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PRIMAFF Symposium on “Environmentally Friendly Agricultural Policy and Realization of Sustainable Agriculture: Toward the Diffusion of Organic and Biodiversity-friendly Agriculture“

Development of Environmentally Friendly Agriculture and Farm Management Development in Rural Areas

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Self-introduction

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Education & Research Keywords

Farm management, sustainability, technology adoption, diffusion, organic agriculture, environmentally friendly agriculture, biodiversity, natural farming

Educational and research activities

Outline

1. Background and Objective
2. Case Overview
3. Case Studies

Background

- As the realization of a sustainable society becomes an important global issue, there is a need to diffuse and promote environmentally friendly agriculture.
- It is necessary for the entire region, rather than individual farmers, to engage in environmentally friendly agriculture.
- The government has also promoted the creation of production areas that engage in environmentally friendly agriculture (organic agriculture) on a region-wide basis.
  - Model Town Project for Organic Agriculture: 2008 – 2009.
  - Organic Villages: 2022 – present. 129 municipalities are working on it in FY2024
- There are already a number of region-wide initiatives for environmentally friendly agriculture in Japan.

Objective

How environmentally friendly agricultural practices affect local areas and agricultural managements?

- In this presentation, the following two points will be focused on advanced cases in Japan.
  1. Development process.
  2. Development of agricultural management.

Technologies considered in this presentation:

- Special cultivation and organic agriculture
- Focusing on initiatives that meet the definition of the Act on Promotion of Organic Agriculture as “organic agriculture”.
  - This is looser than the Japanese Agricultural Standard (JAS) for organic agriculture.

1. Background and Objective

2. Case Overview

3. Case Study

Case Overview

Two processes of organic agriculture spreading in the region (Taniguchi et al., 2019：p.201):

1. Government-led top-down (“government-led”)
   - ➢ *Kohnotori-hagukumu Nouhou* (KHN) (stork-friendly farming)
2. Farmer-led bottom-up (“endogenous”)
   - ➢ Nagasaki-Nanbu Production Cooperative (NNPC)

KHN and NNPC have been working on environmentally friendly agriculture since 2002 and 1975 respectively, and their continued development shows that these are sustainable initiatives.

		Hometown	
		Inside the area	Outside the area
Management type	Individual farm (unincorporated)	A D	E
	Organizational management entity (corporation)	B (agricultural producers' cooperative corporations) C (Inc.)	

Notes: Red color means KHN cases, and black color means NNPC cases.

Regional Characteristics of Considered Cases

	KHN	NNPC
Natural Characteristics	Plain area and paddy Soil	Hilly and mountainous areas and Volcanic ash soil
Historical Characteristics	Life-combining	Voluntary and networked
Structural Characteristics	Local Brand Type and Government and JA-led	Regionally combined and producer-led

Source: Kondo (2005), Uenishi (2022), and interview survey.

1. Background and Objective
2. Case Overview
3. Case Study
   （1）*Kohnotori-hagukumu Nouhou* (KHN)
      1) Overview
      2) Development process
      3) Farm management development
   （2）Nagasaki-Nanbu Production Cooperative (NNPC)
      1) Overview
      2) Development process
      3) Farm management development

Kohnotori-hagukumu Nouhou Method

- “Farming methods that promote a rich culture, region, and environment that nurtures delicious rice and diverse living creatures, and where oriental storks can live.” (Method that grows safe rice and living creatures at the same time)

- Japan Agricultural Cooperative (JA) Tajima collects all KHN rice and markets it under a special label.
- This study focuses on Toyooka City, which is the main production area in JA Tajima jurisdiction (5 municipalities).

- Since 1988, within the JA's jurisdiction, “Tsuchikaori” rice has been produced as a product of Co-op Kobe.

