



Base of knowledge and techniques to achieve profitable  
agriculture, forestry and fisheries.

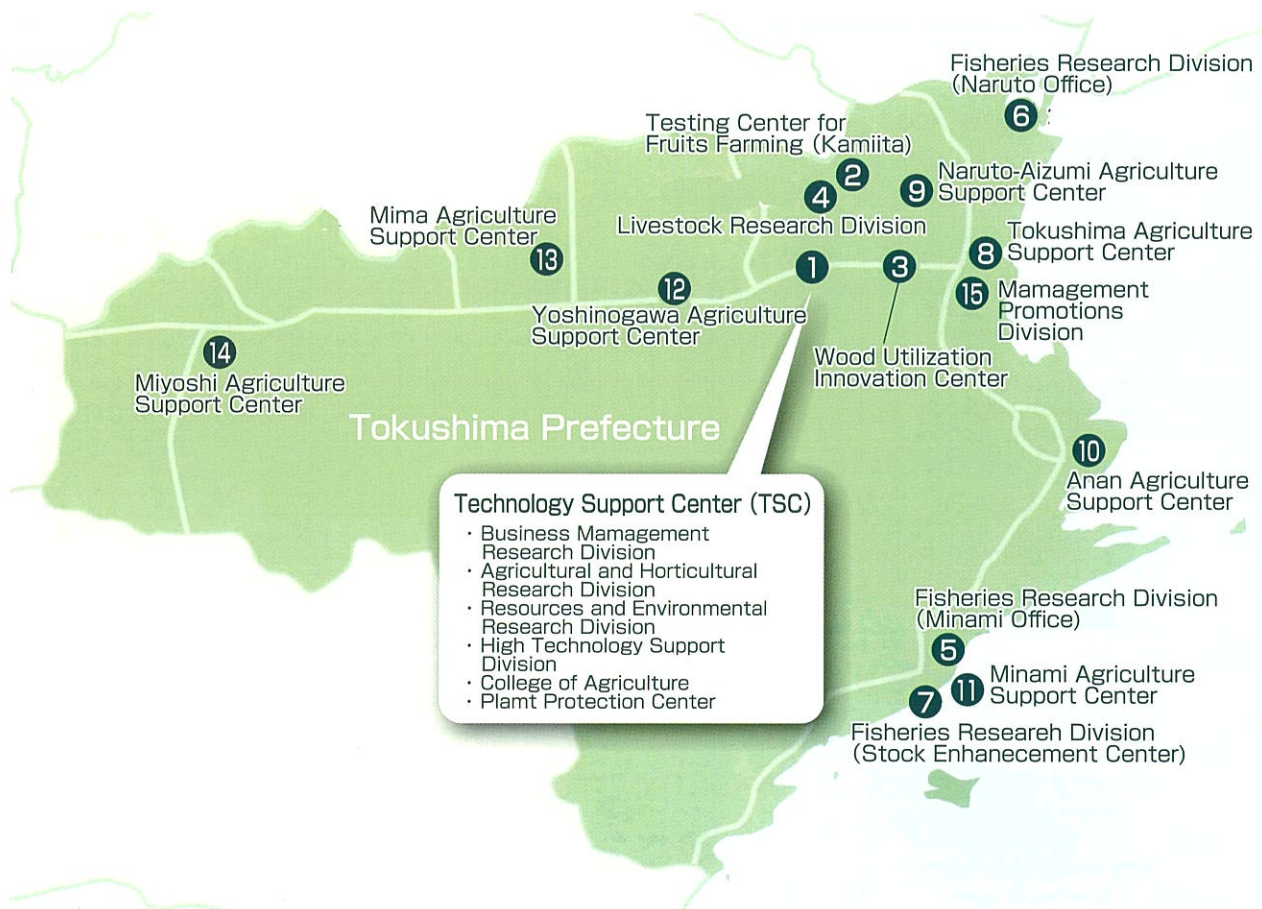
**Tokushima Prefectural Agriculture,  
Forestry and Fisheries Technology  
Support Center**

Tokushima Prefecture

# We develop profitable agriculture, forestry and fisheries of Tokushima

## Technology Support Center (TSC)

The Technology Support Center (TSC) was established in April 2005 as a part of system reorganizations by integrating related research facilities, the Agricultural Extension Center and College of Agriculture. TSC's roles are to facilitate the synergy of research, dissemination and education; to develop and propagate new breeds and technologies; and to cultivate human resources.



