

TARC/NARO

Tohoku Agricultural Research Center
National Agriculture and Food Research Organization

Supporting for a Vibrant Tohoku Agriculture and Farming Villages



The Tohoku Agricultural Research Center, NARO, (TARC/NARO) is responsible for three of the major research themes included in the NARO 4th Mid-term Plan (2016-2020).

The TARC/NARO is consistently making every effort to achieve the goals set for each research theme, through collaboration with other NARO institutes, producers, private firms, public research institutes, universities, and many others.

1. Realization of a large-scale paddy field farming system for cold regions

- Establishment of a systematized technique that aids in the realization of an ultra labor-saving lowland crop rotation farming system for large-plot fields
- Establishment of a systematized open-field vegetable production system for the food industry that can be incorporated into a large-scale paddy field farming system
- Establishment of a systematized field and livestock farming collaboration technique based on production of highly nutritious forage and application of livestock excrement to farmland

2. Breeding pioneering cultivars to further improve crop yield, crop quality, and outstanding crop characteristics

- Breeding of paddy rice, wheat and barley, soybean, rapeseed, buckwheat, vegetable, and pasture grass cultivars

3. Development of technical countermeasures for radioactive substances

- Development of technical measures for an early resumption of farming in the nuclear disaster-affected areas

Organization



Division of Crop Production and Management Research

The division is engaged in the development of mechanization and cultivation systems suitable for large-scale paddy field farming, and in making managerial assessments through on-site empirical experiments. To be more specific, the division is using high-speed, high-precision, and general-purpose seeders, as well as smart agriculture, to develop a labor-saving, mechanized crop-rotation system involving rice, wheat, soybean, and corn, centering on a dry-field, direct-seeding rice cultivation technique. The division is currently conducting an on-site verification experiment involving the crop-rotation system, introducing these developed techniques and assessing their effectiveness by formulating a management model based on the data obtained.



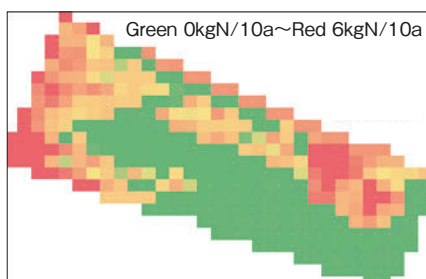
Seeding work using vacuum planter for dry seeded rice culture



Growing of rice by dry seeded rice culture on a large-scale paddy field (3.4ha)



An on-site verification experiment using a general-purpose seeder



Variable-rate fertilizer application technique based on the fertilizer application map



An on-site chemical spray trial using a drone

Division of Field Crops and Horticulture Research

The division is conducting breeding and cultivation experimentation and research on wheat, barley, buckwheat, rapeseed and vegetables in the Tohoku region. To be more precise, the division is aiming to grow and disseminate (a) wheat that is not only well suited to the Tohoku region, but equal or comparable in quality to imported wheat brands, (b) buckwheat with stable production capability, and (c) rapeseed whose meal can be used as forage. To establish the stable cultivation and year-round supply of vegetables, the division is also specifically developing cropping systems of spring-sowing summer-harvested onions and winter harvested onions grown from sets; new onion cultivars; the mechanized production system of cabbage; as well as new strawberry cultivars and the cultivation techniques suitable for the Tohoku region.



The extra-strong "Ginganochikara" wheat cultivar, suitable for bread and Chinese noodle making



The "Kirakiraginga" multi-purpose rapeseed cultivar



Spring planted and summer harvested onions that can be shipped during the off-crop season



The "Toyoyukihime" strawberry cultivar, suitable for semi-forced and open-field cultivation

Division of Livestock and Forage Research

The object of this division is improving beef production system through field and livestock farming collaboration based on the paddy fields that characterize the Tohoku region. Specifically, the division is aiming to develop and disseminate pasture grass cultivars suited to the Tohoku region; cultivation, processing, and storage techniques for corn grain, forage soybean, and rice straw in paddy fields; efficient feeding techniques using these self-supplied feeds grown in paddy fields; techniques to assess the recovery of reproductive function after parturition, and techniques to reduce the open period; techniques that promote much healthier growth and rearing of calves, and techniques to reduce the fattening period and related costs; and improvement in the use of a sensing technique to achieve smart agriculture (livestock).



