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KEO Discussion Paper No. 198

From Paddy to Port:
The Role of Northwestern Korean Rice Cultivation in Interwar Japan

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Howard Kahm

From Paddy to Port:
The Role of Northwestern Korean Rice Cultivation in Interwar Japan*

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February 2026

Abstract

This paper examines the expansion of rice cultivation in northwestern Korea during the interwar period and its role in supplying food to Japan. The Policy to Increase Rice Production (PIRP) implemented by the Governor-General of Korea (GGK) had a significant impact in addressing food shortages and unstable rice prices in the Japanese market. As Korean rice production increased significantly, the northern regions experienced rapid growth in both paddy cultivation area and production yields, thus surpassing the traditionally dominant southern provinces. The introduction and expansion of irrigation and Japanese rice breeds propelled the transformation of land productivity, particularly in Hwanghae province. High-yield rice varieties, such as Rikuu No. 132 and Fukubōzu, further boosted production, allowing northwestern Korea to become a significant rice supplier. The expansion of sea routes complemented increased production by facilitating Korean rice exports to Japan, particularly to Osaka and Tokyo. However, Korean rice faced increasing competition from Taiwanese Hōrai rice, which had lower production costs and thus gained popularity among Tokyo customers. By the mid-1930s, Taiwanese rice exports to Japan outpaced Korean rice, again altering the dynamics of the colonial rice trade and the metropolitan economy.

Keywords: colonial Korea, imperial Japan, rice, Tokyo, Taiwan
JEL classification codes: N45, N75, N55

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1. Introduction

In the summer of 2024, record high temperatures in Japan devastated the *koshihikari* rice harvest as the scorching heat turned the rice grains brittle and cloudy. In the postwar period, Japan has long protected its domestic rice producers from foreign imports for various reasons, including national identity as well as food security. However, the implicit bargain of protectionism has required rural farmers to produce enough rice to satisfy domestic demand. When the *koshihikari* rice harvest failed in 2024, panic buying and hoarding led to widespread shortages that required the Japanese government to release stocks from its strategic rice reserves in March 2025. In addition, the Japanese government allowed the import of Korean rice to address high rice prices for the first time in twenty-five years (Davis and Ueno 2024; Ohnuki-Tierney 1993, 1995; Notoya and Zhuang 2025; Yoon and Ueno 2025).

While Korean rice exports to Japan in contemporary times is a rare phenomenon, they were an important feature of Korean-Japanese trade in the early twentieth-century. Over a hundred years ago, imperial Japan depended on imported rice to meet its dietary and economic needs during the interwar period from 1918 to 1936. Following the rice riots (*Kome Sōdo* 米騒動) from July to September 1918, the government promoted rice production in the Japanese colonies of Korea and Taiwan to increase domestic supply and bring down prices. The resultant Program to Increase Rice Production (PIRP, *Sanmai Zōshoku Keikaku* 産米増殖計画) expanded rice cultivation while increasing land productivity throughout colonial Korea. While much of the existing research has focused on the fertile southern half of the peninsula, fewer scholars have addressed the history of rice production in the northwestern provinces.

In the existing historiography of the Japanese Empire, previous studies have covered in detail the influence of the metropolitan Japanese economy on the Korean periphery through a Japan-centered approach to Japanese imperialism. In many cases, authors have posited the unidirectional dissemination of concepts, institutions, and products as a fundamental characteristic of Japan's influence over its Korean colony. More recently, new scholarship has questioned this top-down narrative to posit the simultaneous and conjunctural development of Japanese modernization and empire-building both through and from its colonies into the metropolitan core. Schmid (2000) was one of the first scholars to critique this "Korea problem" in Japanese imperialist historiography to highlight the importance of colonies in constituting the empire. Morris-Suzuki (1998)

examined colonial citizenship in South Sakhalin (Karafuto) and exposed the hierarchy of power and citizenship between Sakhalin natives, Japanese, Koreans, and Taiwanese. Ching (2001) described identity formation in colonial Taiwan, as well as Japanese-ness itself, was formed within the triangular relationship between imperial Japan, colonial Taiwan, and Nationalist China. Young (1998) detailed Manchukuo's impact on Japan through "total imperialism" whereby Japanese control of the Manchurian region created a complex network of connections between the Japanese metropole and the Manchurian periphery. Kushner (2012) examined how Japanese control of Taiwan reversed sugar consumption trends in Japan, which had previously been running lower in Japan than Europe until the turn of the twentieth century.

In the realm of rice, many scholars have maintained a Japan-centered focus on both production and consumption that has largely excluded the colonial milieu (Verschuer and Cobcraft, 2016; Ohnuki-Tierney 1993). In her examination of food policy, Francks (1998, 2003, 2007) states that Japanese pursuit of "self-sufficiency" was conditioned by industrial interests as well as changing consumption patterns among more 'urban' consumers. Ōmameuda (2007) has shown how Japanese rice consumption expanded significantly from 1890 to 1920 and then plateaued until the end of the 1930's. Cwiertka (2002) focuses on how military nutrition in Imperial Army and Navy military diets in wartime Japan enabled the dietary transformation of modern Japan, but mainly as a phenomenon defined solely within the Japanese metropole. Hara (1998) is emblematic of scholarship that assumes colonial Korea within the metropole's economy and considers rice produced in colonial Korea to be defined as "Japanese" rice. Schaede (1989) examined the Osaka Dōjima rice exchange as a marker of the development of modern finance, but its importance is limited to the realm of "Japanese" economic development.

Within this context, this article examines the end-to-end relationships of rice production, distribution, and consumption between colonial Korea and imperial Japan, particularly focusing on the connection between northwestern Korea and the Tokyo market. The transformation of Korean production with the inputs of irrigation, fertilizers, seed, and colonial labor is generally well understood, but the growth of northwestern Korean production was dependent on the introduction of particular superior rice breeds suited for the northern climate. Rice from southern Korea had long been sold into the Osaka market, but the Great Kantō Earthquake of 1923 and the particular characteristics of northwestern Korean rice enabled its penetration into the Tokyo rice market. However, increased competition from cheaper Taiwanese pushed out northwestern Korean rice as pricing

proved to be the decisive factor for Japanese rice retailers and consumers. Consequently, the entire journey of Korean rice all the way from the production decisions of the landlord and tenant in Korea to the end consumer in Japan with all the intermediate steps in between were affected by imperialism, capitalism, and consumer taste.

2. The Historical Background of Korean Rice Production

Korean rice production has historically been centered in the warmer and more fertile southern provinces of Kyŏnggi, North Ch'ungch'ŏng, South Ch'ungch'ŏng, North Chŏlla, South Chŏlla, North Kyŏngsang, and South Kyŏngsang provinces. At the end of the 1910s, the southern region held 75 percent and 80 percent of Korean rice production area and volume, respectively. After the annexation of Korea in 1910, Japanese exploitation of Korean agricultural production resulted in a significant increase in land productivity for rice production during the interwar period.

According to the three-year averages of rice production from 1918–20 and 1934–36, production volume grew substantially by 26 percent, while the rice paddy area expanded slightly by 8 percent (see Fig. A.1). This indicates that production volume outpaced the growth of cultivated areas as a result of improvements in land productivity. While Korea's overall role as a key food supplier for the Japanese Empire was solidified, southern Korea emerged as a significant rice-producing region within the empire.

However, by the mid-1930s, the southern region accounted for 71 percent of the rice production area and 70 percent of the production volume (see Fig. A.2). The decline in the relative weight of the southern region was due to the expansion of production in the northern provinces, as a result of policies implemented by the Governor-General of Korea (GGK) to enhance rice production. An impetus of these changes were the rice riots (*kome sōdō*) which occurred from July to September 1918, due to soaring rice prices during World War I.