# We accelerate technological innovation and diverse human resource development

## Making the industries of agriculture, forestry and fisheries attractive through cooperation among industry, academia and government

In order to accelerate open innovation through collaboration with higher educational institutions and private businesses, TSC signed contracts with related organizations aiming to promote the growth of the industries of agriculture, forestry and fisheries. TSC also reorganized research centers and established the following: "Agriscience Zone" mainly consisting of the Agriculture, Forestry and Fisheries Technology Support Center in Ishii and the farm of Faculty of Bioscience and Bioindustry, Department of Bioindustry, Tokushima University; "Forest Science Zone" centralized in the Wood Utilization Innovation Center in Minami-shomachi, Tokushima City; and "Marine Science Zone" comprised of the Fisheries Research Division in Minami Town and Naruto City. Each zone strives for "creation of new technologies and values" and "human resources to lead the next generation of the industry" by integrating "knowledge's and technologies."



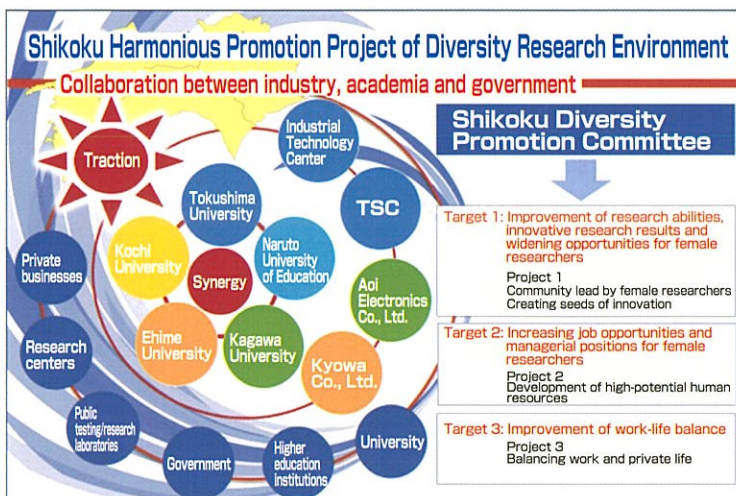
Examples of local produce.

## Efforts to achieve a diverse research environment

**TSC collaborates with nine leading research facilities in Shikoku, including Tokushima University, and participates in Shikoku Harmonious Promotion Project of Diversity Research Environment.**

Ministry of Education, Culture, Sports, Science and Technology (MEXT)  
"Initiative for the Implementation of the Diversity Research Environment"

### Organization and Efforts



- ◆ The proportion of female researchers in Japan remains lower than in western countries.
- ◆ An increased number of female researchers and facilitation of their skills will lead to more diverse perspectives and creativity of organizations while pursuing gender equality.
- ◆ Younger generations of researchers, regardless of gender, drive new innovations. Integrated support for a good work-life balance regardless of gender is essential for leadership development.
- ◆ High school and college students bear the future of testing and research. The door for the world of research will be opened by proactively providing opportunities for internships and research results.