"Quattro-TK5", the new snow-resistant Italian ryegrass cultivar



Forage soybean cultivated by a living mulch system



Cultivation of corn grain



A cow and calf during an extended lactation period experiment



A dressed carcass of cattle-fed corn grain silage



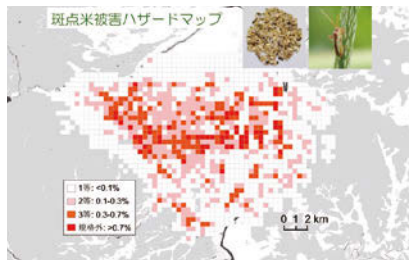
Labor-saving processing of grain silage by Flecon-Wrap Method

Division of Agro-Environment Research

This division is engaged in the development and adoption of, for instance, a technique to forecast rice blast epidemics and a decision-aiding technology to control the disease by utilizing information and communication technology (ICT); area-wide prediction of pecky rice damage due to stink bugs using land use data; disease and pest control for spring-sowing and summer-harvested onions and cruciferous vegetables; techniques to regenerate farmland soil fertility after decontamination; effective fertilizer management techniques for vegetables such as spring-sowing onions; and organic sewage water purification techniques utilizing constructed wetlands. In addition, the division is also developing a cultivation management support system utilizing meteorological data and growth prediction models, involved in the elucidation of the mechanisms underlying the absorption and accumulation of radioactive cesium in paddy rice, and in the development of related corrective measures, as well as numerous other initiatives.



Meteorological data collection in farmland for rice blast disease forecasting



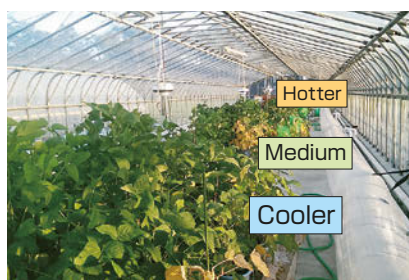
A potential hazard area map for pecky rice damage



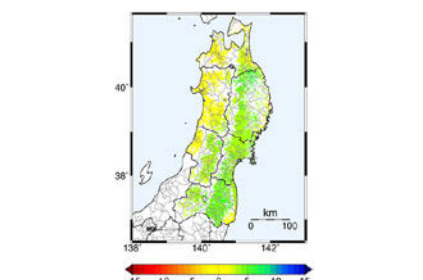
Development of techniques to control pest and soft rot in, and apply fertilizer to, onion



An organic sewage water purification test utilizing constructed wetland



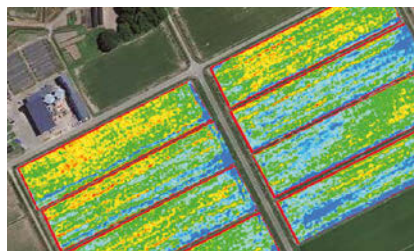
Soybean growth experiment in a temperature-gradient chamber



Prediction of the areal ear-emergence time of rice

Division of Lowland Farming Research

The division is engaged in the research of paddy rice and soybean farming that exploits the climatic and geographical conditions of the inland heavy-snow areas in the northern part of the cold region, to support large-scale paddy field farming under cool-weather and wet-lowland conditions. Specifically, the division is aiming, for example, to optimize crop-growth control using ICT; promote proper management of soil and weeds for sustainable lowland crop rotation; reduce labor and costs of rice production by direct seeding in flooded paddy fields; achieve stable and high soybean yield by avoiding dry and wet damage; and develop paddy rice and soybean cultivars through selection techniques and genomic breeding methods utilizing gene markers.