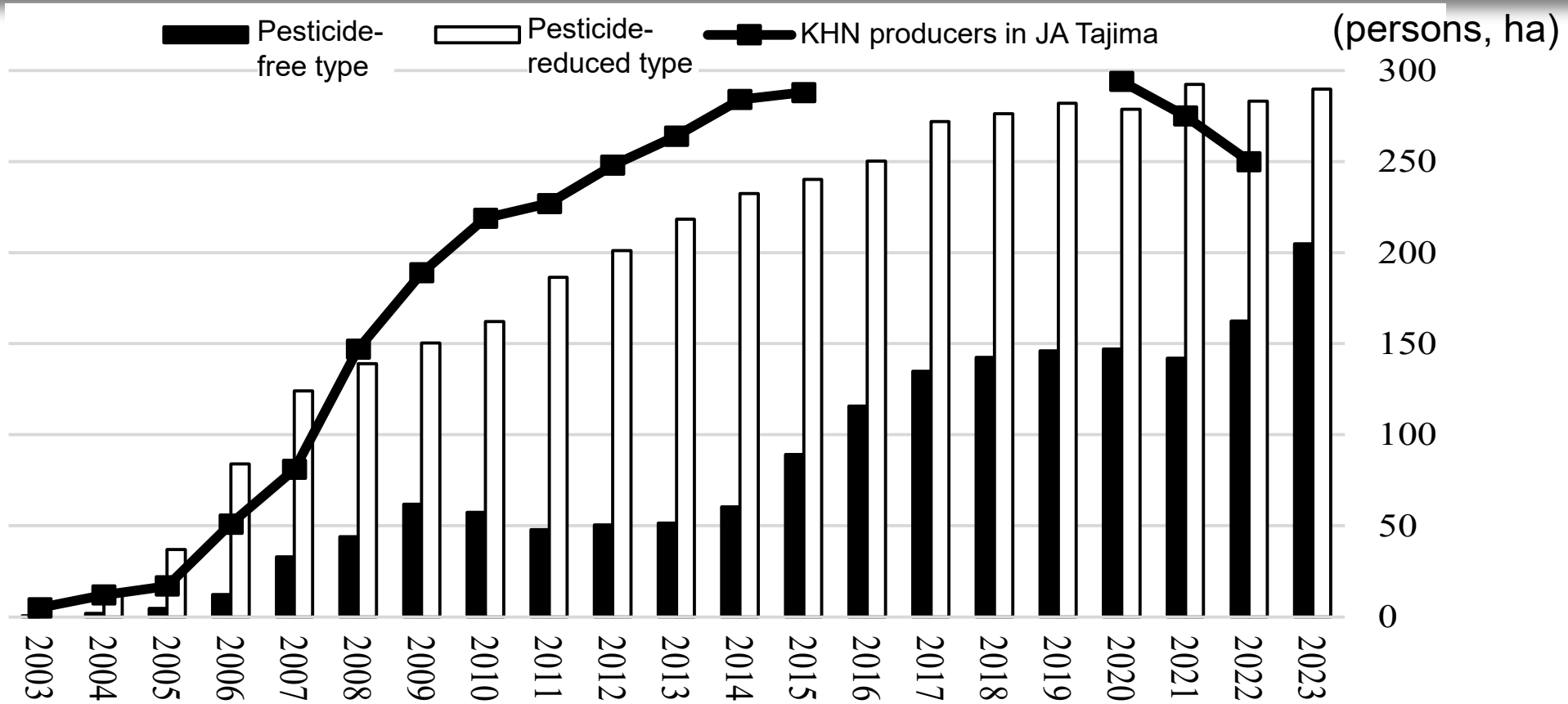
Techniques of *Kohnotori-hagukumu Nouhou* (KHN) farming method

		Pesticide-free and JAS	Pesticide reduced
Seedling growing period	Seed disinfection	Disinfection with warm water or vinegar	
	Insecticides and fungicides	Disused	
Growing period	Insecticides and fungicides	Disused	
	Herbicide	Disused	85% reduction
	Chemical fertilizer	Disused	
Others	Sidewalk maintenance	Herbicide free	
	Water management	Winter flooding, early flooding, deep water management, postponement of midsummer drainage	

Source: 2024 KHN rice (Koshihikari) cultivation calendar

- Organic JAS-compliant materials are used for the pesticide-free type.
- Medium-sized seedlings are used to reduce weed damage

Rice Planted Area and Number of Member of the Producer Group of the *Kohnotori-hagukumu Nouhou* (KHN) Rice in Toyooka City



Source: Documents provided by Toyooka City and JA Tajima, and results of the interview survey.
Notes: Organized management entities are counted as one person. Producer group were established in 2006; therefore, the number of producers is shown until 2005.