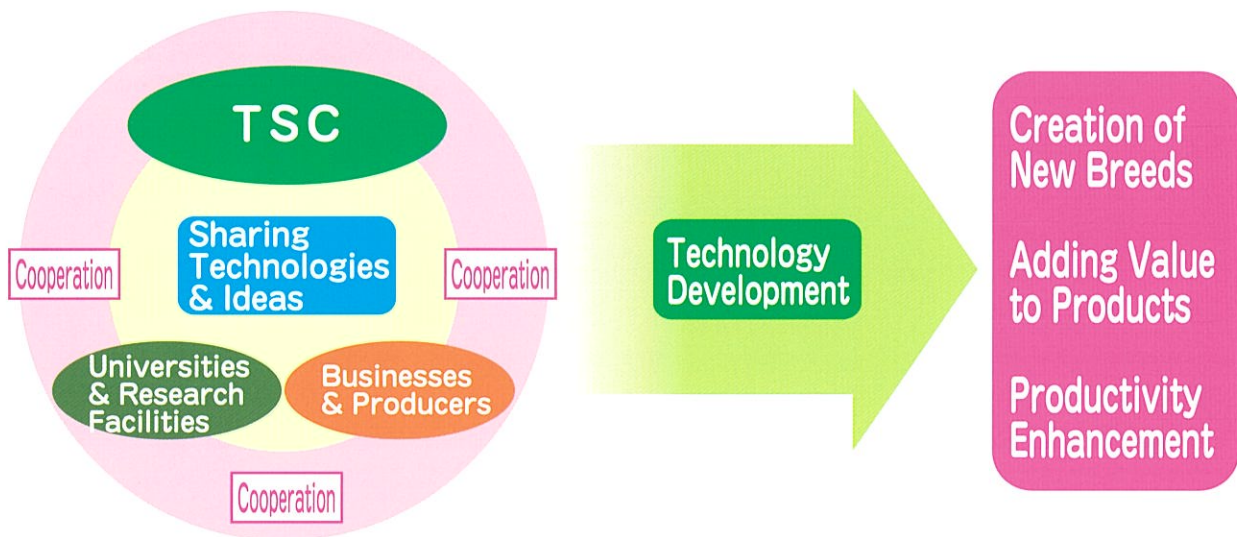


Creation of new and innovative values by fully utilizing the technologies and knowledge of participating organizations

# Development of new technologies through open innovation

In order to increase profitability within the industries, TSC supports the introduction of advanced technologies such as IoT and AI, the development of new breeds to meet demand, increasing production capacity and development of new cost-effective technologies, while also emphasizing the strength of facilities and organizations in Agriscience, Forest and Marine Science Zones.

## Research & Development contributing to the growth of agriculture, forestry and fisheries



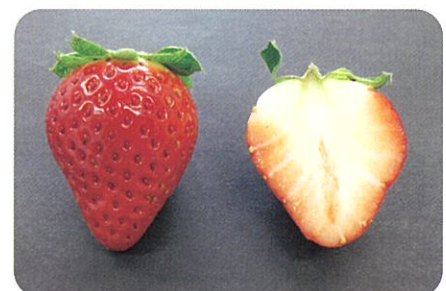
### 1. Creating new breeds for improved quality in response to changes in climate.

- ① Awa Hakushū is a new breed of lotus root that grows faster enabling it to avoid the negative impacts of typhoons.



Awa Hakushū

- ② Awa Hōbeni is a new breed of strawberry with improved yields and higher resistance against anthracnose infections.



Awa Hōbeni

- ③ Developing a new breed of late-maturing sudachi citrus that stays green longer.



New tentative breed of sudachi citrus (left) and Honda breed (right)

- ④ Developing better-quality and -taste Akisakari, a heat-tolerant rice cultivar.



Akisakari (left) and Kinuhikari (right)

- ⑤ Bed-cultivated Arage Kikurage mushrooms to reduce air-conditioning costs during summer.



