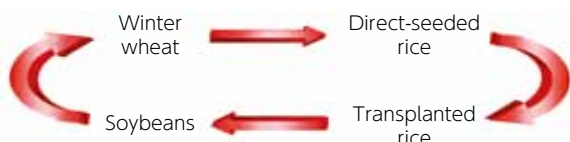
Genetic Resources Center, NARO

Center for Seeds and Seedlings, NARO

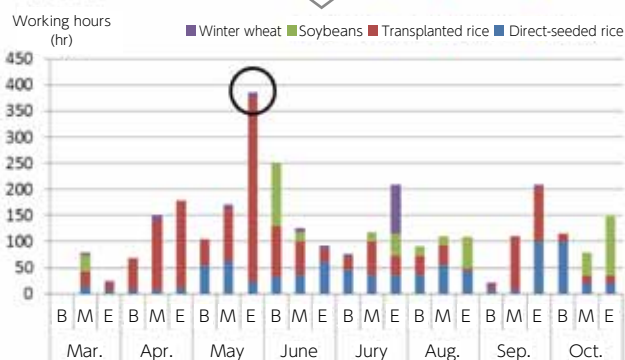
Bio-oriented Technology Research Advancement Institution, NARO

## 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, soybean and onion.
- Farming Management Evaluation Group: Formulation of farming model with high profitability via cultivation of open-field vegetables such as onions in large-scale lowland farming and introduction of new technologies to the feed production and management of dairy cow in dairy farming.



Assumed large-scale lowland crop rotation system (100 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)



Ground leveling for direct sowing of rice in dried paddy fields

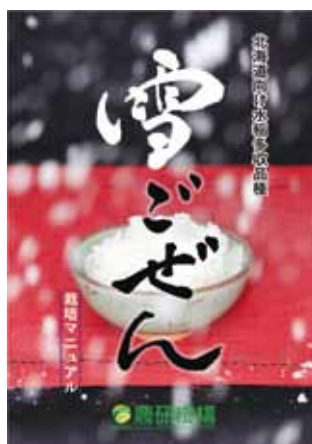
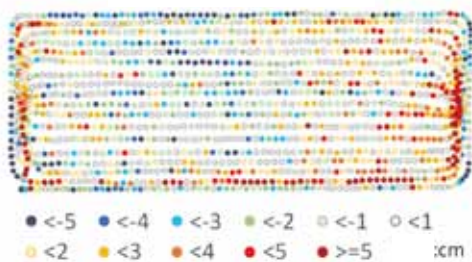


Direct sowing and pinpoint fertilization of onion

## Main research results

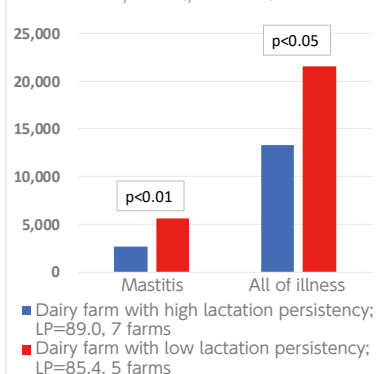
- A system of ground leveling in the previous year for direct sowing and cultivation of rice in well-drained paddy fields has been developed and its effectiveness for reducing working hours in spring has been demonstrated.
- In transplanted rice, we created the manual to achieve high grain yield (7.3 t/ha) with a new variety 'Yukigozen'. 'Yukigozen' is suitable for commercial use such as rice balls. Required spikelet number to achieve the target grain yield is 36 thousand spikelets/m<sup>2</sup>.
- The effectiveness of lactation persistency on decreasing the healing costs for cows in the dairy farm has been cleared.

Paddy field elevation map



Manual for 'Yukigozen' cultivation

Lactation persistency and annual healing cost on dairy cow (yen/head)



## 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 : Development and presentation 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.

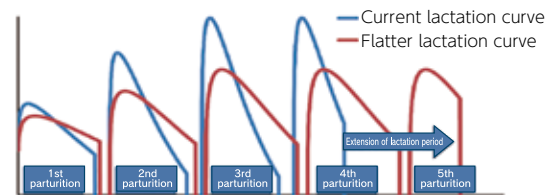


Development of technology to discriminate milk from grass fed cows and ear-corn silage fed cows.



