

NARO



NARO, aiming to make valuable contributions to society



President Kazuo Kyuma

Japan's agricultural sector is currently facing many challenges that must be addressed immediately, such as the shortage of workers, aging of farmers, improvement of productivity, and drastic reduction of production cost. On the other hand, the demand for food overseas is expected to increase and pave the way for opening big business opportunities with the strategic expansion of agricultural exports.

In this scenario, the major role of NARO is to create innovations in science and technology that will eventually transform agriculture into a robust industry. We are pursuing research initiatives to support agriculture as a sustainable industry towards the goal of "providing a stable supply of safe, reliable and high-quality agricultural and food products" and "contributing in the government's economic growth policy of achieving a GDP target of 600 trillion yen through strong industrialization of agriculture and increased share of agricultural products in the global market".

We prioritize on 6 research areas in agriculture and food production in accordance with the "5th Science and Technology Basic Plan" of the Council for Science, Technology and Innovation (CSTI) towards the realization of a super smart society (Society 5.0). These research areas include the following: (1) creation of a data-driven innovative smart agriculture, (2) development of a smart breeding system and cooperation with the private sector in breeding new cultivars, (3) construction of a smart food value chain including exports, (4) utilization of biological function to create new industries and enhance health care through food, (5) development of essential agricultural knowledge and technologies (environmental data, gene bank, soil etc.), and (6) advancement of fundamental technologies (artificial intelligence, data linkage, robotics etc.). Furthermore, we will also prioritize on optimal allocation of research budget and human resources, promotion of collaborative activities across organizational and cross-border networks, strategic utilization of intellectual property rights and international standardization, enhancement of intellectual property rights and international standardization, intensification of public relations activities, and diversification of human resources, in order to accelerate the implementation of our research achievements into society.

History

- 1893 Research centers established as national experimental research institutes.
- 2001 National Agriculture Research Organization, Independent Administrative Agency.
- 2003 National Agriculture and Bio-oriented Research Organization, Independent Administrative Agency.
 - * Integrated with the Bio-oriented Technology Research Advancement Institution.
- 2006 National Agriculture and Food Research Organization, Independent Administrative Agency.
 - * Integrated with the National Institute for Rural Engineering, National Food Research Institute, National Farmers Academy (closed at the end of 2011).
- 2015 National Agriculture and Food Research Organization
- 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.

[1983]
National Institute of Agrobiological Sciences
National Institute for Agro-Environmental Sciences

[1986]
National Center for Seeds and Seedlings

[2016]
INTEGRATION

[Original cultivars developed by NARO]