Arage Kikurage

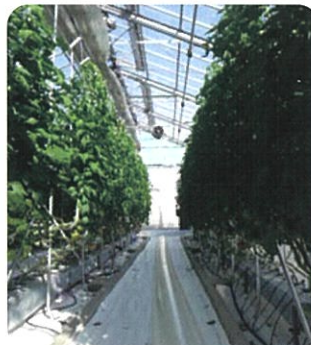
- ⑥ Developing seaweed seedlings with resistance against rising water temperatures.



High temperature tolerant seaweed

## 2. SMART Technologies for higher processing capabilities

- ① Cultivation and environmental control technologies in greenhouse horticulture.



Environment control inside greenhouses

- ② Carrot cultivation support system using ICT.



Monitoring ICT for simpler facilities

- ③ Growth diagnosis technology utilizing AI (deep learning).



Growth diagnosis technology using AI

- ④ Remote monitoring system for micro-pests.



Remote monitoring system for micro-pests

- ⑤ Remote monitoring and capturing technology to reduce deer-induced damage in forestry.



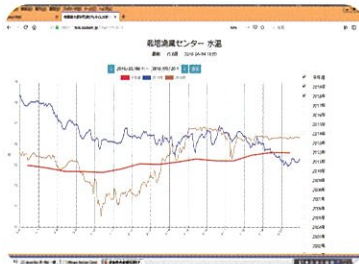
Remote monitoring of deer traps in forestry

- ⑥ Energy- and cost-saving production technology for beef cattle production using ICT.



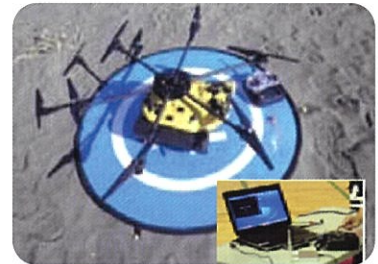
Rumination monitoring system

- ⑦ Real-time information and forecast network on water quality utilizing IoT/AI.



Real-time information on water quality

- ⑧ Investigation of seaweed beds utilizing marine drones.



Seaweed bed investigation drone

### 3. Adding value to drive demand expansion

- ① Japanese indigo production technology.



Cultivation of high-quality Japanese indigo

- ② Edible wild plants and medicinal crop cultivation technologies for hilly and mountainous areas.



Awa Haruka butterbur sprout

- ③ Identifying and quantifying the functional components in citrus fruits.



Mishimasaiko grass and roots



Component analysis of citrus fruits

- ④ Drying method for Tokushima's local cedar which has long-term durability.
- ⑤ Adding functionality to livestock brands of Tokushima (Awa Beef, Awa Ton Ton pork, Awa Odori chicken).
- ⑥ Development of packaged emergency food utilizing unused fish.



Method of drying Tokushima's local cedar



Feeding test for Awa Odori chicken



Packaged emergency food



Manufacturing packaged emergency food

#### 4. Establishing environmentally-safe production technology

- ① Pest control utilizing natural enemies and LED.
- ② Safety evaluation and analysis of environmental burdens from agrochemicals.
- ③ Development of environment-friendly fertilizing technology for algae
- ④ Practical use of underwater plant beds for algae developed by Tokushima Prefecture



LED natural enemies capture device



Safety evaluation of agrochemicals



Fertilizer for algae



Underwater plant bed for algae

## 5. Realization of low-energy, low-cost, and high-production farming

① Establishing a business model facilitating the maintenance and expansion of local farming.

② Highly efficient production technology for containerized cedar seedlings to promote forest restoration.

③ Indoor production technology for seaweed seeds and seedlings.



Growing containerized cedar seedlings



Establishing business models



Indoor production of seaweed seeds and seedlings

## 6. Development of new technologies for the growth of agriculture, forestry and fisheries

① Freshness preservation technology during mid- to long-term transportation targeting export expansion.



Quality checking for products to be exported

② Pest control technology to meet the limitation standards for residual chemicals set by importing countries.



Red spider mite fumigation using high concentration carbon dioxide

③ Technologies for cryopreservation of pig semen and fertilized egg and subsequent implantation.