Variable-rate fertilizer application that can adjust the amount of fertilizer according to the growth of the previous year (from red [good] to blue [bad])



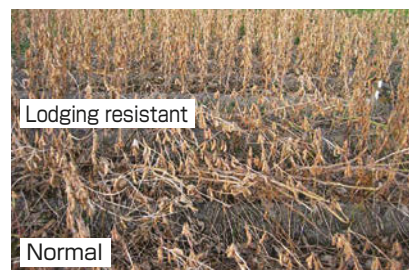
Long-term paddy field experiment on fertilizer and compost



Direct seeding of uncoated rice seeds in shallow soil by paddy harrow seeder



Display field of rice cultivars bred by TARC/NARO



Lodging resistant

Normal

Resistant cv. "Satonohohoemi" (upper), and normal cv. "Enrei" (lower)

Agricultural Radiation Research Center

The center is engaged in the development of techniques that mitigate the transfer of radioactive substances to paddy rice and field crops; providing empirical support for labor saving farmland management techniques, with the aim of supporting the resumption of farming; the introduction of animal-damage control measures; providing empirical support for energy- and resource-circulation farming techniques, and in the development of agricultural water management techniques. More precisely, the center is engaged in research necessitated by the Tokyo Electric Power Company's Fukushima Daiichi Nuclear Power Plant disaster resulting from the Great East Japan Earthquake, including development of techniques to mitigate the transfer of radioactive cesium from soil to rice and field crops; verification of labor-saving farmland management techniques for the resumption of farming; introduction of techniques to control bird and animal damage; development of techniques to manage irrigation water; and ICT-based verification of farming techniques.



Radioactive substances analysis building (completed in April 2013)



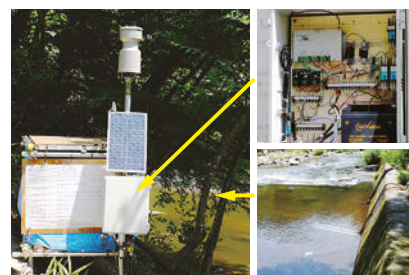
Wild boar sow and piglet that appeared in farmland in the disaster-affected area