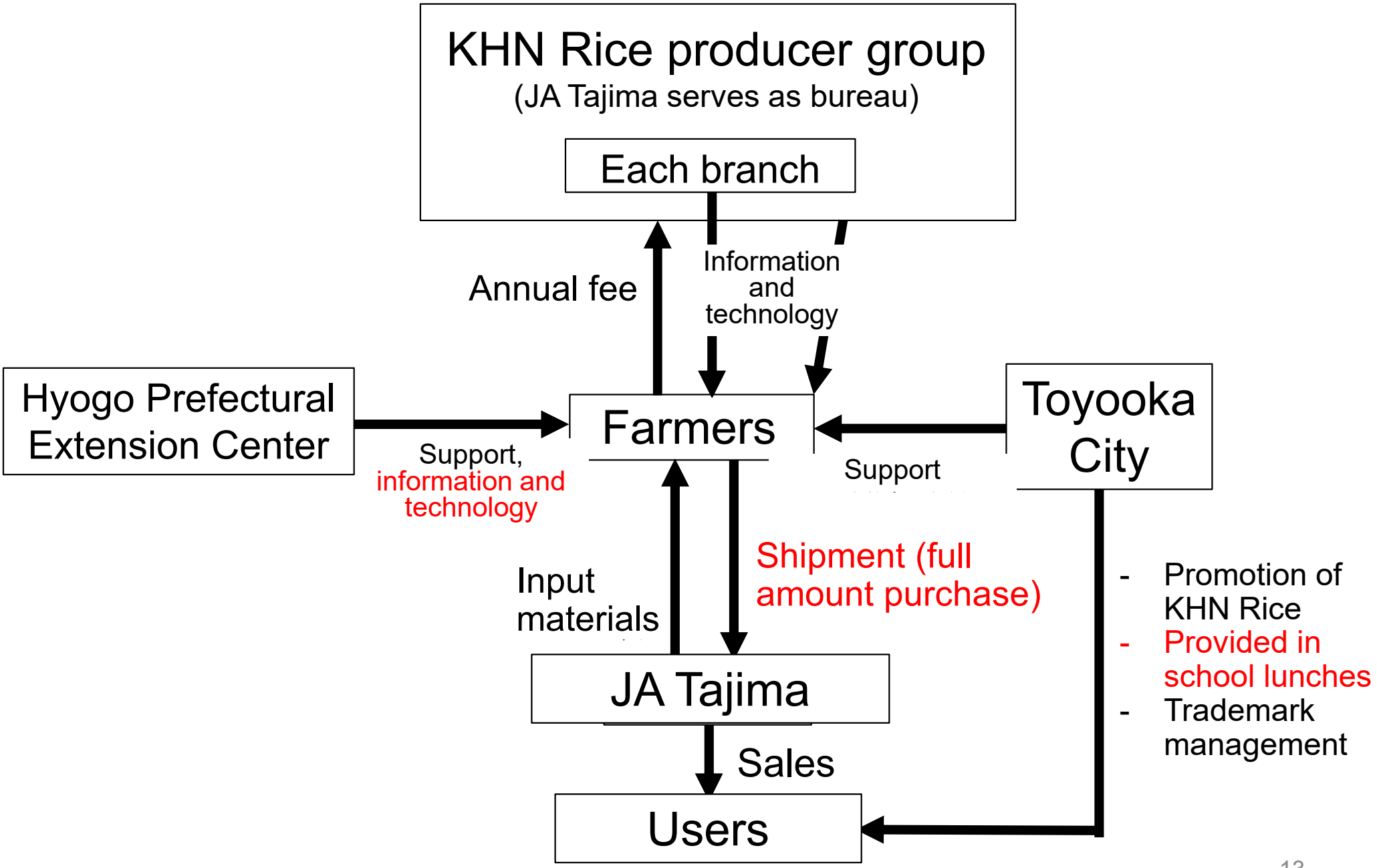
- The area and number of producers of pesticide-free type is increasing, while that of pesticide-reduced type has not changed significantly.
- Although the number of producer group members is decreasing, mainly due to the aging of the farming population, the accumulation of farmland by community farming and corporate management is progressing.
- Percentage of WSF area to paddy rice planted in 2020 is 18.1%, of which 6.3% is pesticide-free type (calculated from the 2020 Census of Agriculture and Forestry).

The Creation Process of *Kohnotori-hagukumu Nouhou*

- In 1971, storks in the wild became extinct in Toyooka City.
- Factors contributing to the extinction of the stork include:
  - Decrease in distribution area due to overhunting.
  - Habitat loss due to loss of low marshy areas and reduction of pine trees as nesting sites.
  - Pollution by pesticides and other toxic substances.
  - Decrease in genetic diversity.
- The last trigger was damage caused by pesticides.

- In 2002, the number of storks in captivity reached 100, and the decision was made to release storks in 2005.
- It became necessary to develop an environment where storks could live through agriculture, and test cultivation began to establish the technology of *Kohnotori-hagukumu Nouhou*.
- From the beginning, a tripartite cooperative system (producers, government (Hyogo Prefecture and Toyooka City) and JA) was established for extension, distribution and sales.

Networks and roles of each actor of *Kohnotori-hagukumu Nouhou* (KHN) Rice



Development Process (to 2009)

Year	Production	Consumption and Sales	Major Subsidized Projects
2002	Started trials of pesticide-reduced and chemical fertilizer-free cultivation.		
2003	Started trials of pesticide- and chemical-free cultivation.	JA Tajima started collection and sales of KHN rice.	Paddy Field Nature Restoration Program in Harmony with Storks (through FY2010)
2004	Cultivation guidelines for reduced pesticide types completed.	Start of purchase of KHN rice by local mass retailer under the production cost guarantee system	
2005	- Definitions and requirements were established, naming it KHN. - Cultivation guidelines for pesticide-free types were completed. - A preparatory committee of producer group was set up within JA.		
2006	The KHN Rice Producers Group is formed and begins local training and other activities.		
2007	KHN initiatives begin throughout the Tajima region	- School lunches are served three times every two months with a pesticide-reduced type of KHN rice in the city. - Toyooka City registers Kohnotori-hagukumu as a trademark.	
2009	The Producers' Group has been organized into five branches.		