Awa Ton Ton piglets born through assisted reproductive technologies

④ Aquafarming technology for seaweed, fish and shellfish.



Development of on-shore farming technology for algae



## 7. Operations supporting agriculture, forestry and fisheries businesses

- ① Evaluation of management to realize profitable farming.
- ② Wild animal control technology in agriculture and forestry.
- ③ Disease control to protect crops (forecasting and preventing the emergence of major pests) .
- ④ Improvement of soil fertilization management to boost brand power.
- ⑤ Information provision on fishing and oceanographic conditions, nutrient salts, red tides and shellfish poison.



Precaution against sweet potato pests



Soil fertilization management



Microscopic inspection for red tides and shellfish poisons



Fisheries research vessel Tokushima

## 8. Research facilities open to the public

- ① The Sixth Industrialization Research Facility utilizes local resources and studies food processing.
- ② The Wood Utilization Innovation Center supports the development of new technologies and products using Tokushima's resources.
- ③ The New Minami Office supports sixth industrialization of fisheries, equipped with disaster prevention functions.
- ④ Publicity of research results through categorized seminars on agriculture, forestry and fisheries Center Fair etc.



Sixth Industrialization Research Facility



Wood Utilization Innovation Center



Exhibition of research conclusions at the Center's fair



Seminar on exportation



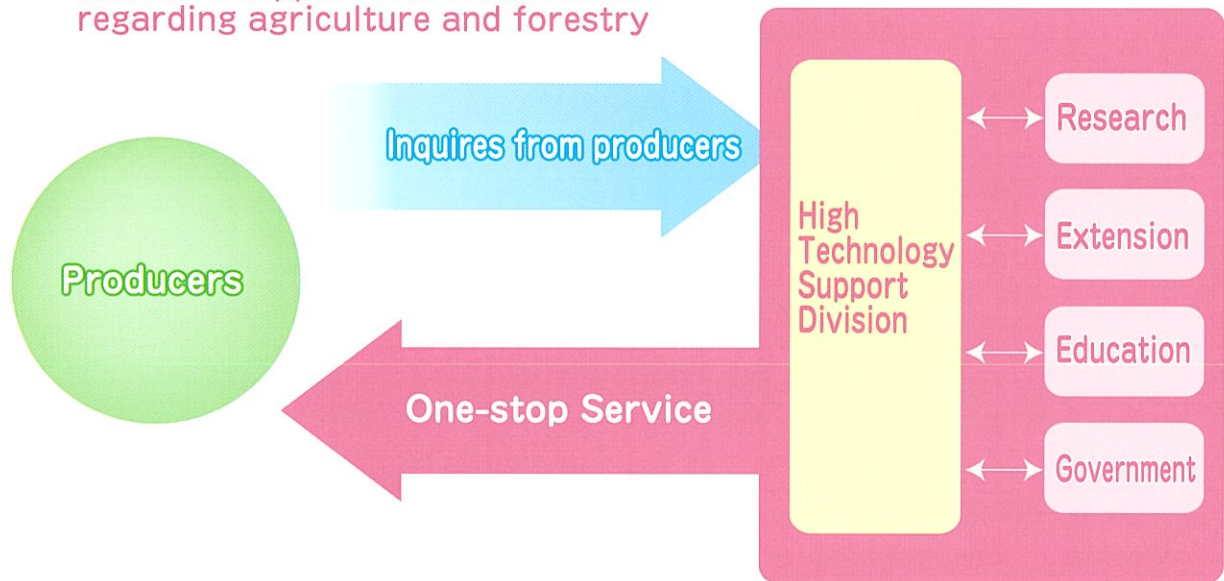
Comprehensive support for earnings improvement and innovation of local agriculture and forestry

# Direct support for farmers and forestry workers based on reliable technologies

In order to further disseminate new technologies and support management for those within the agriculture and forestry businesses, TSC collaborates with public testing and research laboratories, JA and other related organizations. High technology Support Division support widely shares new technologies developed by laboratories while also offering technical support for forward-thinking farmers and forestry workers. The seven Agriculture Support Centers help with community development, human resource development and regional production development.