'Fuji' apple



'Shine muscat' grape



'Yumechikara' wheat

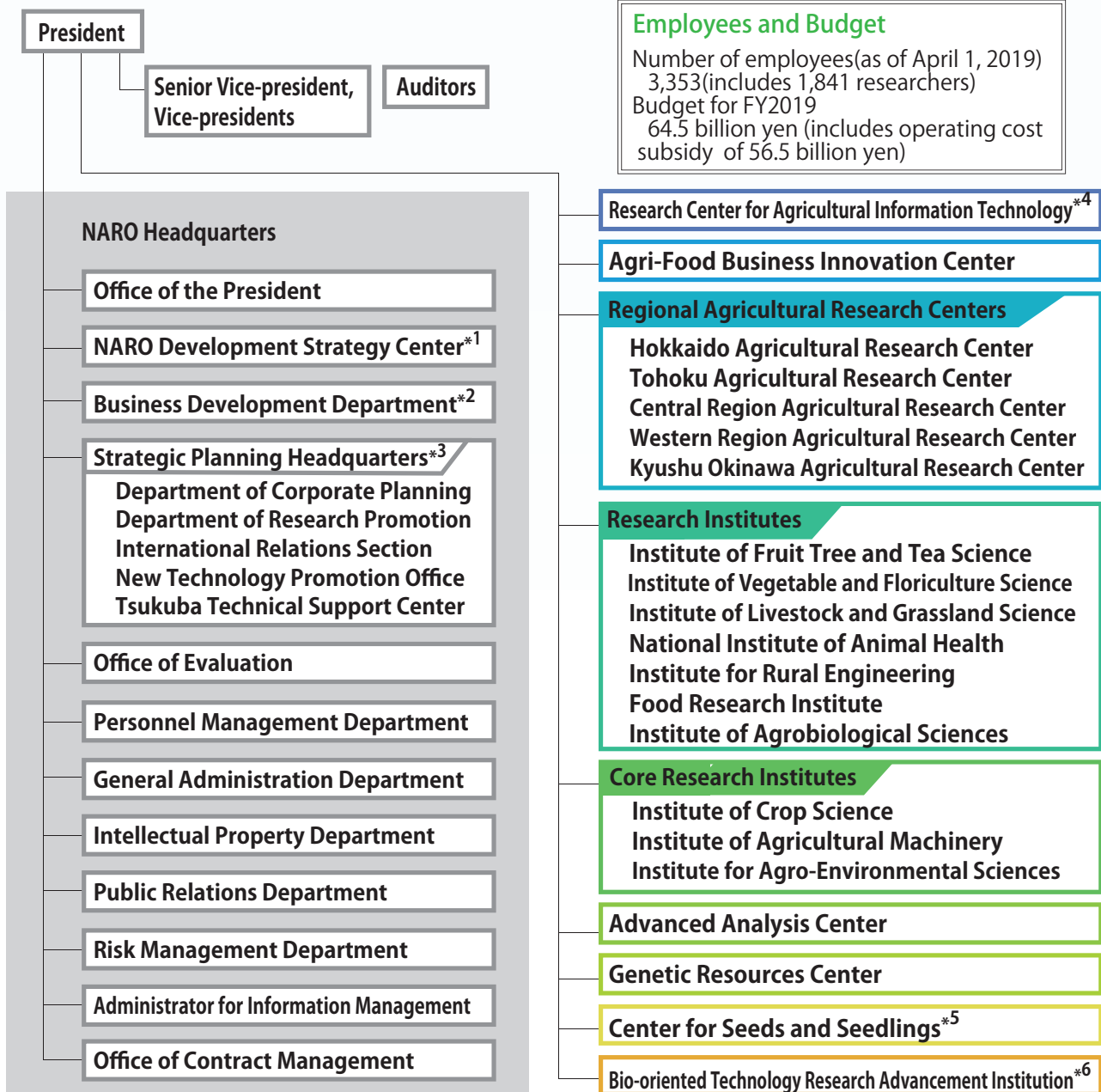


'Nikomaru' rice



'Benifuuki' tea

NARO Organizational Chart



***1 NARO Development Strategy Center**
investigates and analyzes policies, social expectations and trends domestic and global to formulate the R&D strategy as NARO's think tank (since Apr'19).

***2 Business Development Department**
connects NARO's research outcomes to social and economic benefit in the field of business and agriculture (since Oct'18).

***3 Strategic Planning Headquarters**
strengthens NARO's R&D as a whole through the optimum budget allocation, external funds' acquisitions and research promotion also being aligned with NARO's global strategy (since Apr'19).

***4 Research Center for Agricultural Information Technology**
promotes Artificial Intelligence (AI) utilization in agriculture, development and management of the agricultural data collaboration platform and strategic use of data assets (since Oct'18).

***5 Center for Seeds and Seedlings**
conducts cultivation tests for variety registration, supports to protect breeders' rights and inspects seeds and seedlings.

***6 Bio-oriented Technology Research Advancement Institution**
commissions researches on bio-oriented technology to companies, universities and national research institutes and disseminates the results.