The situation escalated into nationwide unrest, prompting the Japanese government to deploy military forces to suppress the turmoil (Totman 2005: 371). In response, the government established the Special Investigation Committee on the National Economy (Rinji Kokumin Keizai Chōsakai 臨時国民経済調査会) in 1918. Comprised of Diet members, bureaucrats, business leaders, and scholars, the committee aimed to stabilize Japan's economy and the livelihoods of the civilian populace (NAJ 1918a). The committee urged the government to promote rice production in its colonies, particularly

Korea and Taiwan, to ensure a stable supply of colonial rice (NAJ 1918b: 33–34). Acting on these recommendations, the GGK introduced the PIRP in Korea (Peattie 1998: 256).

Between 1920 and 1925, the GGK pursued two main objectives: expanding rice paddies and increasing land productivity. To achieve the first goal, it provided subsidies to landowners for reclaiming wilderness and dry beaches. To enhance productivity, the GGK implemented two key measures. First, it encouraged landowners to form associations to secure funding for irrigation infrastructure. Second, experimental farms imported various Japanese rice strains to assess their adaptability to Korea's climate and soil conditions (Governor-General of Korea 1922b: 6–10). In 1926, the GGK revised the PIRP and continued these initiatives under the second PIRP (Governor-General of Korea 1926c: 2). The PIRP forced Korean farmers to increase their workload, resulting in negative effects on Korean society. As a result, many tenant-landlord conflicts occurred between 1920 and 1932 (Shin 1996).

The global economic downturn triggered by the Great Depression in 1929, followed by the Showa Depression in 1930, led to a sharp decline in rice prices. Consequently, Japan's Ministry of Agriculture and Forestry ordered the GGK to halt the PIRP to prevent further price drops in Japan (Governor-General of Korea, Bureau of Agriculture and Forestry 1933: 2). In 1932, the GGK suspended the PIRP. Nevertheless, the first and second PIRPs had already strengthened Korea's rice supply capacity, particularly in the northern provinces.

To assess the outcomes of the PIRP, Fig. 1 presents the growth rates of rice production volume and paddy area from 1918–1920 to 1932–1934. The expansion of rice paddies varied between northern and southern Korea. The six northern provinces saw a 24 percent increase in rice paddies, whereas the southern seven provinces experienced only a 3 percent rise. A similar regional disparity is evident in production volume: northern provinces recorded an 86 percent increase, while southern provinces grew by just 10 percent. The northwestern provinces—Hwanghae, South P'yŏngan, and North P'yŏngan—saw their production volumes soar by 72 percent, 98 percent, and 143 percent, respectively (see Map A.1). As a result, the share of these provinces in Korea's total rice production rose to 21 percent following the PIRP (see Fig. A.2).

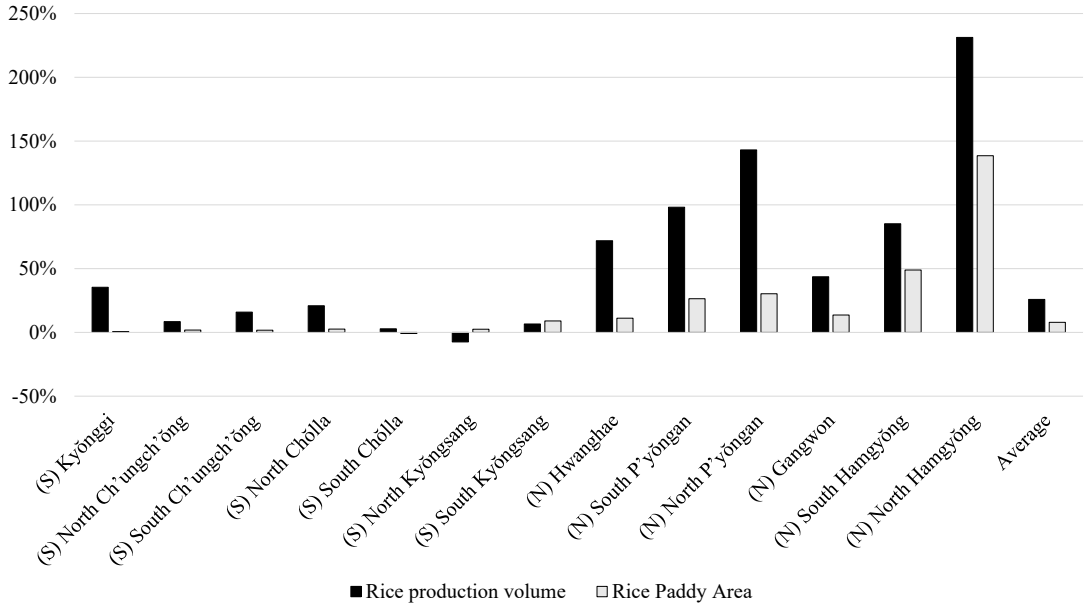

Fig. 1 Growth rates of rice production volume and paddy area, 1918–36

Notes: This figure shows the growth rates of rice production volume and paddy area from 1918–20 to 1934–36. (S) and (N) denote southern and northern Korea, respectively.

Sources: Governor-General of Korea 1919: 126–29, 1920: 110–11, 1921: 6–7, 1935a: 74, 1936a: 74, 1937a: 74.

The expansion of rice cultivation in Korea was driven by two key factors: the increase in rice paddy area and improvements in land productivity. The latter played a particularly crucial role, as higher productivity led to greater output despite limited land expansion (see Fig. 1). During the PIRP, the GGK prioritized irrigation infrastructure and the introduction of Japanese rice strains, particularly in northwestern Korea, to enhance land productivity. The following sections examine these two measures in greater detail.

3. Expansion of Irrigation in Korea

In 1917, Korea's irrigation ratio was only 21 percent (see Fig. A.3). Before the PIRP, Korean agriculture primarily relied on rain-fed cultivation. However, the PIRP brought about a significant transformation, increasing the irrigation ratio to 70 percent by the mid-1930s. The expansion of irrigation facilities varied across provinces, with northern Korea experiencing the most significant growth. From the late 1910s to the mid-1930s, the irrigation ratios in the northern provinces increased by more than 50 percent, while in the southern provinces, the increase remained below 50 percent. Notably, Hwanghae province,

which had the largest rice production area and output in northern Korea, saw its irrigated land expand rapidly, with its irrigation ratio rising by 66 percent.

The Korean Peninsula has four extensive plains, each covering more than 300 square kilometers (74,000 acres). Hwanghae province contains two of these: the Chaeryŏng Plain, the second-largest, spanning approximately 450 square kilometers (111,000 acres), and the Yŏnbaek Plain, the fourth-largest, covering around 370 square kilometers (91,000 acres). Together, these plains account for one-quarter of Hwanghae province's total land area. Additionally, South P'yŏngan province is home to the P'yŏngyang Plain, the third-largest, covering about 430 square kilometers (106,000 acres), while the Anju Plain, which extends across South P'yŏngan province and North P'yŏngan province, spans approximately 220 square kilometers (54,000 acres) (Hidaka 1924: 15–16). These northwestern provinces were well-suited for large-scale irrigation projects, and their geography was effectively leveraged to expand irrigated rice paddies. Hwanghae province, in particular, dramatically increased its irrigation ratio during the PIRP.

The Hwanghae provincial government prioritized irrigation infrastructure development and actively encouraged landowners to establish irrigation associations (Hwanghae Provincial Government 1927: 99). Between 1922 and 1938, these associations were responsible for constructing 96 percent of Korea's irrigated rice paddies (Governor-General of Korea, Bureau of Agriculture and Forestry 1940b: 2–3). By March 1939, there were 189 irrigation associations across Korea, varying in size by province. In the northern provinces, the associations were generally larger, with each managing over 1,000 hectares of irrigated land. In Hwanghae province, the average irrigated area per association was particularly large, at 4,211 hectares, due to the presence of several massive associations (see Fig. A.4).