## Realization of "One-Stop Service"

Intensification of research, knowledge extension and education enables technical support and consultation regarding agriculture and forestry



## Striving for quick problem-solving together with on-site workers!

Knowledge hubs quickly respond to producers' problems!

Project teams study, investigate and demonstrate solutions!

Project teams work on the development of a nutriculture system for vegetables, verify the efficacy of resolutions against strawberry red spider mites, develop simple countermeasures against heat for cymbidium, demonstrate technologies for water discharge on mild slopes, and so on.



Strawberry seedlings technology study



On-site training on IPM technology



Simulator training for high performance forestry machinery

## Development and procuring of human resources

### Supporting the development of workers with management skills and incorporation of group farming communities

TSC supports new farmers in establishing their businesses, founds local Group Farming Corporations, establishes new labor procuring systems and offers technical training.



Founding group farming corporations

## Promotion of paddy field agriculture

### Supporting efficient utilization of paddy fields and stable business management to achieve diverse paddy field farming

TSC has introduced Akisakari, a new heat-resistant rice breed, to adapt to global warming, promotes the cropping of Akidawara, a high-yielding rice for animal feed, organizes the supply system of whole crop silage (WCS) as well as strives for the popularization of rice flour in processed foods.



Drone pest control

## Promotion of horticulture

### Supporting horticulture to achieve profitable farming

TSC has introduced new technologies developed by Tokushima Prefecture aiming for vegetable production increase, has established the commissioned work system for "soil sterilization treatments by solar heat" for lotus roots farming, promotes the Kaifu Town Cucumber project to revitalize local farming by those who are moving into the area, and supports the Kaachan Yasai (Mother's Vegetables) project which highlights women in farming. It also supports the introduction of the low-cost Ubiquitous Environment Control System (UECS) for SMART farming and environment-friendly agriculture as well as farmers switching to more profitable fruits and sixth industrialization.



UECS workshop



Strategical human resource development through the collaboration of higher education institutions and provision of training fields

# Developing agricultural human resources with management skills to grow the industry

Utilizing "training" courses (College of Agriculture) to cultivate farmers with a deep understanding and passion for agriculture and food processing through practical learning from production to sales, and "improvement" courses (Agri-Business School) to meet the needs in this era of longevity.

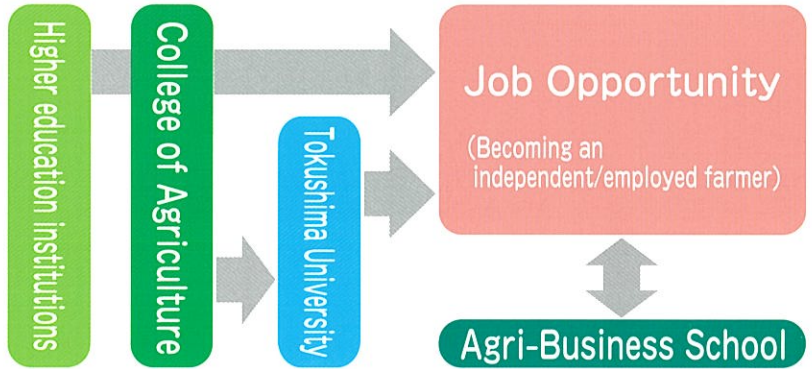
**Development of future agriculture workers**  
~ Training ~

**Development of human resources**  
~ Job opportunities and employment retention ~

**Development of managerial skills**  
~ Diversification and expansion ~

## Career improvement for agricultural workers

Higher education institutions, College of Agriculture and Tokushima University are in collaboration to offer the Career Advancement System to teach basic and managerial skills.