1

Strengthening the capability of agricultural production and farm management

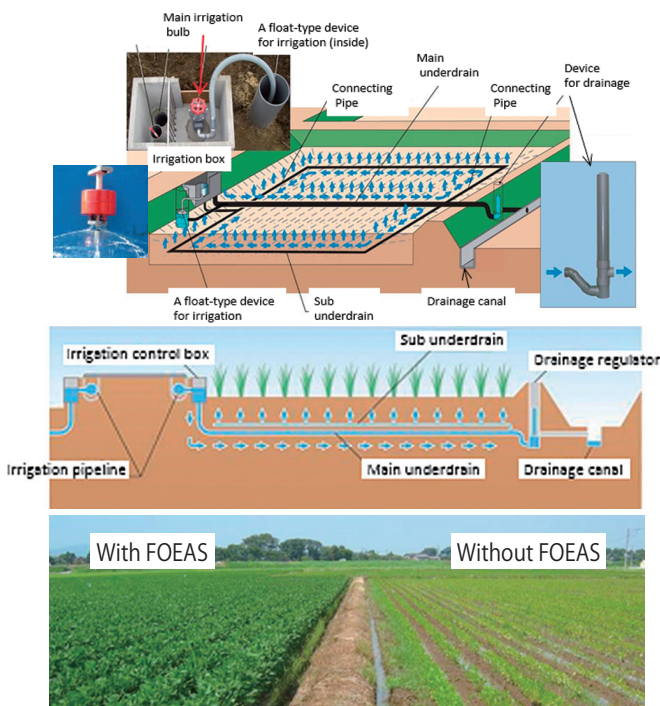
Overview of Research

We are addressing the urgent issues facing the agriculture and food industry, such as the decreasing number and aging of farmers, to contribute to the enhancement of the base of agricultural production, to promote the development of farm management through innovative technologies, and to achieve vigorous productivity in paddy-field farming, upland farming, livestock production etc., by taking advantage of regional conditions.

- Research on establishing highly productive paddy-field farming, upland farming etc., in accordance with the climate and soil conditions of a given region
- Research on applying robotics, Information and Communication Technology (ICT) to develop innovations in agricultural production
- Research on strengthening the production base and enhancing the competitiveness of the livestock industry
- Research on developing and implementing technological beef-production and cattle-breeding systems in accordance with the specific conditions of a given region

Main Achievements

- Development of the Farm Oriented Enhancing Aquatic System (FOEAS), a new water control system with irrigation and drainage facilities for cultivation of upland crops in paddy fields, enhanced the growth and yield of many upland crops.



Comparison of the growth of upland crops in paddy field with and without FOEAS.

- Unmanned robots that can perform agricultural works such as tillage, puddling, transplanting and harvesting have been developed using GPS technology.

- Sustainable grazing management enables the grazing of cattle in paddy fields, grasslands and abandoned farmland. It has thus far facilitated the raising of roughly 10,000 cattle, and contributed to livestock production through the effective use of arable land.
- A low-cost production system of ear corn silage and technology for efficient utilization as livestock feed was developed.



2

Development of new varieties and agricultural products towards realization of a strong agriculture and creation of innovative industries

Overview of Research

We are promoting the development of novel crops and new agricultural products through genomic and agrobiological research, innovative research focusing on new elementary biological materials such as high-quality silk products which can factor in the development of new industries, and communicating the merits of such products to producers, users and consumers.

- Research on the development of leading crop varieties with high yield and superior qualities
- Research for the advancement of genomic breeding techniques in various crops
- Research for improvement in agrobiological productivity and the production of useful substances and new functional materials

Main Achievements

- Development of high yielding and disease resistant two-rowed barley cultivar 'Haruka-Nijo' which is suitable for cultivation in western Japan and a potential source for making shochu.



- We have developed the Tartary buckwheat cultivar 'Manten-Kirari' with the flour containing only trace amounts of ruti-nosidase and without bitter taste.



- Recombinant gene technology and the silkworm's high protein production capacity are combined and exploited for production of drugs, cosmetic materials etc.

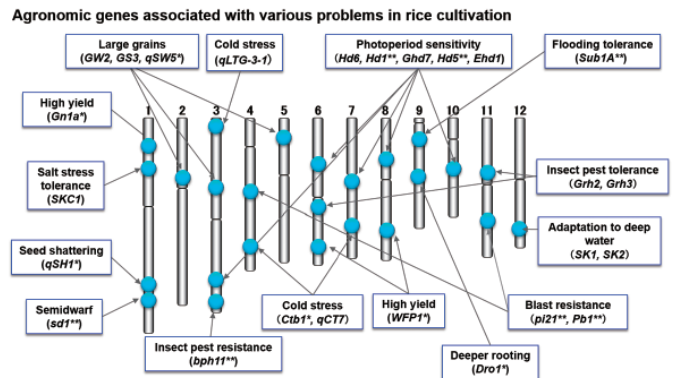


Left: Testing drugs for human osteoporosis (In collaboration with Nittobo Medical Co., Ltd.)