Germanium semiconductor detectors



Soil dressing was performed after removal of the topsoil

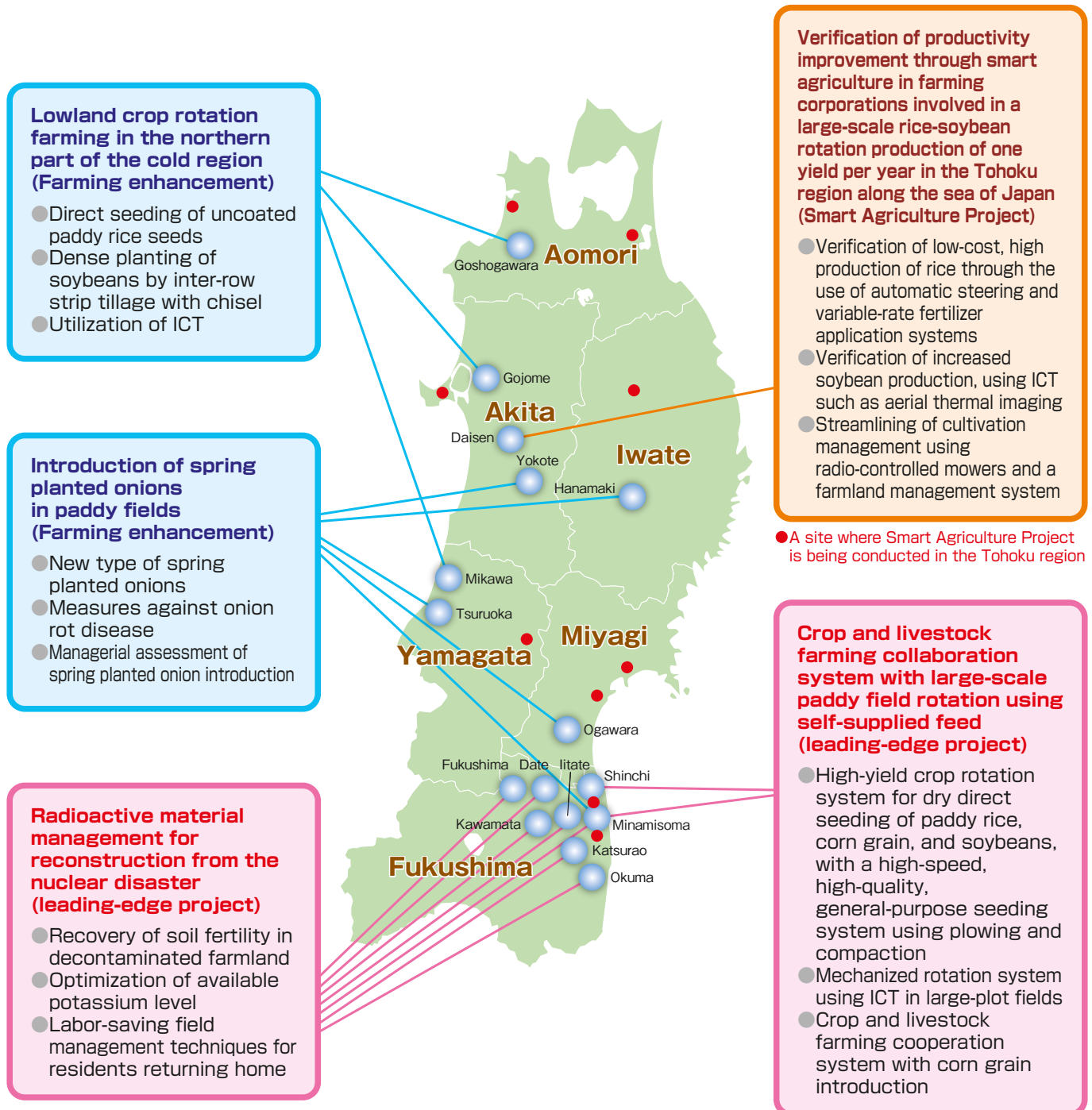


Monitoring of irrigation water

Promotion of on-field empirical research projects

To develop agricultural techniques that support reconstruction and restoration after the Great East Japan Earthquake, and to develop innovative systematized techniques that contribute to strengthening the competitiveness of future Japanese agriculture, TARC/NARO is conducting on-field empirical research projects in collaboration with public research institutes, universities, private firms, and numerous other stakeholders in the Tohoku region.

The following describes the Ministry of Agriculture, Forestry and Fisheries-related empirical research projects led by TARC/NARO, and their locations.



(As of November 2019)