## College of Agriculture Fundamental Course

### Learn advanced, leading-edge technologies

The course cultivates future local agricultural leaders by teaching advanced knowledge and technologies as well as providing on-site experience and problem-solving practice for vegetable, fruit, flower and animal industries.



Project study

### Leaders for sixth industrialization

Sixth industrialization includes utilization of local resources and food processing. It offers practical experience in management and understanding consumer needs through the development and sales of products in Sorasoja, a simulation company which develops senses not only for agriculture but for food industry and variety of roles in communities. College of Agriculture also encourages to achieve different levels offered by the Sixth Industrialization Producer Training program.



Sales experience

### Certifications and licenses for better job opportunities

TSC offers support in obtaining licenses or certifications for special large vehicles, traction vehicles (limited to agricultural vehicles), forklifts, Hazardous Materials Engineer, Certificate by National Chamber of Agriculture and hunting.



Driving practice for obtaining special large size vehicle license



Agricultural machineries safety training



On-site practice



College of Agriculture Fair

## Agri-Business School

### Leaders with agricultural management skills

It teaches leading-edge and practical managerial skills needed for "profitable farming" including strategies in financial planning, labor management and marketing, as well as advanced "technologies" such as soil fertilization and disease/pest control.



On-site practice

### Industry-ready human resources in citrus farming

It offers "Tokushima Citrus Academy" for citrus farming households utilizing the former Fruit Research Center. It also collaborates with the municipal governments and production sites to facilitate independence of farmers.



Tokushima Citrus Academy

### Leaders for sixth industrialization

College professors and business owners are invited to teach hygiene control, food processing, distribution, sales, product development and management strategies to cultivate leading forces for the sixth industrialization.



Sixth industrialization training

### "Farming Fans" of Tokushima

An array of courses of varying duration, with devised learning tools, and content (e.g. Basic Management, Agricultural Machinery Safety Training and Internet Course) are offered to meet the needs of working students while classes open to public offer more attractive participant-friendly themes.



Open classes

## Primary TSC Facilities

### Tokushima Prefectural Agriculture, Forestry and Fisheries Technology Support Center

It was launched for sustainable development of Tokushima's agriculture, forestry and fisheries and revitalization of rural areas through testing/research, technology dissemination and unification of educational facilities. Branding via development of new breeds, "increased production" of vegetables, and the development of "human resources with high managerial skills" are the main focus. There is an open laboratory in sixth industrialization research facility on the premise, where food processing and development take place.



### Livestock Research Division

It is the leading facility of Tokushima studying milking cows, beef cattle, pigs, chickens and feeding crops. It supports Tokushima's animal farming for fresh milk, Awa Beef, Awa Ton Ton pork and Awa Odori chicken through various testing and research on production including breed improvement, reproduction/development and fattening, environmental safety, animal feed production technology, and leading-edge biotechnology such as ICT.



### Fisheries Research Division

The Minami office focuses on production increase for rocky-shore fisheries of southern Tokushima (e.g. abalone, Japanese spiny lobster and seaweed), information collection and dissemination on oceanographic conditions utilizing the fisheries research vessel Tokushima, disease control, and aquafarming. The Naruto office develops new technologies for farming seaweed, studies red tides/shellfish poison and nutrient salts, and inland fisheries for sweetfish etc.



### Wood Utilization Innovation Center

Forest Science Zone at the Wood Utilization Innovation Center offers solutions to technical issues concerning demand expansion through collaboration of government, industry and academia and strives for sophistication and acceleration of research development for more attractive products and human resources.

It is a "demonstration facility open to the public" which owners of lumber businesses can utilize freely.