Right: Cosmetic products with collagen (In collaboration with IBL Co., Ltd.)

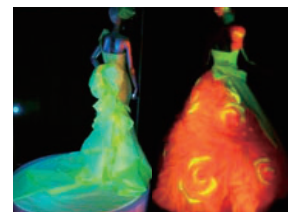
- By decoding the genome sequence of rice, and analyzing the gene functions, we have developed DNA markers associated with important agronomic traits, which is expected to facilitate efficient improvement of rice cultivars.



- Backcrossing of 'Sachiyutaka', the major soybean cultivar of western Japan, using DNA markers, produced a non-shattering cultivar, 'Sachiyutaka No. A1', resulting in significant reduction in yield loss during harvest.



- Development of silk fibers containing fluorescent proteins of different colors and new functionality silk materials with spider dragline protein.



(Design by Ms. Yumi Katsura)

3

Producing high-quality and healthy foods and ensuring the safety and reliability of agricultural products

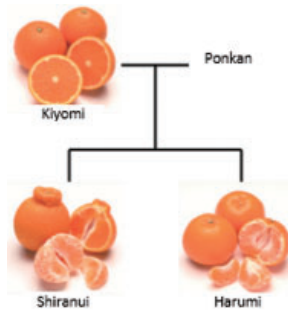
Overview of Research

We are pursuing extensive research to provide delicious, healthy, safe and reliable food and agricultural products to consumers, and contribute to the maintenance and improvement of health.

- Research targeting high value-added fruit trees, tea, vegetables and flowers
- Research seeking public health-oriented, high-quality, easy-to-eat food products
- Research aimed at ensuring the safety and reliability of food, livestock products, and agricultural crops
- Research on animal diseases and crop pests which constitute a threat to domestic industry and public health

Main Achievements

- We developed a delicious citrus cultivar 'Kiyomi' which was eventually used to breed many new high-quality citrus fruits such as 'Dekopon' and 'Harumi' cultivars.



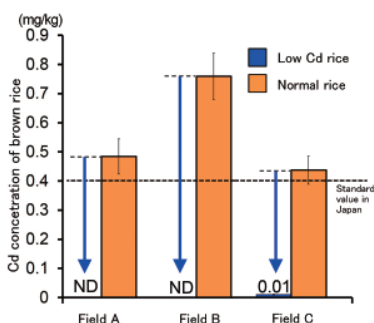
- Breeding of delicious strawberry cultivars such as 'Toyonoka' and 'Sachinoka' cultivars, and a cultivation technology that enables the fruits to be harvested throughout the year.



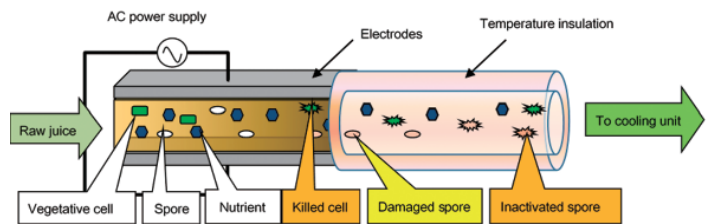
- Discovery of a gene that modulates the flowering of morning glory. The shelf-life of the flowers can be prolonged by suppressing the movement of this gene.



- Development of new rice varieties which do not absorb or accumulate even small quantities of cadmium (Cd) and comply with international safety standards.



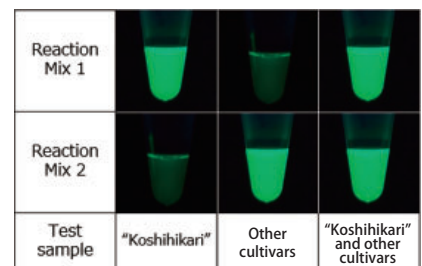
- Development of food sterilization technology using high electric field alternating current (HEF-AC) that maintains the quality of fruit juices.



- Elucidation of the effect of the β -cryptoxanthin in 'Unshumikan' facilitated the labeling of food products derived from this citrus fruit as "Foods with Function Claims".