Hwanghae province had eleven irrigation associations, three of which managed over 10,000 hectares each (Governor-General of Korea, Bureau of Agriculture and Forestry 1940b: 10–23). The largest of these, the Hwanghae Irrigation Association (Kōkai Suiri Kumiai 黄海水利組合), was founded in 1929 by eighty-six landowners in the Yŏnbaek plain. The association financed its irrigation projects through membership dues, subsidies from the GGK, and loans from the Chōsen Industrial Bank (Chōsen Shokusan Ginkō 朝鮮殖産銀行) (Hwanghae Irrigation Association 1939: 2). Between April 1929 and March 1934, these sources accounted for 0.1 percent, 16.9 percent, and 81.8 percent of total revenue, respectively. The Korean Industrial Bank, a government-affiliated financial institution, played a crucial role in funding irrigation construction (Chōsen

Industrial Bank 1938: 115–28). By forming irrigation associations, landowners improved their creditworthiness and successfully secured substantial loans. Construction of reservoirs and irrigation canals began in 1931 (Hwanghae Irrigation Association 1939: 2–8). The large irrigation associations, exemplified by the Hwanghae Irrigation Association, significantly expanded irrigated rice paddies and enhanced land productivity across the vast northwestern plains.

4. Transplantation of "Superior Breeds"

4.1. Compulsory Naturalization of Japanese Rice Breeds in Korea

Korea and Japan both lie in the temperate zone and cultivate the japonica rice breed, which meant that Korea was able to transplant Japanese rice breeds. The GGK promoted this transplantation and rigorously selected specific breeds suited to the Korean climate and soil conditions. These selected Japanese breeds were referred to as "superior breeds" (yūryō hinshu 優良品種) (Hishimoto 1938: 138–39). The introduction of these superior breeds enabled Korean farmers to increase their harvest per unit area.

From 1920–22 to 1933–35, the three-year average rice yield per hectare increased by 8 percent (see fig. A.5). This increase resulted from the expansion of rice paddies planted with superior breeds. The three-year average yield of superior breeds per hectare was 10.8 *koku*, compared to 8.7 *koku* for standard breeds in 1933–35. In other words, superior breeds produced 24 percent higher yields per hectare than standard breeds. Furthermore, the proportion of rice paddies planted with superior breeds increased from 60 percent to 79 percent between the early 1920s and the mid-1930s. As a result, the three-year average difference in rice yield per hectare between superior breeds and all breeds decreased from 1.2 *koku* to 0.4 *koku* as Korean farmers replaced standard breeds with superior ones. During the PIRP, the northwestern region was particularly active in adopting superior breeds.

In contrast, the southern region had already been cultivating superior breeds before the PIRP. Between 1920 and 1921, the two-year average proportion of rice paddies planted with superior breeds in the southern provinces was 72 percent, while in the northern provinces, it was only 20 percent (see fig. A.6).[1] Consequently, the southern provinces had limited opportunities to introduce superior breeds after the 1920s, increasing their proportion by only 12 percent, reaching 84 percent by the late 1930s. By contrast, the

northern provinces had significant room for adopting superior breeds in the early years of the PIRP and actively replaced standard breeds throughout the 1920s. As a result, their proportion of superior breeds in total rice paddies increased dramatically by 63 percent, reaching 83 percent. The PIRP thus transformed the northern provinces into key production areas for superior rice breeds.

The superior breeds were divided into more than ten species, and their composition changed over time during the PIRP. During the 1920s, three superior species—Hayashinriki, Kokuryōmiyako, and Tamanishiki —were dominant. Their respective shares in the total production of superior breeds from 1920 to 1924 were 25 percent, 31 percent, and 16 percent (see fig. A.7). However, by the early 1930s, new superior species had emerged, gaining prominence while the old superior species declined in share. The new superior species primarily included Fukubōzu, Ginbōzu, Akashinriki, and Rikuu No. 132. From 1934 to 1938, their respective shares were 2 percent, 31 percent, 4 percent, and 14 percent, while the shares of the old superior species declined to 0.3 percent, 24 percent, and 7 percent, respectively.

Following GGK recommendations, Korean farmers selected superior breeds based on various desired traits, such as yield, grain quality, disease resistance, and adaptability to heavy fertilizer use. The following section compares the cultivated superior breeds in the three northwestern provinces, which actively adopted superior varieties, with those in the three southern provinces—South Ch'ungch'ŏng, South Chŏlla, and North Kyŏngsang—where superior breeds had been traditionally grown.

4.2. Replacement of Superior Rice Breeds in the Northwestern Provinces

The Korean Peninsula spans approximately 600 kilometers (370 miles) from north to south, resulting in diverse climatic conditions. The northern region experiences a colder, drier climate, whereas the southern region has a more temperate and humid climate. According to GGK meteorological data from 1931 to 1935, the average annual temperature in Sinŭiju, North P'yŏngan province, near the Manchurian border, was 8.6°C (47.5°F), with 97.2 days of precipitation. In contrast, Mokp'o, South Chŏlla province, at the southern edge of the peninsula, had an average annual temperature of 13.1°C (55.6°F) and 129.6 days of precipitation (Governor-General of Korea, Weather Observation Station 1936: 1–3; see map A.1). These climatic differences influenced the selection of superior rice species across provinces, resulting in significant regional variation.

During the 1920s, the three northwestern provinces primarily cultivated the Hinode rice variety (see fig. A.8). Meanwhile, the three southern provinces mainly grew Hayashinriki, Kokuryōmiyako, and Tamanishiki. There were some exceptions, such as South Chŏlla province, which uniquely cultivated Omachi, and North P'yŏngan province, where Kamenoo was widely grown. However, most of these provinces significantly altered their cultivated rice species during the 1930s.

By the 1930s, both the northwestern and southern provinces—except for North Kyŏngsang—had replaced their cultivated species. In the northwest, South P'yŏngan province and North P'yŏngan province primarily cultivated Rikuu No. 132, while Hwanghae province grew four new superior species: Fukubōzu, Ginbōzu, Akashinriki, and Rikuu No. 132. In the southern region, South Ch'ungch'ŏng and South Chŏlla mainly cultivated Ginbōzu, whereas North Kyŏngsang continued growing Kokuryōmiyako. Overall, Fukubōzu, Rikuu No. 132, and Ginbōzu became the dominant varieties in both regions, as they adapted well to heavy fertilization (Izumi 1936b: 35).

During this period, Korean farmers rapidly increased their use of chemical fertilizers. Fertilizer consumption, which stood at 21,000 tons in 1925, surged to 174,000 tons in 1930 and exceeded 500,000 tons by 1938 (see fig. A.9). Until the 1920s, most Korean farmers relied on self-produced fertilizers. However, with the expansion of Korea's chemical fertilizer industry in the 1930s, farmers increasingly purchased commercial fertilizers. The Nihon Chisso Corporation, one of Japan's largest fertilizer manufacturers, established its Korean subsidiary, Chōsen Chisso Corporation, in 1927. Chōsen Chisso constructed factories in South Hamgyŏng province and began producing chemical fertilizers—such as ammonium sulfate and superphosphate of lime—in 1930. By 1939, the company's production capacity reached 500,000 tons of ammonium sulfate and 50,000 tons of superphosphate of lime (Nihon chisso 1940: 74–78). This expansion drove the widespread use of chemical fertilizers in Korean rice cultivation, compelling farmers to adopt rice varieties better suited to heavy fertilizer usage.

From 1931 to 1938, the average yields of Fukubōzu and Rikuu No. 132 per hectare were over 15 *koku*, while those of the old superior species, Hinode and Kamenoo, were less than 12 *koku* (see fig. A.9). Among the new superior species, Ginbōzu was lower in land productivity. Its average yield per hectare was 13 *koku*. Nevertheless, even Ginbōzu was higher than the old superior species, consisting of Hayashinriki, Kokuryomiyako, Tamanishiki, and Omachi, whose average yields were 9 *koku*, 12 *koku*, 11 *koku*, and 10 *koku*, respectively. There were differences in land productivity among species, and Korean

farmers selected various species with various objectives.