Source: Materials provided by Toyooka City, JA Tajima, and the extension center, and results of interviews

Development Process (since 2010)

Year	Production	Consumption and Sales	Major Subsidized Projects
2010		KHN Rice sales promotion representative has been placed at the city office.	
2011			KHN Promotion Program
2012			KHN Entire Village Project (through FY2014)
2015		KHN rice was served three days a week in school lunches (pesticide-reduced type).	Pesticide-Free Cultivation Challenge Program (through FY2017)
2016		KHN rice was served five days a week in school lunches (pesticide-reduced type).	
2018	Obtained Global GAP group certification (suspended in FY2021). Started Organic JAS production.		
2023		Pesticide-free type offered on a trial basis in school lunches.	Organic Village Declaration
2024			Organic Agriculture Production Area Development Promotion Program

Hyogo Prefectural Extension Center: Establishment of Kohnotori-hagukumu Nouhou (KHN) Technology.

Tests in demonstration plots set up by community-based farm cooperatives and producer group

Cooperative A	Cooperative B	Cooperative C	Producer group
Winter Flooding Rice bran weeding EM molasses weeding No-till cultivation	Early Flooding Rice bran weeding Machinery weeding	Machinery weeding	Early Flooding EM molasses weeding Machinery weeding

- The project asked several community-based farm cooperatives and individual farms to set up demonstration plots and collect data to establish the technology.
- Community-based farm cooperatives: Consists mainly of part-time farmers and retired workers who have returned to farming.
- Individual farms group: Consists of full-time business farmers.

=> By establishing the technology based on the opinions of both producers, it is expected to spread to a wide variety of producers.

Toyooka city:
Paddy Field Nature Restoration Program in Harmony with Storks

Types		Biotope in paddy field	Rice cultivation with winter flooding and midsummer drainage deferred
Objective		Establishment of technology to use paddies not planted with rice as biotopes	Establishment of rice cultivation technology that nurtures living creatures
Content		Nurture living creatures by maintaining flooded conditions throughout the year	Nurture living creatures by introducing techniques such as deferring midsummer drainage and winter flooding.
Commission fee	2003-2007	54,000 JPY/10a	40,000 JPY/10a
	2008-2010	27,000 JPY/10a	7,000 JPY/10a
Common requirements		- Consolidation of approximately 1 ha or more in the same water system - Continuous implementation for 3 years or more - Work and observation daily records	
Specific requirements		- Managed without pesticides - Maintain a water level of at least 5 cm in principle - At least 1 coarse plowing, at least 1 tillage, and at least 3 ridge weed management	- Cultivation with no pesticides or with less than half the pesticides input as is conventional - Postponing the midsummer drainage - Maintain a water level of at least 5 cm in winter in principle

- KHN fits the rice cultivation with winter flooding and midsummer drainage deferred.
- Commission fees for FY2003-2007 were shared half by Hyogo Prefecture and half by Toyooka City; from FY2008, the city has been solely responsible for the project.

Major Support Program by Toyooka city :

Expanding Consumption Through School Lunches

Pesticide-Free Cultivation Challenge Program:

- Objective is to establish pesticide-free cultivation techniques using pot-grown seedlings.
- Background to this is that the expansion of production of pesticide-free types has been stagnant due to issues such as lower yields caused by weed damage, and supply shortages have persisted.
- The prefectural extension center played the role of technical guidance, while the JA provided agricultural guidance and taste analysis.
- In addition to lending agricultural machinery, participants were able to receive technical guidance, and 16 people (16.5 ha in total) participated in the program.

School Lunches:

- In 2007, local elementary and junior high school students approached the mayor directly and began serving KHN rice (Nakagai, 2023).
- Since then, the frequency of serving rice has gradually increased, and in FY2016, KHN rice is served 5 days a week.
- Under the “Organic Agriculture Implementation Plan,” the goal is to convert all rice used for school lunches to pesticide-free rice by FY2027 (90 tons).

JA Tajima: Full amount purchase by at a high unit price

- From the beginning, the full amount purchases have been made at a high unit price.

- 2005 rice (first-class rice, per 60 kg)
  - Pesticide-free type: 21,000 JPY (approx. 150% of the price of local conventional rice)
  - Reduced pesticide type: 16,800 JPY (approx. 120%)
  - Regional conventional Koshihikari rice: 14,100 Yen
- Maintains high unit prices to date

- JA Tajima and Toyooka City staff collaborate to actively promote and expand sales channels throughout Japan and around the world.
- Explain the story of KHN rice and promote understanding among consumers and actual buyers.

JA Tajima: Obtained Global GAP and Organic JAS certification

- Group certification was obtained to improve the brand strength of KHN rice as a region.

Global GAP:

- A council was set up with 4 producers (from all over Tajima region) and JA Tajima.
- JA Tajima serves as the administrative office, and certification is obtained.

Organic JAS certification:

- JA Tajima serves as the administrative office.
- Planted area in 2022: 41 ha.