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

### Lactation curve



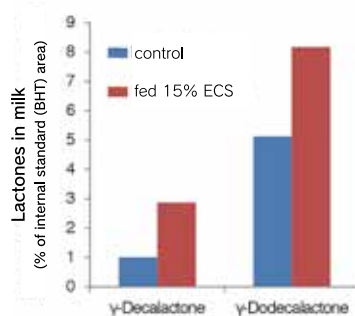
Development of labor-saving technology for management of cows with high lactation persistency.

## 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



Improvement in reliability by about 10%

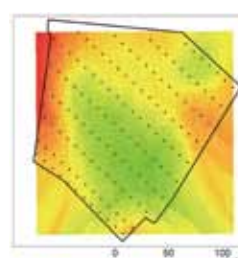
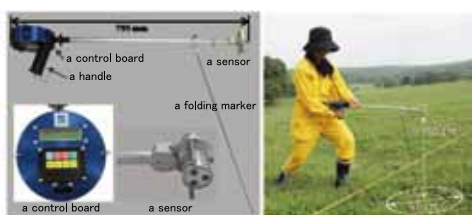
**Conventional method**

- Rump angle, foot angle, rear udder height

**New method**

- Somatic cell score, feet and legs, angularity
- Milk yield in first lactation, chest width, udder support, udder depth, front teat placement

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



Crude protein amount

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

## 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



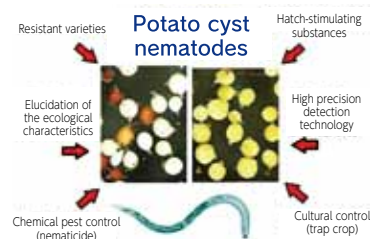
Agriculture meteorological alert system and regional expert assistant system



Development of technology for soil management and diagnosis



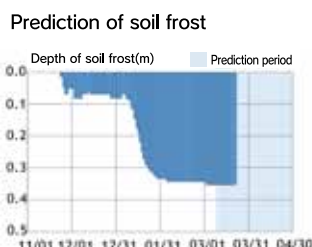
Disease and insect damage control technology



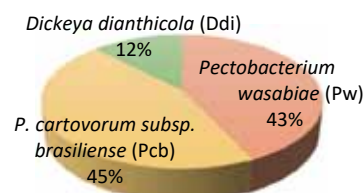
Technology for control of nematodes

## 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).
- The bacterial composition of blackleg disease of potato occurred in Japan in recent years has been clarified.
- A method for controlling potato cyst nematode by trap crops (Peruvian wild tomato and sticky nightshade) has been developed.



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



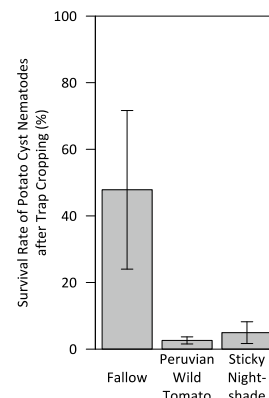
The bacterial composition of blackleg disease of potato occurred after 2000 (Pcb was reported for the first time in 2016 in Japan.)



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](http://www.naro.affrc.go.jp/publicity_report/publication/pamphlet/tech-pamph/054611.html)

Development of a method for utilizing indigenous mycorrhizal fungi



Development of a nematode control technique using trap crops

## 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 suitable for grazing, alfalfa with machine trampling tolerance, and red clover suitable for over seeding
- Horticultural Crop Breeding Group : Breeding of early maturing onion varieties that can be easily processed; Development of winter squash cultivars suitable for processing with short internodes and high storage ability
- 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 winter squash varieties



Breeding of rice varieties



Breeding of forage crops with high nutrient contents



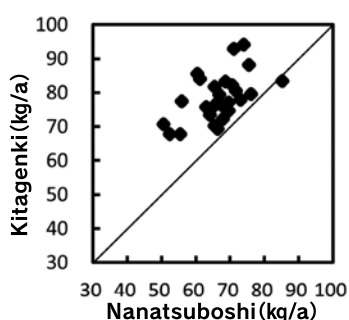
Breeding of onions and winter squashes for processing