Many Korean farmers in the northwestern provinces tended to emphasize yields and selected Fukubōzu and Rikuu No. 132. The agricultural experimental stations in Yamagata and Akita prefectures in Japan had developed these two new superior species that were transplantable to northern Korea, as these prefectures were at the same latitude and had the same climate conditions as northern Korea. (see map A.2). Therefore, Fukubōzu and Rikuu No. 132 were suitable for rice cultivation in northwestern Korea (Izumi 1936a: 35; Izumi 1936c: 22–24). In contrast to these provinces, the farmers in South Ch'ungch'ŏng and South Chŏlla preferred quality over yield, because quality often correlated with sale price, and chose high-quality Ginbōzu to grow. (Izumi 1936b: 27). Some farmers in Hwanghae province grew Akashinriki, which was lower in land productivity than the older species but could better tolerate salty soil (Izumi 1936a: 30–31). During the PIRP, Hwanghae province expanded its rice paddies by bay reclamation, and some new rice paddies had salty soil.

The northwestern provinces rapidly constructed irrigation facilities after the 1920s and planted new superior species characterized by high yields after the 1930s. Consequently, northwestern Korea became one of the significant areas producing superior rice breeds. At the beginning of the 1920s, southern Korea cropped more than 90 percent of the superior rice breeds (see fig. A.11). In comparison, northwestern Korea occupied only 5 percent of the composition ratio in superior rice production volume. However, in the mid-1930s, its composition ratio increased to 20 percent, while the composition ratio of the southern provinces decreased to about 70 percent. During the same period, the individual northwestern provinces almost equaled the individual southern provinces in the composition ratio. The composition ratios of each northwestern province reached about 7 percent, while those of each southern province plunged to 10 percent, which was due to the increase in land productivity in the northwestern provinces from the alteration of agricultural facilities and the adoption of superior breeds.

5. Northwestern Korea as a Major Rice Source

Fig. 2 examines the land productivity of rice cultivation in each province and its changes from the end of the 1910s to the mid-1930s.

At the end of the 1910s, before the implementation of the PIRP, there was a clear difference in land productivity between the southern and northern provinces. The southern

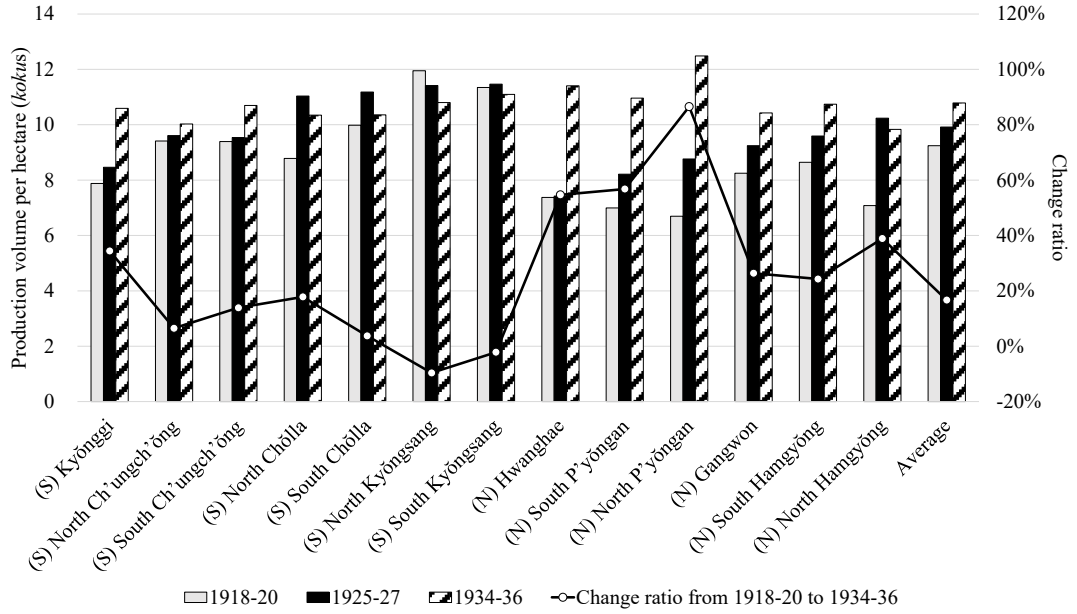

Fig. 2 Land productivity of Korean rice cultivation, 1918–36

Notes: The bar charts show the three-year average rice production volume per hectare in 1918–20, 1925–27, and 1934–36. The line chart draws the change ratios of the three-year average rice production volume from 1918–20 to 1934–36. (S) and (N) denote southern and northern Korea, respectively.

Sources: Governor-General of Korea 1919: 126–29, 1920: 110–11, 1921: 6–7, 1926a: 87–88, 1928a: 89, 1929a: 87–88, 1935a: 74, 1936a: 74, 1937a: 74.

provinces had higher rice production per hectare than the northern provinces. Notably, the three northwestern provinces—Hwanghae province, South P'yŏngan province, and North P'yŏngan province—produced approximately 7 *koku* per hectare, while most southern provinces exceeded 9 *koku*. Before the PIRP, these northwestern provinces played only a minor role in Korea's rice production.

However, after the late 1920s, land productivity in the northwestern provinces increased significantly due to three key factors: the construction of irrigation facilities, the transplantation of superior rice breeds from Japan, and the replacement of older superior species with newer, more productive varieties. As a result, these provinces dramatically improved their land productivity, with rice yields per hectare increasing by more than 50 percent from the late 1910s to the mid-1930s. The PIRP thus transformed the northwestern provinces into major rice-producing regions in Korea. After the late 1920s, these provinces also expanded their exports of Korean rice to Japan.

6. Sea Route Expansion and Korean Rice Exports

6.1. Sea routes between Korea and Japan

Overseas shipping routes have connected Korea and Japan since the 1870s. The Yūbin Kisen Mitsubishi Corporation established the first regular line between the two countries in 1876, departing from Nagasaki, the westernmost city in Japan, and arriving in Pusan, the southernmost city in Korea (Nippon yūsen 1935: 12; maps A.1 and 2). In 1880, the Sumitomo Company also inaugurated a regular service between Osaka in Japan and Pusan (Osaka shōsen 1934: 50). During the 1880s, many Japanese shipping lines merged, leading to the establishment of OSK Line (Osaka Shōsen 大阪商船) in 1884 and NYK Line (Nippon Yūsen 日本郵船) in 1885 as the two major shipping corporations.

Japanese shipping lines expanded their sea route networks between Korea and Japan, but they designated only western Japanese cities, such as Osaka and Kobe, as their starting ports. This decision was based on proximity, as these cities were closer to the Korean Peninsula than eastern Japanese cities like Tokyo and Yokohama (Nippon yūsen 1935: 86, 508; Osaka Shosen 1926: 11–17, 21; map A.2). As a result, Osaka, Japan's second-largest city, became a hub for distributing Korean commodities as early as the 1880s and began importing Korean rice in the early 1890s. At that time, Korean rice contained inedible contaminants, such as small stones and sand, due to the crude threshing methods used by Korean farmers. These impurities risked damaging the milling machines used by rice retailers in Japan. Consequently, specialized retailers equipped with machines to remove contaminants emerged in Osaka and played a key role in the Korean rice trade (AFFRC 1939: 1–3). Korean rice trading in Japan expanded further after 1910 when Japan annexed Korea as a colony.

CYK Line (Chōsen Yūsen 朝鮮郵船) was established in 1912 and subsidized by the GGK to operate and maintain domestic and middle-distance routes between Korea and Japan (Chōsen yūsen 1937: 6–32). However, even in the 1910s, no regular shipping routes existed between Korea and eastern Japan, resulting in only a limited amount of Korean rice being imported to Tokyo (Korean Rice Association 1934: 18–19). This changed in 1920 when CYK Line launched the Sinŭiju-Tokyo route, the first direct service connecting western Korea with eastern Japan. It had previously opened the Sinŭiju-Osaka Line in 1917. These routes, terminating in Sinŭiju at the northwestern end of the Korean Peninsula, stopped at five major western Korean ports: Pusan, Mokp'o, Kunsan, Inchŏn, and Chinnamp'o (Namp'o) (see map A.1). They became the primary transportation routes for

rice harvested in western Korea (Chōsen yūsen 1937: 141–44).