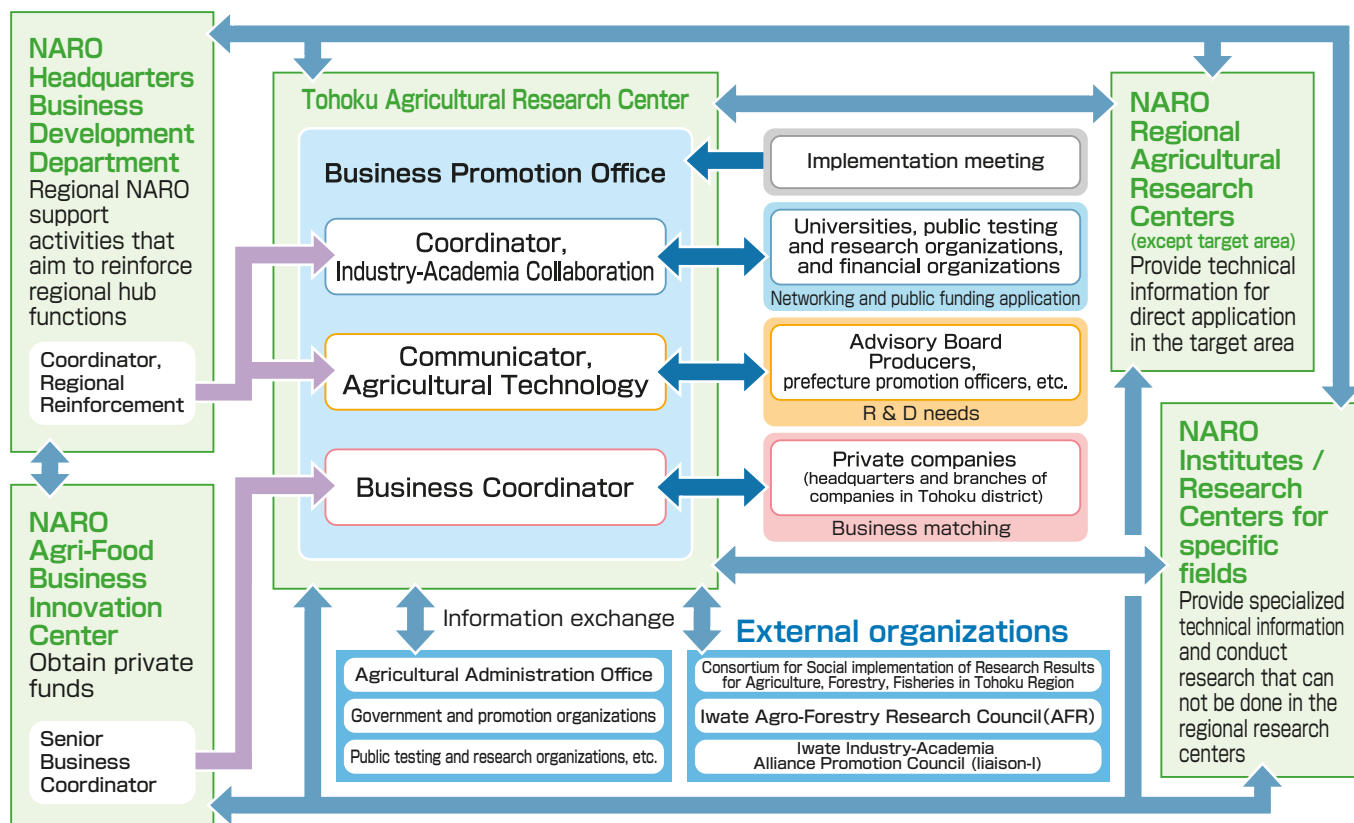
Leading-edge project: Ministry of Agriculture, Forestry and Fisheries, "A Scheme to Revitalize Agriculture and Fisheries in Disaster Area through Deploying Highly Advanced Technology", 2018-2020

Farming enhancement: Ministry of Agriculture, Forestry and Fisheries, "The special scheme project on vitalizing management entities of agriculture, forestry and fisheries", 2017-2019

Smart Agriculture Project: Ministry of Agriculture, Forestry and Fisheries, "On-farm Demonstration Trials of Smart Agriculture", 2019-2020

Promoting cooperation among industry, academia, and the public sector

To promote regional agricultural research tailored to local needs, and to support and strongly encourage the efforts for steady implementation of the developed techniques, TARC/NARO is actively involved in industry, academia, and public-sector cooperative activities, as a vanguard in the development and implementation of techniques at NARO.



Open laboratory

A group of facilities called the Gradiotron was built in 1995 to study the damage caused by cold weather or elevated temperatures, the effects of global warming, and differences between crop responses on flat land and in mountainous areas, with different temperature ranges. The name Gradiotron came from its representative facilities: One of the world's largest temperature-gradient chamber (TGC) complex, which enables us to establish a continuous temperature range in a 24-meter-long greenhouse, allowing us to rapidly analyze the temperature responses of crops. The Gradiotron also has artificial weather control rooms that provides highly precise control over temperature, light and humidity.



Cooperation with universities (cooperative graduate schools)

TARC/NARO signed a cooperative graduate school agreement with Iwate University in April 2006, and each year since then, TARC/NARO has been dispatching visiting faculty members to the university to make professional guidance and advice for PhD thesis in agricultural meteorology, crop physiology, and other fields.

Research exchanges

Research fellow invitation program:

Guidance on relevant experiment and research is given to employees of the national government, local public bodies, universities, private firms, etc.

Technical training system:

TARC/NARO uses this system to provide technical training to employees at research and development institutions, as well as farmers, and those in the food industry. We also accept graduate student interns through this system.

Inviting and hosting foreign researchers:

We welcome foreign researchers who wish to undergo training or conduct research at TARC/NARO, through requests received via the Japan International Cooperation Agency (JICA) or from domestic or overseas research and development institutions. We also invite overseas researchers to TARC/NARO, to promote collaboration and cooperation with overseas research institutions.