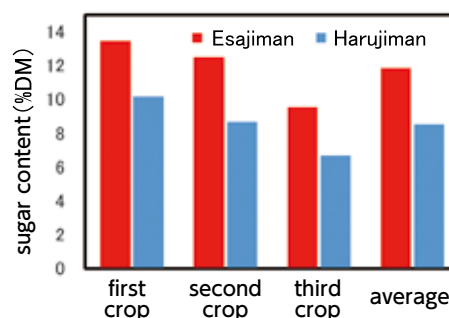
Development of breeding materials to improve the adaptability to direct sowing of rice

## Main research results

- We developed excellent crop varieties such as new rice varieties, 'Kitagenki', with super-high-yielding ability and 'Sansanmaru' suitable for direct seeding with high eating quality, a new alfalfa variety, 'Ushimosuki', with high yielding and high disease tolerance, a new winter squash variety, 'Oitoke Kuritan', with short internodes and high storage ability (storable up to three months).
- 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 winter squash variety with short internodes, 'Oitoke Kuritan', retains good quality after storage for 3 months (released by cooperative breeding with Watanabe-seed Co. Ltd.)



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



## Main research targets

- Wheat Breeding Group : Development of wheat varieties with agricultural traits such as pre-harvest sprouting resistance, and suitable for making bread, noodles and confectionery.
- Potato Breeding Group : Development of potato varieties with resistance to pests and diseases, and suitable for processing as potato chips and French fries.
- 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



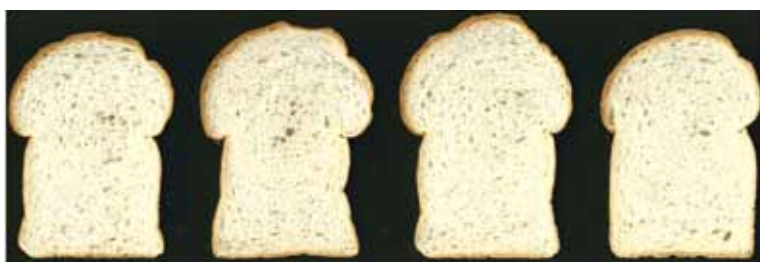
Development of potato varieties with resistance to potato cyst nematodes and late blight



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 consumption.
- We released a new common buckwheat variety, 'Kitamitsuki', and a new Tartary buckwheat variety, 'Manten-Kirari', that will lead to revitalization of soba producing regions.
- We released 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.



## 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



The tool makes it easy to compare the images of the same field shot on different dates.



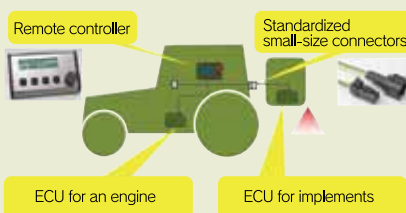
Comprehensive identification of disease-resistant potatoes using a camera drone

Tools such as viewers and three-dimensional configurations that can handle large images such as satellite images and acquired images using fixed wing 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.

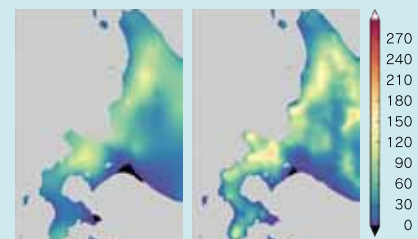
Standardized communication technology for agricultural machines



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



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

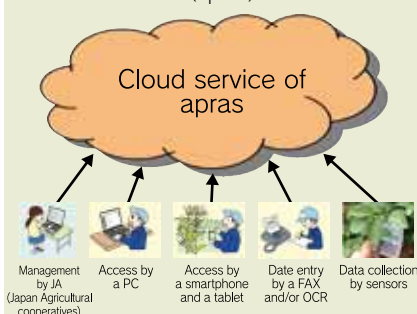


Conventional model Newly developed model

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



Production management cloud service (apras)



### Department of Regional Strategy

#### Business Promotion Office (Coordinator, Industry-Academia Collaboration, Communicator, Agricultural Technology, Business Promotion Team, Business Coordinator)

Duties are related to strengthening our hub function in the region, collecting research needs, research and development in cooperation with farmers, research institutes, agricultural extension organizations, universities, private companies, etc., and transfer and rapid extension of research results.