Shortly after the launch of the Sinŭiju-Tokyo Line, the Great Kantō Earthquake struck in September 1923, causing catastrophic damage to Tokyo. In response, emergency shipments of Korean rice were sent to Tokyo from Korea and Osaka. For many Tokyo consumers, this was their first experience with Korean rice, and the earthquake served as a catalyst for its wider adoption in the city (Korean Rice Association 1934: 20–21). Additionally, since the annexation of Korea in 1910, the GGK had forced Korean farmers to remove contaminants from their rice, leading to significant quality improvements by the mid-1920s. As a result, average rice retailers in Tokyo could now handle Korean rice, eliminating the need for specialized retailers (AFFRC 1939: 3–4). After the mid-1920s, CYK Line was joined by other shipping companies in operating routes between western Korean cities and Tokyo. For example, OSK Line launched its first regular service from eastern Japan, inaugurating the Chinnamp'o-Tokyo Line in 1926 (Osaka shōsen 1934: 205–08). The entry of new competitors intensified competition in the rice transportation market, and by the early 1930s, fourteen shipping companies were engaged in the trade between Korea and Japan. Although they reached agreements on cargo rates, they could not avoid a freight rate war. Many companies secretly offered freight rebates to cargo senders to maximize shipment volumes (Sudo 1935: 1–3). The expansion of Korean rice consumption in Japan and the decline in freight rates further boosted rice exports from Korea to Osaka and Tokyo.

6.2. From Southern and Northwestern Korean ports to Osaka and Tokyo

Fig. 3 illustrates the volume of Korean rice exports by destinations from 1919 to 1938.[2]

Overall Korean rice exports continued to grow until the mid-1930s, with destinations shifting during the interwar period. Until the early 1920s, most Korean rice was exported to western Japan, with Osaka being the largest destination. Osaka maintained this position until the 1930s. However, after the late 1920s, exports to eastern Japan increased, and Tokyo became the second-largest destination. The contribution ratios of the two cities to the growth of Korean rice exports varied over time (see fig. A.12). From the early 1920s to the mid-1920s, Osaka and Tokyo contributed 26 percent and 12 percent, respectively, to the growth of Korean rice exports. By contrast, from the mid-1920s to the mid-1930s, Tokyo's contribution ratio rose to 38 percent, approaching Osaka's 41 percent. Thus, after the late 1920s, Korean rice exports expanded due to increasing demand in both

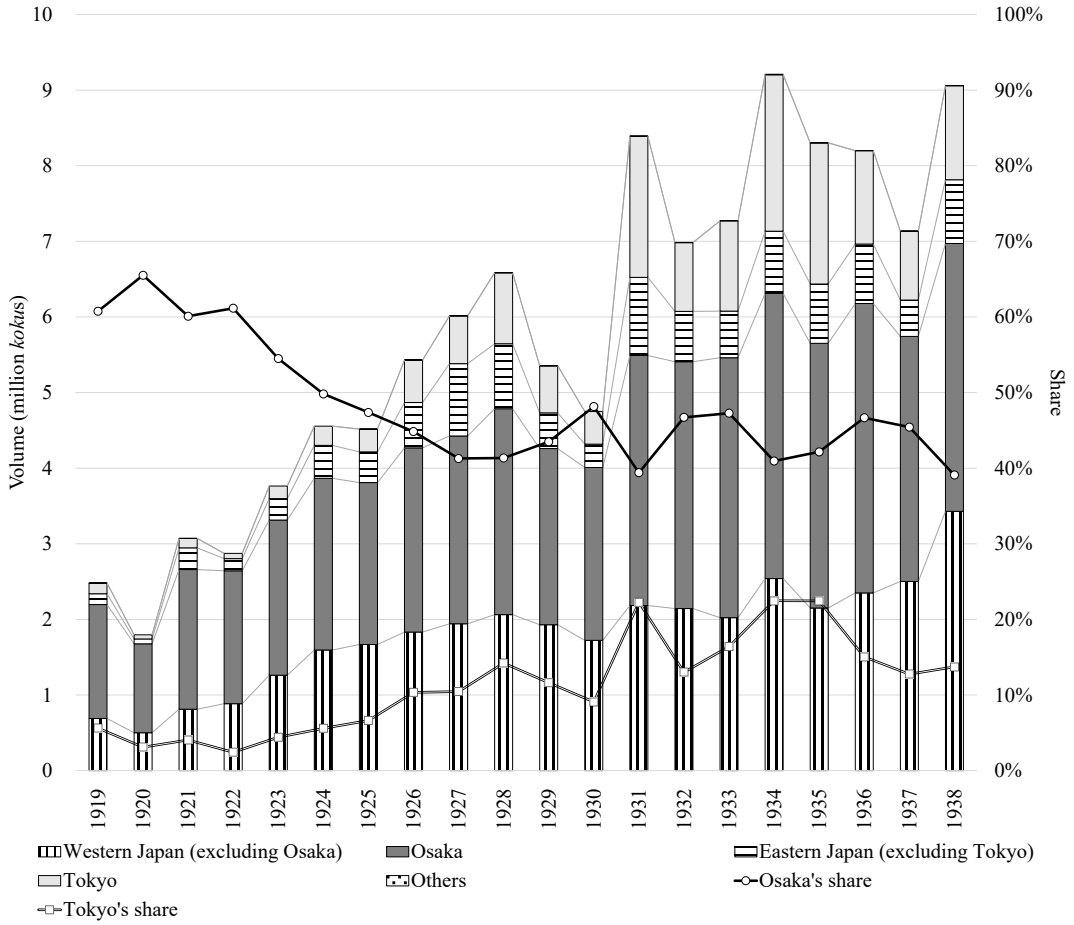

Fig. 3 Korean rice exports by destination, 1919–38

Notes: There is no data on the volume of exported rice from Korea by destination until 1918. The two line charts indicate the shares of rice shipped to Osaka and Tokyo in the total export volume of Korean rice.

Sources: Governor-General of Korea 1923: 744–53, 1924b: 966–97, 1927b: 716–51, 1930b: 678–89, 1933b: 642–51, 1936b: 774–81, 1939b: 830–37, 1941a: 1034–41.

Osaka and Tokyo.

Southern Korea was the primary supplier of rice to Japan. From 1923 to 1938, southern ports accounted for 76 percent of the rice exported from Korea to Japan. This region had four major ports: Pusan, Mokp'o, Kunsan, and Inch'ŏn (see fig. A.13 and map A.1). Their respective shares of Korean rice exports were 24 percent, 9 percent, 23 percent, and 20 percent. A significant port also emerged in the northwestern region: Chinnamp'o, located at the southern end of South P'yŏngan province, accounted for 14 percent of Korean rice exports. By the late 1920s, it had become the primary port serving P'yŏngyang, the largest city in northern Korea, ranking just behind the major southern ports.