Surveyed Farm Management: Individual Farm A

	Farm A
Survey subjects	Owner
Age at start of farming (and at become a farm owner)	28 (28)
Ways to become owner	Succeeded to the family business
Family work force	4 persons (owner, grandfather, father, mother)
Number of employees	2 permanent employees
Farmland area	Paddy rice: 5.3 ha Field vegetables: 1 ha Greenhouse vegetables: 20 crops

Notes: Figures for FY2024; same for B to E management.

Process of management development and technology learning

Management development:

- Started natural farming and KHN (pesticide-free type) in the first year of farming.
- Convert KHN pesticide-free type to organic JAS in 2024 (1.5 ha).
- Intend to convert the entire area of pesticide-free type to JAS Organic in the future.

Technology learning

- Participated in all the training sessions of the producer group during the first and second years of farming.
- Consulted individually as needed with farmers of high technical level who had formed a network through the activities of the producer group.
- A pesticide-free cultivation manual published by Toyooka City.

- The unit price of the organic JAS type is added to that of the pesticide-free type.
- Even taking into account the application fee for Organic JAS, Organic JAS is more economically advantageous, and the intention is to develop the management by changing the cultivation method.

Surveyed Farm Management: Corporation B

	Corporation B
Organization overview	Established around 2000 as a machine utilization cooperative. Incorporated in 2014. 36 households in the community participate (55 households in all).
Executives	7 members. Representative director is 67 years old and has been representing the corporation since he was 54 years old.
Work force	Full-time employees: 1 Operators: 5
Farmland area	Paddy rice 11.5 ha (KHN pesticides-free type rice) Field vegetables 50a
Machinery and equipment	2 tractors, 2 combine harvesters, 2 rice trans planters, 1 weeder, 4 dryers, etc.

Process of management development and technology learning

Management development:

- The year after incorporation, partial conversion from special cultivation rice to KHN rice (pesticides-free and -reduced), followed by gradual conversion; by 2022, the entire area will be converted to KHN rice.

=>Because KHN rice has a higher unit price.

=>One of the reasons for the pesticide-free type was to apply for the city's challenge program.

- In FY2023, operating profit was positive for the first time since incorporation.
- In FY2023, the pesticide-free and pesticide-reduced types of KHN rice were each 5.5 ha, but in FY2024 the entire area is converted to pesticide-free.

Technology learning

- The pesticide-free type received technical guidance within the above-mentioned program of the city.

- The city's program was an opportunity to start KHN rice, which has since become established.
- The conversion process of specially cultivated rice => KHN rice (pesticides-reduced and pesticides-free) => KHN rice (pesticides-free) has been followed to achieve management development.

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Nagasaki-Nanbu Production Cooperative (NNPC)

- In 1975, the company was established as the Nanbu Vegetable Production Association (5 members) with the aim of direct delivery from the production area, and was incorporated in 1991.
- The area includes Minamishimabara City, Shimabara City, and Unzen City, Nagasaki Prefecture.

- Collect and sell 35 items, mainly vegetables (FY2024)
- Onions and potatoes are the only items certified as JAS organic in FY2024.
- All other items are produced under special cultivation standards.