#### Research Promotion Office (Promotion Team, Management Team, Intellectual Property Team, Public Relations Team, Coordinator, Staff Management and Training Team, Smart agriculture)

Duties are related to promotion and support of research work such as management of research projects, planning and management of budgets, correspondence of administrative organizations and headquarters, joint research contracts, intellectual property management, public relations activities, human resource development of research staff, and promotion and support of smart agriculture.

### Department of Administration for Hokkaido Area

#### General Affairs Section (General Affairs and Welfare Team, Labor and Staff Management Team, Administration Team for Memuro Station) , Accounting Section (Accounting Team, Facility Management Team)

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

#### Safety and Health Management Office

Duties are related to occupational safety and health management and chemical substance management.

#### Manager, Information Promotion (Reside in Department of Administration for Hokkaido Area)

Duties are related to strengthening operation management and security of information systems.

## Technical Support Center of Hokkaido Region

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.

#### Hokkaido Operation 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



#### Hokkaido Operation 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



#### Hokkaido Operation 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 Kotani 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 : Reorganized 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 office staff	39 (7)
Administrative technical staff	18 (4)
Technical staff	39(11)
Research staff	113(35)
fixed-term staff	9 (1)
Total	219(58)

Number in parenthesis indicates research staff in Memuro.

## Premises

Location	Buildings	Upland field	Paddy field	Grazing land	Mountain, forest, etc	Unit:ha Total
Hitsujigaoka (Sapporo)	37.2	142.2	6.5	197.3	439.8	823.0
Memuro Upland Farming Research Station	10.1	91.0	—	—	1.6	102.7
Bibai Lowland Test Field	0.9	4.0	—	—	50.0	54.9

(The number of staff and premises are as of Dec. 2019)

## Sapporo



1, Hitsujigaoka, Toyohira-ku, Sapporo,  
Hokkaido  
062-8555, JAPAN

### Access information

★ Sapporo Station  $\xrightarrow[\text{13 min.}]{\text{Subway Toho Line}}$  Fukuzumi Station  $\xrightarrow[\text{4 min.}]{\text{Chuo Bus}}$   
 $\rightarrow$  Tsukisamu-Higashi 1-19  $\xrightarrow[\text{15 min.}]{\text{Walk}}$  HARC

★ New Chitose Airport  $\xrightarrow[\text{48 min.}]{\text{Chuo Bus/Hokuto Kotsu Bus}}$   
 $\rightarrow$  Tsukisamu-Higashi 1-19  $\xrightarrow[\text{15 min.}]{\text{Walk}}$  HARC

## Memuro Upland Farming Research Station



9-4, Shinsei-minami, Memuro-cho, Kasai-gun,  
Hokkaido  
082-0081, JAPAN

### Access information

★ Tokachi-Obihiro Airport  $\xrightarrow[\text{40 min.}]{\text{Tokachi Bus (25km)}}$  JR Obihiro Station  $\xrightarrow[\text{20 min.}]{\text{JR(13.6km)}}$   
 $\rightarrow$  JR Memuro Station  $\xrightarrow[\text{10 min.}]{\text{Car(4.5km)}}$  Memuro Upland Farming Research Station

## Locations and Access 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)

Research Center for Agricultural Information Technology, NARO  
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  
(Saitama, Saitama)

Bio-oriented Technology Research  
Advancement Institution, NARO  
(Kawasaki, Kanagawa)

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

## Contact

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Mar. 2020 Explanations of photos on the cover  
 Snow-breaking as countermeasure against volunteer potatoes (Memuro-cho, Kasai-gun, Hokkaido)  
 Rice transplanting operations by an unmanned robot tractor  
 Experimental research on sustainable livestock production system  
 A new rice variety, 'Kitagenki' with high yielding ability adapted to cold regions  
 A new winter squash variety, 'Oitoke Kuritan', with good quality after a long term storage  
 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 for various uses