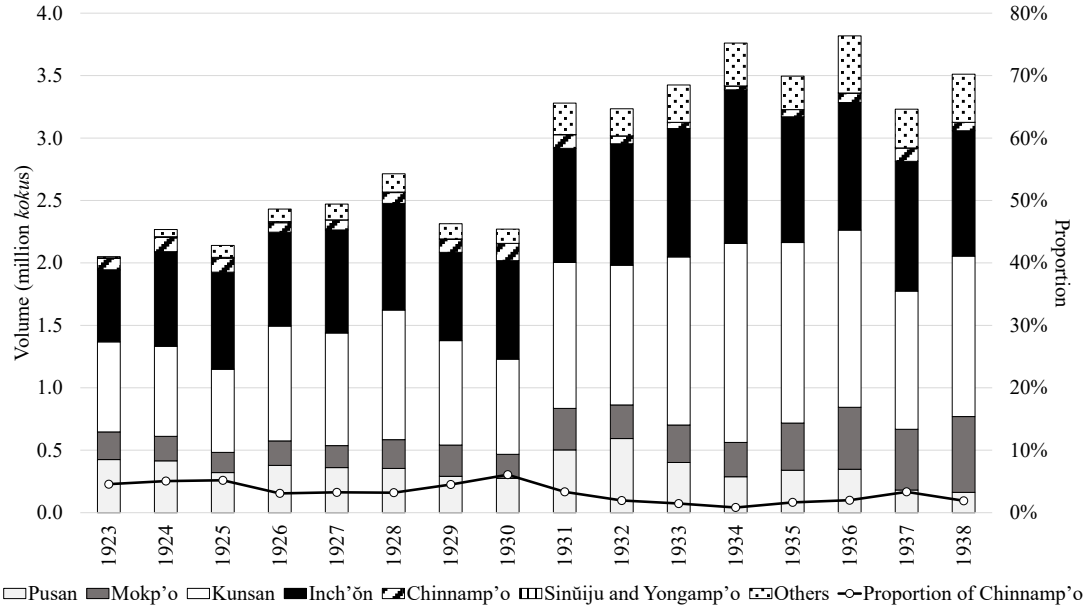

Fig. 4 Korean rice exports to Osaka by departure port, 1923–38

Sources: Governor-General of Korea 1924b: 346–47, 1925b: 360–61, 1926b: 372–73; 1927b: 240–43; 1928b: 218–21, 1929b: 224–27, 1930b: 224–27, 1931b: 220–23, 1932b: 220–23, 1933b: 216–19, 1934b: 210–13, 1935b: 222–23, 1936b: 366–67, 1937b: 390–91, 1938b: 392–93, 1939b: 426–27.

Between the mid-1920s and mid-1930s, Chinnamp'o's contribution to the growth of Korean rice exports was 18 percent (see fig. A.14). In comparison, the contributions of Pusan, Mokp'o, Kunsan, and Inch'ŏn were 10 percent, 8 percent, 25 percent, and 10 percent, respectively. Thus, Chinnamp'o emerged as a key port during the interwar period. These five ports developed extensive facilities for rice exports, including multiple piers capable of accommodating large vessels and massive rice warehouses. The warehouses in Pusan, Inch'ŏn, and Chinnamp'o, in particular, each exceeded 30,000 square meters (7.4 acres) (Korean Rice Warehouse 1936: 8, 11–12, 14–15). However, Chinnamp'o differed from the major southern ports in its role and trade patterns.

Figure 4 presents the volume of rice exports to Osaka by departure ports in Korea from 1923 to 1938.

Until the mid-1930s, the volume of rice exports to Osaka grew steadily, with southern Korean ports serving as the main points of departure. Kunsan and Inch'ŏn, in particular, played central roles in supplying rice to Osaka. In contrast, after the late 1920s, Tokyo increasingly received rice from northwestern Korean ports. Figure 5 illustrates the volume of rice exports to Tokyo by departure ports in Korea from 1923 to 1938.

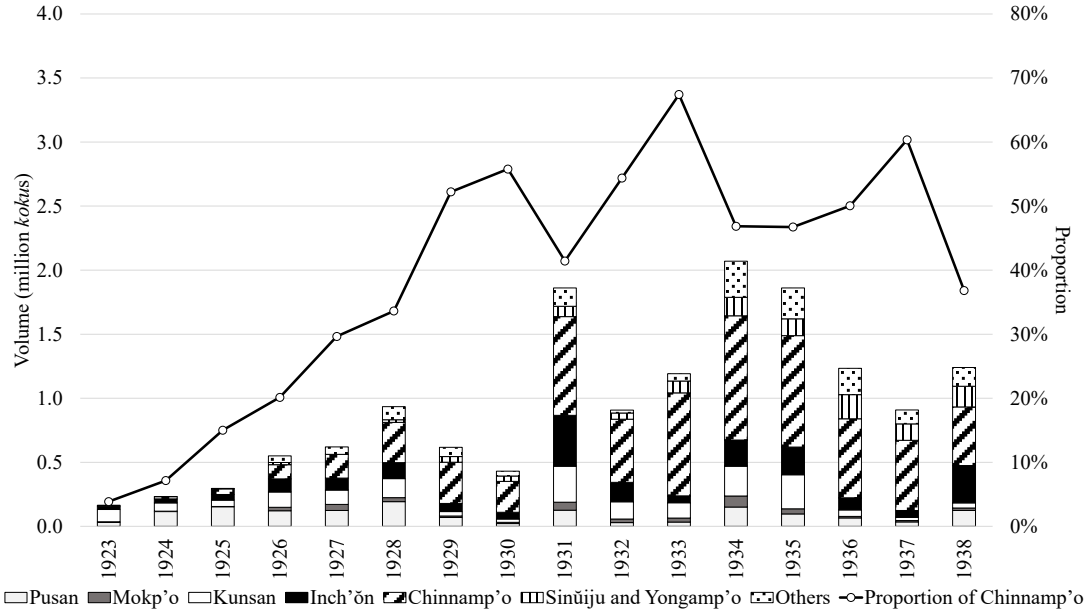

Fig. 5 Korean rice exports to Tokyo by departure port, 1923–38

Source: See fig. 4.

While rice exports to Osaka grew consistently, exports to Tokyo fluctuated significantly after the late 1920s. Until the mid-1920s, Tokyo received Korean rice primarily from the southern ports of Kunsan and Inch'ŏn, similar to Osaka. However, from the late 1920s onward, Chinnamp'o became the principal departure port for rice exports to Tokyo. Located at the intersection of sea routes, river traffic, and railways in northwestern Korea, Chinnamp'o played a crucial role in facilitating this trade.

7. End of Export Growth from Chinnamp'o to Tokyo

7.1. Chinnamp'o's Growth as a Northwestern Korean Rice Hub

Chinnamp'o was the most prosperous port in northwestern Korea. It was opened in 1897, and in 1915, the GGK improved its port facilities, allowing it to accommodate vessels exceeding 10,000 tons (Governor-General of Korea 1916: 1–5). During the 1920s, CYK and OSK Lines launched regular services directly connecting Chinnamp'o with Tokyo, as mentioned in the previous section. The arrival of major shipping companies at the port significantly boosted rice exports, causing the volume of rice exports from Chinnamp'o to Japan to triple from the 1920s to the early 1930s (see fig. A.15). This surge in rice exports from Chinnamp'o was driven primarily by the growing demand in Tokyo. Between the mid-1920s and the early 1930s, Tokyo accounted for 79 percent of the increase in

Chinnamp'o's rice export volume. Consequently, Tokyo's share of Chinnamp'o's total rice exports surged from 6 percent to 56 percent during the same period (see figs. A.15 and A.16). The rapid increase in rice production in northwestern Korea enabled Chinnamp'o to supply Tokyo with substantial quantities of rice.

The Port of Chinnamp'o received rice from three northwestern provinces: Hwanghae, South P'yŏngan, and North P'yŏngan. Between 1928 and 1935, the average composition ratios of rice arriving in Chinnamp'o from these three provinces were 45 percent, 28 percent, and 27 percent, respectively (see fig. A.17). During this period, these provinces sent 63 percent, 62 percent, and 49 percent of their rice production to Chinnamp'o.

Located at the mouth of the Taedong River, which separates South P'yŏngan province and Hwanghae province, Chinnamp'o served as a transit port for coastal ships and riverboats (Ministry of the Navy, Hydrographic Office 1934: 228–9). Additionally, Chinnamp'o was well-connected to the Korean railway network. In October 1910, the GGK inaugurated the P'yŏngnam Line, linking Chinnamp'o Station to P'yŏngyang Station, which was the terminus of the Kyŏngŭi Line running from Pusan to Sinŭiju (Governor-General of Korea, Railway Bureau 1929: 421). Chinnamp'o effectively utilized multiple transportation modes, allowing it to become a major hub for rice collection in northwestern Korea. Between 1924 and 1935, 41 percent of the rice transported to Chinnamp'o from nearby regions arrived by ship, while 52 percent was delivered by train (see fig. A.18). The proximity of Hwanghae province and South P'yŏngan province made it easy for these provinces to ship rice to Chinnamp'o. However, even North P'yŏngan province, which was farther away, dispatched approximately half of its rice to Chinnamp'o. The railway distance between Chinnamp'o Station and Maengjungni Station, the southernmost station in North P'yŏngan province, was 137 kilometers (85 miles) (Japan Tourist Bureau 1934: 196, 204).