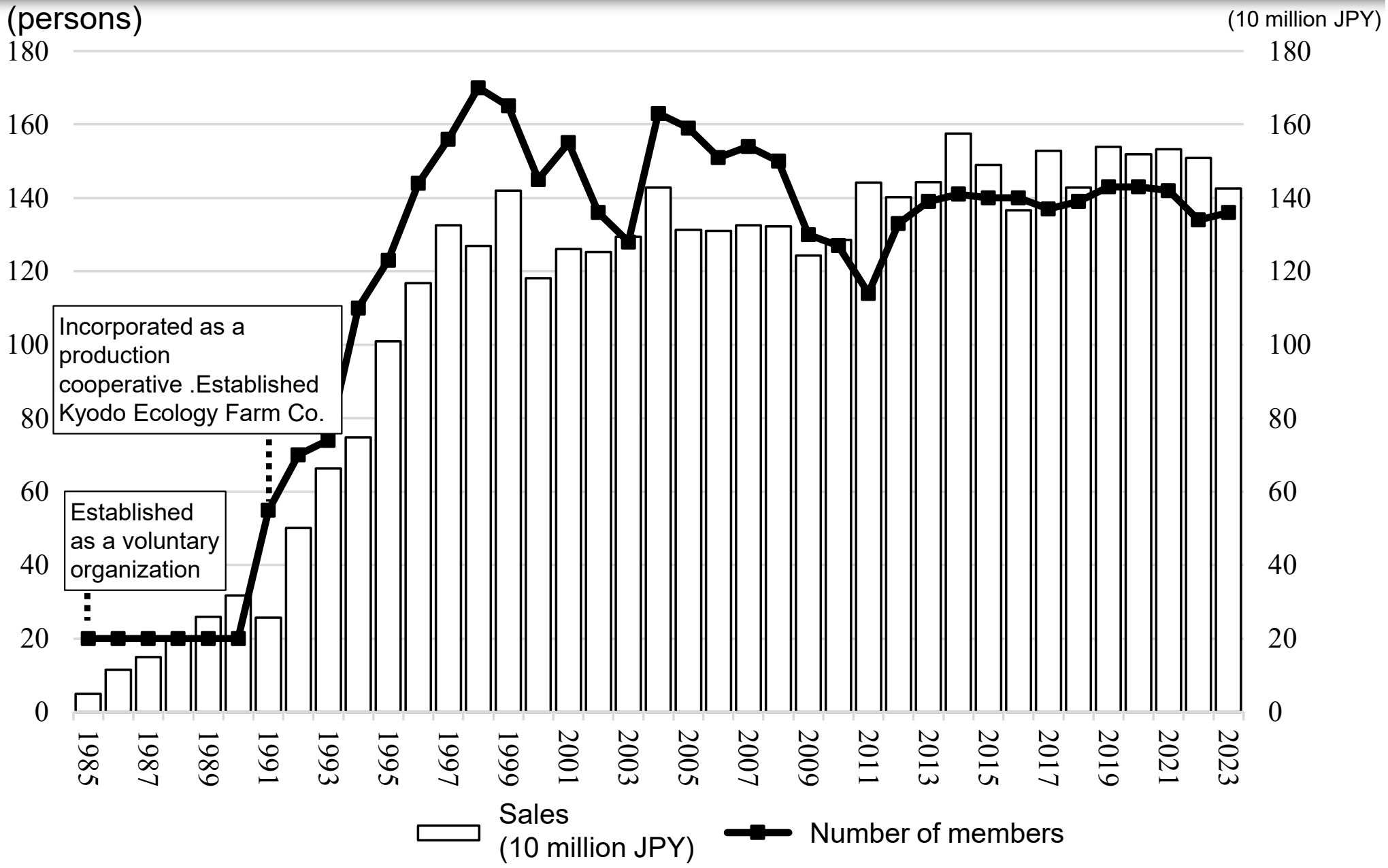
- Sales in FY2023 were 1.4 billion yen, with co-ops accounting for 76% of sales, and co-op direct sales enabling farmers to realize prices that allow them to reproduce.
- The survey focuses on onions and cherry tomatoes, which are the higher ranks in sales, and the farmers producing these products.
  - Onions and cherry tomatoes have occupied first and second place since 2016

NNPC cultivation techniques (special cultivation)

	Onions		Cherry tomatoes	
	Nitrogen content of chemical fertilizers (kg/10a)	Number of times pesticides used	Nitrogen content of chemical fertilizers (kg/10a)	Number of times pesticides used
Nagasaki prefecture conventional level	24kg	16 times	39kg	56 times
NNPC's level	12 kg or less	8 times or less	15kg or less	20 times or less

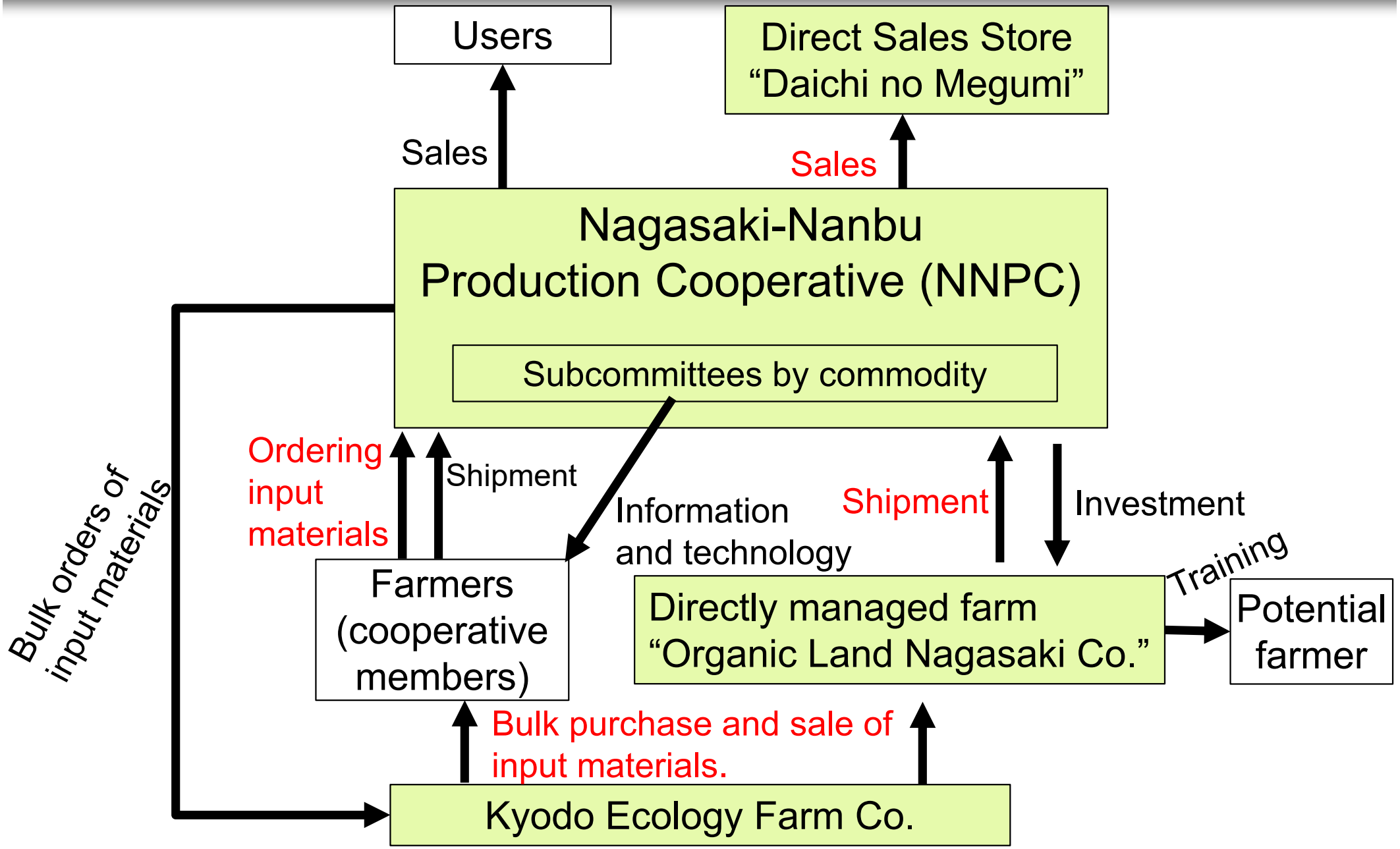
- Distribute materials on cultivation and pest management plans at the general meeting of the subcommittees by commodity.
- Information on pesticides, such as target pests, available pesticides, number of ingredients, and RAC codes.