- DNA analysis technology has been developed, which enables accurate, rapid and easy identification of rice cultivars without the use of specialized equipment.



- With the development of a rapid and accurate diagnostic method, we are pursuing the elucidation of pathogenic mechanisms, which will aid in the prevention of important infectious livestock diseases such as highly pathogenic avian influenza.



Resolution of environmental issues and sustainable use of local resources

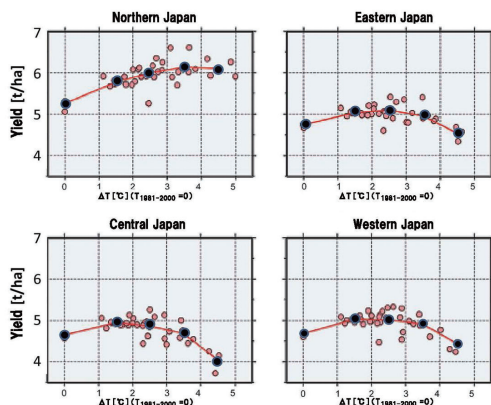
Overview of Research

With a moderate climate, abundant water resources, fertile land, beautiful rural landscape, Japan's natural environment is well-suited to agricultural activities. We pursue various research initiatives aimed at developing a sustainable and resilient agriculture for adaptation to climate change and other environmental problems.

- Research to address global issues such as climate change as an initiative for agriculture of the future
- Research to increase the fundamental strength of agricultural production, and to establish a strong agricultural foundation
- Research to mainstream sustainable agriculture in harmony with nature

Main Achievements

- Projection of the impact of climate change showed that except in northern Japan, the overall rice production will decrease significantly if the current temperature increased by 3°C due to global warming.

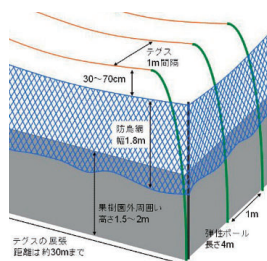


- Publication of area compatible manual on alternatives to replace banned agricultural chemicals such as methyl bromide for soil-borne pest control.



- Development of decontamination technologies for highly contaminated soil and elucidation of radioactive substance leakage from farmland soil.

- Managing bird damage to fruits and horticultural crops with the development of an easy-to-install facility known as 'Kuguren Tegusu-kun' in collaboration with Tokushima Prefecture.

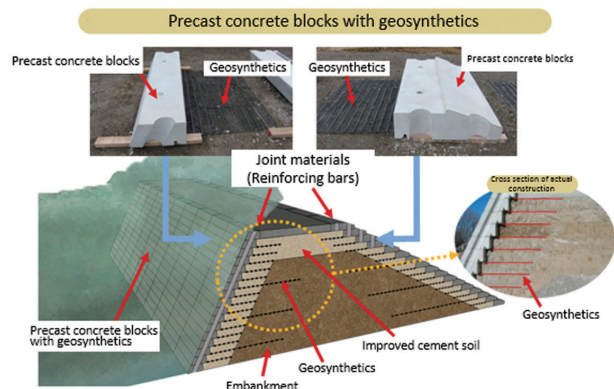


- Traditional gree tea farming practices (chagusaba) on tea plantations was revealed to contribute to the conservation of biodiversity in tea producing areas.



Rare species of plants in 'chagusaba'