Unlike Chinnamp'o, North P'yŏngan province lacked large ports with modern facilities. The province had two ports, Sinŭiju and Yongamp'o, but both were unsuitable for accommodating large vessels. The Port of Sinŭiju, located along the Yalu River near the Korea-Manchuria border (see map A.1), was about 24 kilometers (15 miles) from the river's mouth. Due to the presence of numerous shoals, large vessels could not access the port directly and had to rely on barges to load cargo (Ports and Harbors Association 1931: 145). This transshipment process increased costs significantly—Sinŭiju charged 40 yen per 100 *koku* of rice for stowage, whereas Chinnamp'o charged only 13 yen (Hishimoto

1938: 454). The Port of Yongamp'o faced similar challenges, as it was also located near the Yalu River's mouth and had numerous shoals. Large vessels had to anchor offshore while barges transported cargo to the pier (Ministry of the Navy, Hydrographic Office 1934: 276–7, 283). Given these logistical constraints, North P'yŏngan province relied on Chinnamp'o as its primary export hub for rice shipments to Tokyo. Tokyo, in turn, preferred rice from northwestern Korea over rice from southern Korea.

7.2. Northwestern Korean Rice in the Tokyo Market

The Tokyo rice market operated differently from that of Osaka. In Osaka, rice retailers typically sold single varieties of rice or blends consisting of two different varieties. In contrast, Tokyo rice retailers exclusively dealt in blended rice containing at least three different varieties (Hishimoto 1938: 571). Tokyo's demand for blended rice increased the need for northwestern Korean rice, which had a similar white color and small grain size to Japanese rice. The Rikuu No. 132 variety, cultivated in northwestern Korea, was milky white and small, whereas Ginbōzu, a variety exported to Osaka, was pale brown and large (Izumi 1936b: 21–26, 1936c: 22–24). As a result, the Tokyo rice market valued Rikuu No. 132 more highly than the Osaka market did.

Tokyo and Osaka had two major rice exchanges: the Tokyo Rice and Merchandise Exchange and the Osaka-Dōjima Rice Exchange. Both exchanges operated futures trading and allowed dealers to deliver Japanese and Korean rice upon contract maturity (Ito et al. 2018: 912–15). Every six months, they graded various rice varieties based on quality (AFFRC 1931; KUL 1930). While both exchanges assigned equal grades to Ginbōzu rice from Kunsan, they assessed Rikuu No. 132 from Chinnamp'o differently. For instance, in April 1935, the Tokyo Rice and Merchandise Exchange valued the fourth grade of Rikuu No. 132 at 1.0 yen per koku less than standard Japanese rice, whereas the Osaka-Dōjima Rice Exchange assigned a price difference of 1.4 yen per koku (AFFRC 1935; KUL 1935). This discrepancy indicates that Tokyo had a stronger preference for northwestern Korean rice than Osaka. Consequently, the northwestern provinces emerged as key suppliers of rice to Tokyo. However, during the 1930s, while Korean rice exports to Osaka remained stable, exports to Tokyo fluctuated (see figs. 4 and 5). This contrast stemmed from differences in Korean rice's price advantage between the two cities and the expansion of Taiwanese rice exports to Tokyo.

7.3. Competition Between Korean and Taiwanese Rice in Tokyo

In 1923, Korea's lower labor costs made its rice production approximately 45 percent cheaper than that of Japan (Agricultural Society of Imperial Japan, Investigation Unit 1934: 47, 53). Consequently, Korean rice was generally priced lower than Japanese rice. However, two factors caused the price gap to narrow during the 1920s.

First, Korean farmers bore the costs of irrigation infrastructure and chemical fertilizers, as discussed in earlier sections. By 1933, this reduced their cost advantage to just 7 percent compared to Japanese farmers (Agricultural Society of Imperial Japan, Investigation Unit 1934: 56–57). Second, the quality of Korean rice improved as Korean farmers transplanted superior Japanese rice varieties, reducing the quality disparity between the two countries (Governor-General of Korea, Industrial Bureau 1928: 40). While Korean rice maintained a price advantage in Osaka throughout the 1930s (see fig. A.19), its price competitiveness in Tokyo declined from the 1920s and nearly disappeared by 1932 (see fig. A.20).

The difference in the price advantage of Korean rice between Tokyo and Osaka resulted primarily from shipping freight costs. Osaka imported Korean rice from the southern ports, such as Kunsan and Inch'ŏn. These two ports are 1,090 kilometers (677 miles) and 1,280 kilometers (795 miles), respectively, away from Osaka. By contrast, Tokyo gathered Korean rice from Chinnamp'o in northwestern Korea, and the distance between these cities is 2,130 kilometers (1,323 miles) (Osaka shōsen 1919: 166–68). Tokyo is about 95 percent or 66 percent farther from the port of rice exportation than Osaka. Therefore, in 1935, the shipping companies charged 115 yen per 100 *koku* for rice exported from Chinnamp'o to Tokyo, while charging 93 yen from exporters dispatching rice to Osaka (Hishimoto 1938: 419). The former was about 24 percent higher than the latter. Hence, when Korean rice prices increased and approached Japanese rice prices at the beginning of the 1930s, Korean rice lost its price advantage in Tokyo. This situation caused an expansion of Taiwanese rice exports to Tokyo during the 1930s.

Initially, Taiwan grew indica rice, which differed significantly in shape and taste from the japonica rice varieties cultivated in Korea and Japan (Governor-General of Taiwan, Industrial Bureau, Division of Commerce and Industry 1926: 22). Due to the quality dissimilarity, Taiwanese rice received a low evaluation in Japan. Its prices were also much lower than Korean and Japanese rice in Japan until the 1920s (see fig. A.20). Accordingly, the Governor-General of Taiwan had investigated the transplantation of Japanese rice breeds into Taiwan since 1903. However, in the 1920s, Taiwan successfully

developed Hōrai rice, a japonica variety with characteristics similar to Japanese rice (Taichung Provincial Agricultural Experiment Station 1927: 1). Encouraged by the Governor-General of Taiwan, farmers expanded their cultivation of Hōrai rice in the 1920s, leading to a substantial increase in Taiwanese rice exports to Tokyo.

Taiwanese Hōrai rice had a substantial price advantage over Korean and Japanese rice in Japan. In 1933, its production costs were 18 percent and 24 percent cheaper than Korean and Japanese rice (Agricultural Society of Imperial Japan, Investigation Unit 1934: 56–57). Hence, even in Tokyo, Taiwanese Hōrai rice prices were continuously lower than Korean and Japanese rice during the interwar period (see fig. A.20). Furthermore, Taiwanese Hōrai rice was small and soft, similar in size and resilience to eastern Japanese rice (Tokyo Rice and Merchandise Exchange 1934: 154). Accordingly, Taiwan raised its Hōrai rice exports to Tokyo on the coattails of its price and taste advantages. Tokyo acquired about half of the exported Taiwanese Hōrai rice to Japan, becoming the largest city for Taiwanese rice consumption (see fig. A.21). Tokyo preferred Taiwanese rice, and its preference inhibited the growth of Korean rice exports.

The growth of Korean rice exports to Tokyo was suppressed, and Taiwanese Hōrai rice surpassed Korean rice in the export volume to Tokyo in 1933 (see figs 5 and A.21). In the following year, Japan faced a poor rice harvest. The Japanese rice consumption volume per capita was recorded as the lowest from 1903 to 1939 (Maeda 2024: 55). Korean rice exports to Tokyo greatly increased by 1935 to fill the deficiency. However, Taiwanese Hōrai rice continued to exceed Korean rice in the export volume to Tokyo after 1936 (see fig. A.21).

The diminishing price advantage suppressed Korean rice exports to Tokyo, and the emergence of Taiwanese rice damped the competing power of Korean rice in Tokyo. Although Tokyo continued to import Korean rice to satisfy its rice demand, it acquired Taiwanese rice as low-price colonial rice during the 1930s. Even at the end of the 1930s, Taiwanese rice was lower in quality than Korean and Japanese rice because its variations in size, weight per grain, and color were wide and unstable (Fujimoto and Okura 1939: 18–28). Therefore, it deprived Korean rice of its position to supply low-price colonial rice in the mid-1930s.