NNPC's number of members and sales



- Number of members and sales remained stable

NNPC's Relevant Actors



Note: the green shading in the figure shows the NNPC’s group companies.

Development Process

Year	Events
1975	Nanbu Vegetable Production Association (production and sales) and Nankou fruit tree research group (technical research) is established.
1984	Business transactions begin with Japan Consumers Cooperative Association Kyushu Branch, Consumers Cooperative Society Kagoshima, and Maruetsu (supermarket).
1985	Nanbu Vegetable Production Association and Nankou Fruit Tree Research Group join forces to form the voluntary organization “Nagasaki-Nanbu Production Cooperative (NNPC)”. Start transactions with six Co-ops in Kyushu region, Daichi wo Mamoru Kai and others.
1991	NNPC was incorporated as a production cooperative. Kyodo Ecology Farm Co. was established as a group company.
1999	Conducted open mock audit. Started transactions with Osaka PAL Co-op, Kyoto Co-op, and Kansai Yotsuba Communion.
2005	Direct Sales Store “Daichi no Megumi” was opened in Isahaya City.
2012	Directly managed farm “Organic Land Nagasaki Co., Ronshobaru” was opened.
2015	Directly managed farm “Organic Land Nagasaki Co., Isahaya reclamation” was opened.

Source: author using the material provided by Nagasaki-Nanbu Production Cooperative.

Nagasaki-Nanbu Production Cooperative (NNPC)'s relationship with its members.

- There are four types of members: full members, associate members, successors and contract members, and all types are required to register their plots if they ship to NNPC.
- Eligibility requirements for full members include an admission fee (500,000 JPY), capital contribution (two units of 100,000 JPY or more), a basic agreement and a membership period of at least three years.

- The sales commission rate varies annually in the range of 4-7%, depending on participation in the cooperative's operations. The commission rate is determined after a self-assessment by each member based on a checklist and an assessment by the branch manager assigned to each administrative district and the director in charge of NNPC.

- Maintain and achieve stable and high unit price purchases through continuous expansion of transactions directly from the production area, mainly Co-ops.

Overview of Group Companies

Kyodo Ecology Farm Co.

- Group company responsible for purchasing input materials
- Sales (FY2023) were approximately 240 million yen, with fertilizer (23.6%) and seeds/seedlings (22.1%) accounting for the largest share of sales.

Directly managed farm “Organic Land Nagasaki Co.”:

- The farm is managed directly by NNPC and, in addition to growing low-volume items and experimental items that are expected to be in demand, it also plays a technical training role by hosting potential farmers and interns.

Direct Sales Store “Daichi no Megumi”

- It is a direct sales outlet and its products are mainly organic and specially cultivated agricultural products.
- One of the cooperative members' shipping destinations.