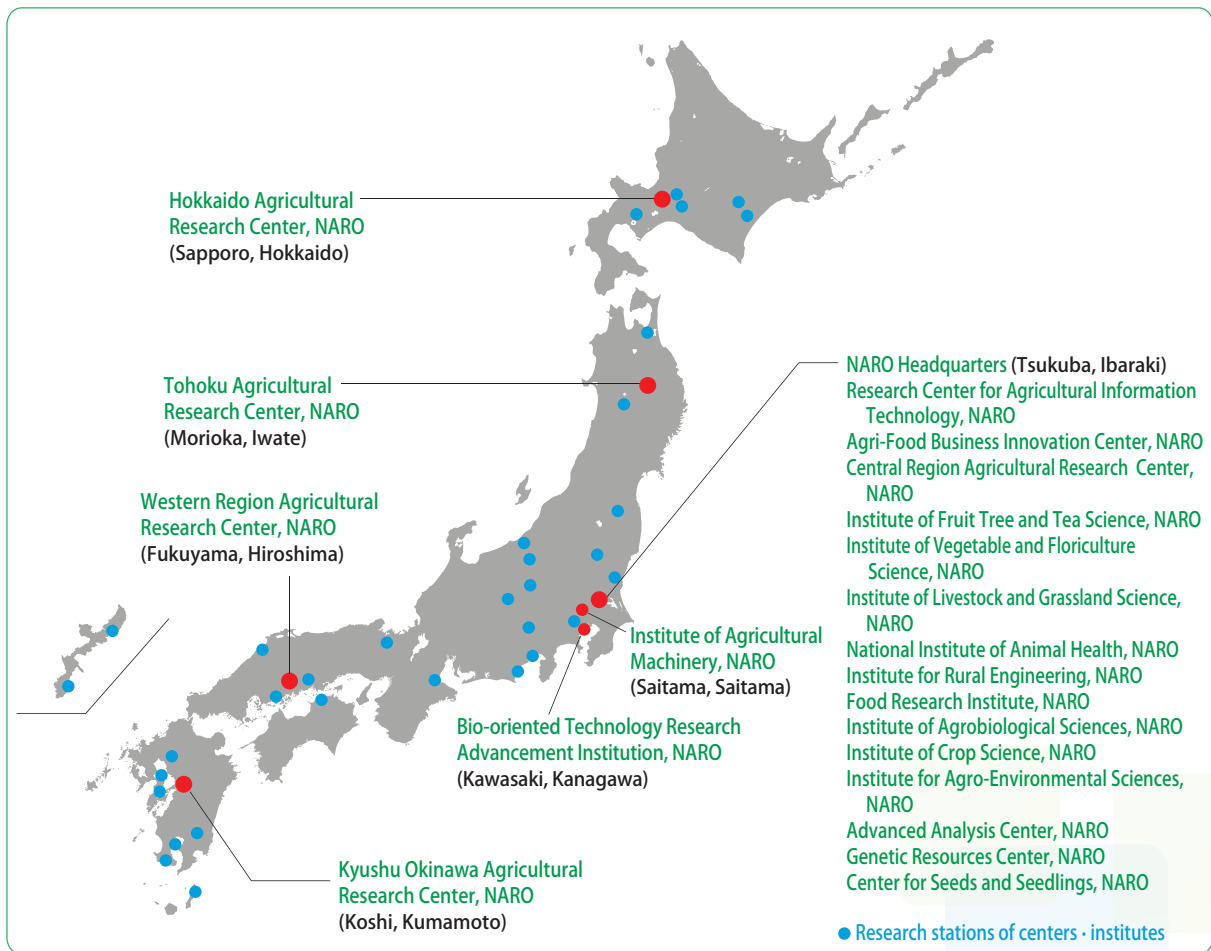
- Development of a robust three-sided integrated embankment to protect farmlands and agricultural facilities in coastal areas, minimizing damage due to tsunami.



- Development of biological agrochemicals such as 'Tobanai Namitento' to control aphid infestation in horticultural facilities.



Locations and Access Information



Train & Bus

● Tsukuba Express, Tsukuba Station

Tsuku-bus Nanbu Shuttle from Tsukuba station
 Take the bus for Kukizaki Madoguchi Center or Kukizaki Rojin Fukushi Center (approx. 16 minutes)
 → Get off at Norin Danchi Chuo → 5 minutes walk

● Tsukuba Express, Midorino Station

Tsuku-bus Jiyugaoka Shuttle from Midorino station
 Take the bus for Fujimidai (approx. 20 minutes) → Get off at Norin Danchi Chuo → 5 minutes walk

● JR Joban Line, Ushiku Station

Kanto Tetsudo bus from Ushiku station West Exit
 Take the bus for Tsukuba Daigaku Byoin, Yatabe Shako (approx. 20 minutes) → Get off at Norin Danchi Chuo → 5 minutes walk

Car

Approx. 5 km from Yatabe Interchange of the Joban Expressway.

Approx. 4 km from Tsukuba-Ushiku Interchange of the Ken-O Expressway.



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