# Directory

|   |   |                                    |
|---|---|------------------------------------|
| <b>Technology Support Center</b>                        | 1660 aza-Ishii, Ishii, Ishii-cho, Myozai-gun  |                                    |
| <b>Business Management Research Division</b>            | General Affairs Section, Management and Postharvest Science Section, Administration Section   | +81-88-674-1660                    |
| <b>Agricultural and Horticultural Research Division</b> | Crops Section, Vegetable and Flower Section, SMART Farming Section, Fruit Section   | +81-88-674-1940                    |
| <b>Resources and Environmental Research Division</b>    | Forestry Resource Section, Production Environment Section, Food Safety Section, Plant Disease / Pest / wildlife Section   | +81-88-674-1956                    |
| <b>Livestock Research Division</b>                      | 1 aza-Sunakou, Izumidani, Kamiita-cho, Itano-gun<br>General Affairs Section, Beef and Dairy Cattle Section, Pig Section, Chicken Section, Feed Crop Section   | +81-88-694-2023                    |
| <b>Fisheries Research Division</b>                      | Minami Office : 1-3 Hiwasa-ura, Minami-cho, Kaifu-gun<br>Naruto Office : 96 aza-Jimawari Ichi, Dounoura, Seto-cho, Naruto-shi<br>General Affairs Section, Environment/Production Increase Section, Marine Production Technology Section | +81-884-77-1251<br>+81-88-688-0555 |
| <b>Plant Protection Center</b>                          | 1660 aza-Ishii, Ishii, Ishii-cho, Myozai-gun  | +81-88-674-1954                    |
| <b>High Technology Support Division</b>                 | 1660 aza-Ishii, Ishii, Ishii-cho, Myozai-gun<br>Reception/Planning and Training Section, Horticulture Section, Resource and Environment Section   | +81-88-674-1922                    |
| <b>Tokushima Agriculture Support Center</b>             | Tokushima Municipal Office : 1-67 Shinkura-cho, Tokushima-shi   | +81-88-626-8772                    |
| <b>Naruto-Aizumi Agriculture Support Center</b>         | 29 aza-Mikazukihouji, Higashi Nakatomi, Aizumi-cho, Itano-gun   | +81-88-692-2515                    |
| <b>Anan Agriculture Support Center</b>                  | Anan Municipal Office, Southern Tokushima Government Building : 46 Aoudani, Tomioka-cho, Anan-shi   | +81-884-24-4182                    |
| <b>Minami Agriculture Support Center</b>                | Minami Municipal Office, Southern Tokushima Government Building : 17-1 aza-Benzaiten, Oku Gawauchi, Minami-cho, Kaifu-gun   | +81-884-74-7491                    |
| <b>Yoshinogawa Agriculture Support Center</b>           | Yoshinogawa Municipal Office : 736-1 Miyanoshima, Kawashima-cho, Yoshinogawa-shi  | +81-883-26-3971                    |
| <b>Mima Agriculture Support Center</b>                  | Mima Municipal Office, Western Tokushima Government Building : 73 aza-Tate Jinjya Shimominami, Inoshiri, Wakimachi, Mima-shi  | +81-883-53-2314                    |
| <b>Miyoshi Agriculture Support Center</b>               | Miyoshi Municipal Office, Western Tokushima Government Building : 2415 aza-Machi, Ikeda-cho, Miyoshi-shi  | +81-883-76-0691                    |
| <b>College of Agriculture</b>                           | 1660 aza-Ishii, Ishii, Ishii-cho, Myozai-gun  | +81-88-674-1026                    |
| <b>Management Promotions Division</b>                   | 1-1 Bandai-cho, Tokushima-shi<br>Planning Section, Farmland Utilization Section, Human Resource Support Section   | +81-88-621-2398                    |
| <b>Wood Utilization Innovation Center</b>               | 5-1-9 Mimami-shomachi, Tokushima-shi  | +81-88-633-6358                    |
|   | New Technology Development Testing Building<br>Forestry Human Resource Development Division   | +81-88-635-7810                    |



Tokushima Prefectural Agriculture, Forestry  
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<https://www.pref.tokushima.lg.jp/tafftsc/>