Surveyed Farm Management: Corporation C

	Corporation C
Survey subjects (age)	Owner (44)
Age at start of farming (and at become a farm owner)	18 (39)
Background to farming	Graduated from an agricultural high school, and then, started farming.
Ways to become owner	Succeeded to the family business
Family work force	3 (owner, mother and wife)
Number of employees	3 permanent employees and 10 trainees
Farmland area	Large tomatoes: 80a (all areas specially cultivated) Cherry tomatoes: 80 a (all areas are specially planted) Okra: 50 a (all areas specially cultivated) (Rice for private use)
Input materials	All purchased through NNPC
Sales channels	All sales to NNPC
Notes	The previous owner was a member of the cooperative and started to engage in special cultivation around 1994. Incorporated in 2006.

Process of management development and technology learning

Management development:

- Since the previous owner joined NNPC around 1994, all agricultural products have been shipped to the NNPC and production materials have also been procured via the cooperative.
- The area planted to tomatoes was increased in 2021, but the following year the farm returned to its current scale, partly because it was unable to secure technical trainees under covid-19.
- There are extra greenhouses, but no plans to increase the scale due to labour constraints.
- One new full-time employee was hired from 2022, bringing the current three-employee workforce.

Technology learning

- Learned from the previous owner.
- Learning through training by the commodity subcommittees.

Surveyed Farm Management: Individual Farm D

	Farm D
Survey subjects (age)	Successor (30)
Age at start of farming	18 (to be succeeded soon)
Background to farming	Graduated from an agricultural high school, and then, started farming.
Family work force	3 (owner, father and grandmother).
Number of employees	3-5 part-timers
Farmland area	Onions: 4.3 ha (all areas specially cultivated) Broccoli: 60 (all areas specially cultivated) Pumpkin: 60 (all areas specially cultivated) (Rice for private use)
Input materials	All purchased through NNPC
Sales channels	All sales to NNPC
Notes	Plans to succeed to the management from the previous owner (father) in the near future. The previous owner was a member of the cooperative and has been involved in special cultivation since around 1984.

Process of management development and technology learning

Management development:

- Recent sales are approximately 30 million JPY.
- Expanding scale through farmland consolidation and converting from other crops to onions.
- Organic JAS onions were grown until a few years ago, but there was a year when a serious disease occurred and had to be controlled, so it was changed to special cultivation. No plans for organic JAS in the future.

Technology learning

- Learned from the previous owner.
- Learning through training by the commodity subcommittees.

- In these two farms, after graduating from the local agricultural high school, the farmers participated in the management of their predecessors and learned the techniques.
- The management was stable due to the high unit purchase price of NNPC and the low-cost purchase of input materials, so the succession of the management progressed (including plans).

Surveyed Farm Management: Individual Farm E

	Farm E
Survey subjects (age)	Owner (50)
Background to farming	Moved to the area after working in self-employment and sales other than farming. Started farming after two years of training.
Age at start of farming	45
Ways to become owner	New farmer
Family work force	2 (owner, wife)
Number of employees	1 part-time and 2 trainees
Farmland area	Large tomatoes: 10a (all areas specially cultivated) Cherry tomatoes: 30a (all areas specially cultivated) Snap peas: 20a (all areas specially cultivated) Sweet potatoes: 30a (conventional cultivation) (Rice for private use)
Input materials	All purchased through NNPC
Sales channels	All specially cultivated products sales to NNPC

Process of management development and technology learning

Management development:

- After training on NNPC's directly managed farm and with a cooperative member, he became a new farmer.
- In the first year of farming, he started special cultivation and at the same time became a member of the cooperative.
- He added one greenhouse every year.
- In his first year of independent farming, he also shipped outside NNPC, but NNPC had high and stable prices, so he decided to ship all his produce to NNPC from the second year.
- He achieved a high unit yield among the cooperative members and received an award from the cooperative.

Technology learning

- Learning through training by the commodity subcommittees. Refer to advanced farmers across the country.

- Improved land productivity due to NNPC's high and stable unit price, enabling even small-scale farmers to establish management.
- Business model suitable for new farmers.

Summary: For promoting environmentally friendly agriculture in the local area.

Kohnotori-hagukumu Nouhou (KHN) Rice (government-led type)

- Conversion process: specially cultivated rice => KHN rice (pesticide-reduced type) => pesticide-free type => Organic JAS.
- Management development is achieved by shifting to more profitable cultivation methods.
- The conversion was triggered by the purchase of rice at high unit prices by Japan agricultural cooperatives (JA), support programs from the government, etc.

➢ Establishment of regional brands and enhancement of brand power by relevant actors.
➢ Improvement of technical skills and networking as a region through training sessions of producer group.

Nagasaki-Nanbu Production Cooperative (endogenous type)

- Stabilization of management through production support by the production cooperative (high unit price purchase, bulk procurement of input materials) and technical support by the commodity sum-committees.
- Management succession progresses within the local area and new farmers take up farming.

➢ Developing sales channels and realizing high unit prices on the strength of regionally combined initiatives.
➢ Human networking through commodity sub-committees.