Meetings for promoting agricultural testing and research in the Tohoku region

To provide opportunities to promote agricultural testing and research in the Tohoku region, TARC/NARO holds promotional conferences covering five specialized fields: crop production, production environment, livestock and forage, vegetables and ornamentals, and orchards. We hold on-site study seminars in summer, and promotional conferences covering each specialized field in winter. We also hold plenary conferences covering all the fields, as well as research strategy conferences.

[History]

- 1950 Founded as the Tohoku National Agricultural Experiment Station, Ministry of Agriculture and Forestry, after a reorganization of national research institutes
- 2001 Reorganized as the National Agricultural Research Center for Tohoku Region of the National Agricultural Research Organization, an Independent Administrative Agency, due to reformation of the independent administrative agency system
- 2006 Reorganized as the National Agricultural Research Center for Tohoku Region of the National Agriculture and Food Research Organization, an Independent Administrative Agency, due to integration of the independent administrative agency system
- 2015 Reorganized as the Tohoku Agricultural Research Center of the National Agriculture and Food Research Organization, a National Research and Development Agency

[Site area]

(㎡ ; As of Nov 2019)

	Buildings	Experimental fields			Others	Total
		Paddy fields	Upland fields	Grasslands		
Head Quarters(in Morioka)	385,570	286,429	540,620	500,248	591,462	2,304,329
Daisen Res. Stn.	42,278	103,532	8,634	0	0	154,444
Kariwano Res. Fac.	41,546	0	75,932	0	145,755	263,233
Fukushima Res. Stn.	48,710	4,070	77,615	0	13,081	143,476
Total	518,104	394,031	702,801	500,248	750,298	2,865,482

[Staff members]

(As of Nov 2019)

	Head Quarters(in Morioka)	Daisen Res. Stn.	Fukushima Res. Stn.	Total
Director-General	1			1
General staff	57	12	7	76
Technical staff	16	6	7	29
Research staff	79	17	15	111
Total	153	35	29	217

Location and Access

● Tohoku Agricultural Research Center (Headquarters)

4 Akahira, Shimo-kuriyagawa, Morioka, Iwate 020-0198, Japan
 (8 minutes' walk from IGR Kuriyagawa Station or 20 minutes' ride on a bus bound for Sugo Depot from JR Morioka Station. Get off at the Nogyo Kenkyu Senta-mae bus stop.)



Daisen Research Station (Daisen City)



Headquarters (Morioka City)

● Daisen Research Station

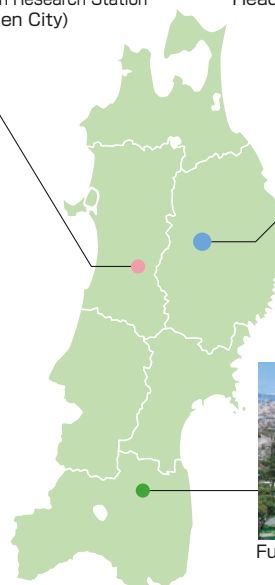
3 Shimo-furumichi, Yotsuya, Daisen, Akita 014-0102, Japan
 (3 minutes' walk from Kitaomagari Station, JR Tazawako Line)

Kariwano Research Facility

297 Uenodai, Kariwano, Daisen, Akita 019-2112, Japan
 (5 minutes' walk from Kariwano Station, JR Ohu Line)

● Fukushima Research Station

50 Harajukuminami, Arai, Fukushima, Fukushima 960-2156, Japan
 (30 minutes' ride on a bus bound for Arai from the East Entrance of JR Fukushima Station. Get off at the Jieitai-mae bus stop (the terminal) and walk for 3 minutes.)



Fukushima Research Station (Fukushima City)

Contact Us

Phone : +81(0)19-643-3433 (main number)
 Fax : +81(0)19-641-7794
 e-mail : www-tohoku@naro.affrc.go.jp
 Website : <http://www.naro.affrc.go.jp/laboratory/tarc/>