8. Conclusion

Korean rice production historically centered in the warmer southern provinces such as

Kyŏnggi, Ch'ungch'ŏng, Chŏlla, and Kyŏngsang. By the late 1910s, these regions accounted for the majority of Korea's rice output, holding 75% of the paddy area and 80% of production volume. Under Japanese colonial rule beginning in 1910, agricultural reforms increased land productivity significantly, particularly during the interwar period.

Japanese authorities, prompted by domestic unrest over rice shortages in 1918, launched the PIRP in Korea. This initiative, running primarily from 1920 to 1932, aimed to stabilize rice supply to Japan by expanding cultivation areas and boosting productivity, especially in the underutilized northern provinces. Measures included land reclamation subsidies, irrigation infrastructure projects, and the introduction of superior Japanese rice breeds.

While the southern provinces had limited room for further productivity improvements, the PIRP dramatically transformed northern Korea's agricultural landscape. Between 1918–20 and 1932–34, rice paddy area in the north expanded by 24%, and production volume surged by 86%. In contrast, the south saw only a 3% increase in area and a 10% growth in volume. Northwestern provinces like Hwanghae, South P'yŏngan, and North P'yŏngan led this transformation, with production increases of up to 143%. This shift altered Korea's rice geography, raising the northern share of total production significantly.

A major driver of northern growth was irrigation. Korea's irrigation ratio rose from 21% in 1917 to 70% by the mid-1930s, with the north experiencing the most notable gains. Hwanghae province, for example, expanded irrigation through large-scale infrastructure projects led by landowner associations, such as the Hwanghae Irrigation Association, which secured funding from the colonial government and the Chōsen Industrial Bank.

Alongside irrigation, the PIRP promoted the use of "superior breeds"—Japanese rice strains adapted to Korean climates. These high-yield breeds increased average rice yields by 8% from the early 1920s to mid-1930s. While the south had already adopted superior breeds, the north's adoption rose from just 20% to over 80%, contributing substantially to yield gains. New varieties like Fukubōzu, Rikuu No. 132, and Ginbōzu became dominant, particularly in the northwest where climate similarities with northern Japan made transplantation effective. Fertilizer use also skyrocketed during this period, further supporting productivity.

By the mid-1930s, the northwestern provinces nearly matched the southern provinces in producing superior rice breeds, despite starting from a much lower base. Their

share in superior rice production rose from 5% to 20%, while the southern share dropped to around 70%. Land productivity in the northwest, once lagging behind, began to approach or even rival that of the south.

In summary, the PIRP transformed northern Korea, especially the northwest, into a key rice-producing region through targeted infrastructural and agricultural interventions. These developments not only changed the regional balance of Korean rice production but also cemented the north's role in supplying rice to the Japanese Empire. As Japan exploited its colonies as rice suppliers, Korea mainly cultivated rice in its southern regions before the GGK implemented the PIRP in 1920. Compared to the 1910s, the PIRP geographically expanded Japan's rice-supplying exploitation across all of Korea from the 1920s onward. Nevertheless, during the same period, Japan forced Taiwan to serve as a rice supplier. Consequently, these policies led to intense price competition between Korean and Taiwanese rice in Tokyo, which eroded the price competitiveness of northwestern Korean rice. Although Japanese colonial policies aimed to increase colonial production, they paid little attention to how colonial goods were distributed, reducing their overall effectiveness.

[1] There are no data on each province's area cultivated the superior breeds in 1918–19, 1922–24, and 1935.

[2] Fig. 3 refers to the Annual Trade Statistics of Korea issued by the GGK (Governor-General of Korea 1923; 1924b; 1927b; 1930b; 1933b; 1936b; 1939b; 1941a). Even the National Library of Korea and the National Diet Library in Japan did not hold all volumes of these statistics. Accordingly, we collect them at five Japanese libraries: the National Diet Library, Keio University Library, Waseda University Library, Kyoto University Library, and Oita University Library.

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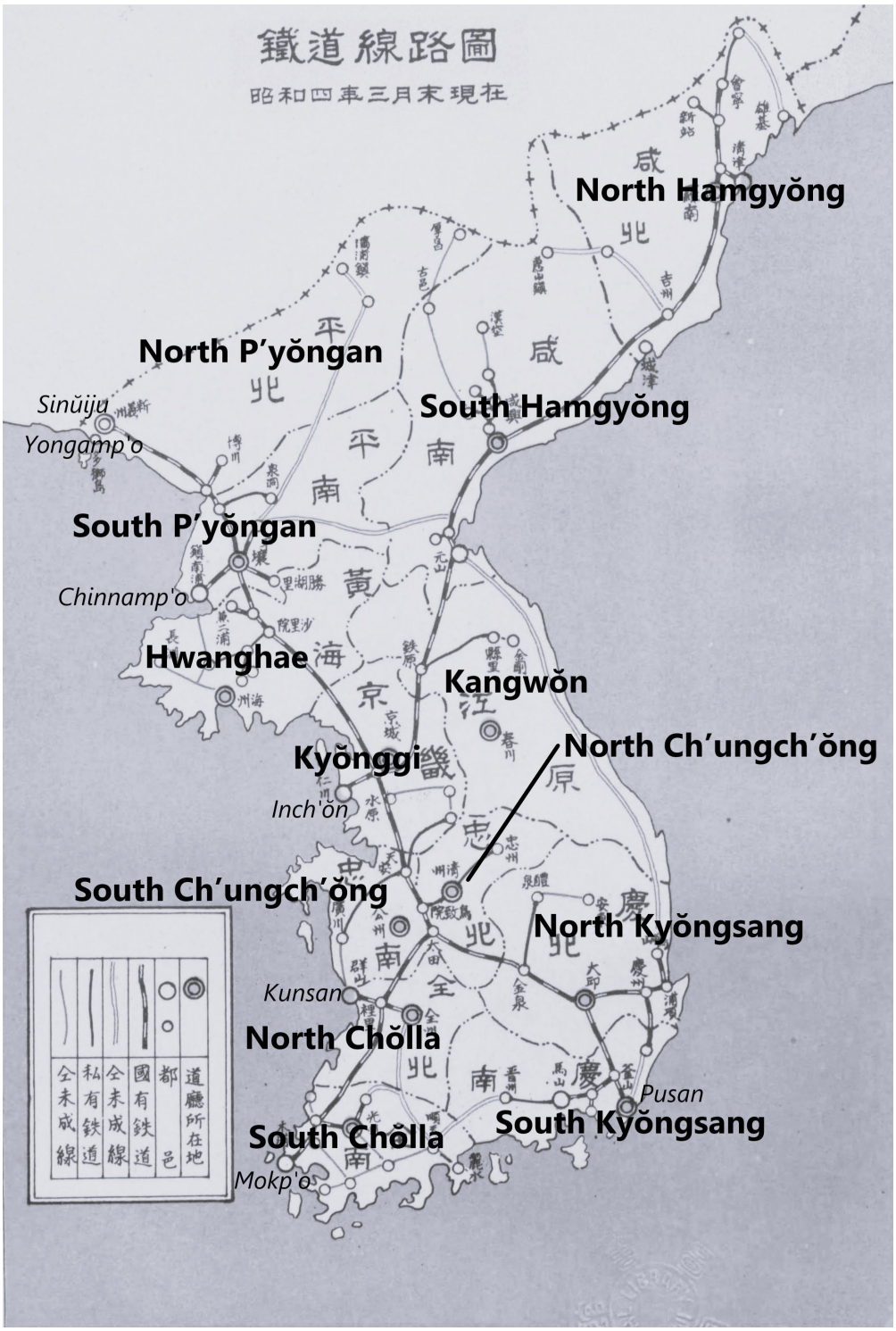
Supplementary Materials



MAP A.1 Korean provinces and major cities under the colonial period (1910–45)

Source: Governor-General of Korea 1929d: supplementary figure 51.

MAP A.2 Korea and Japan

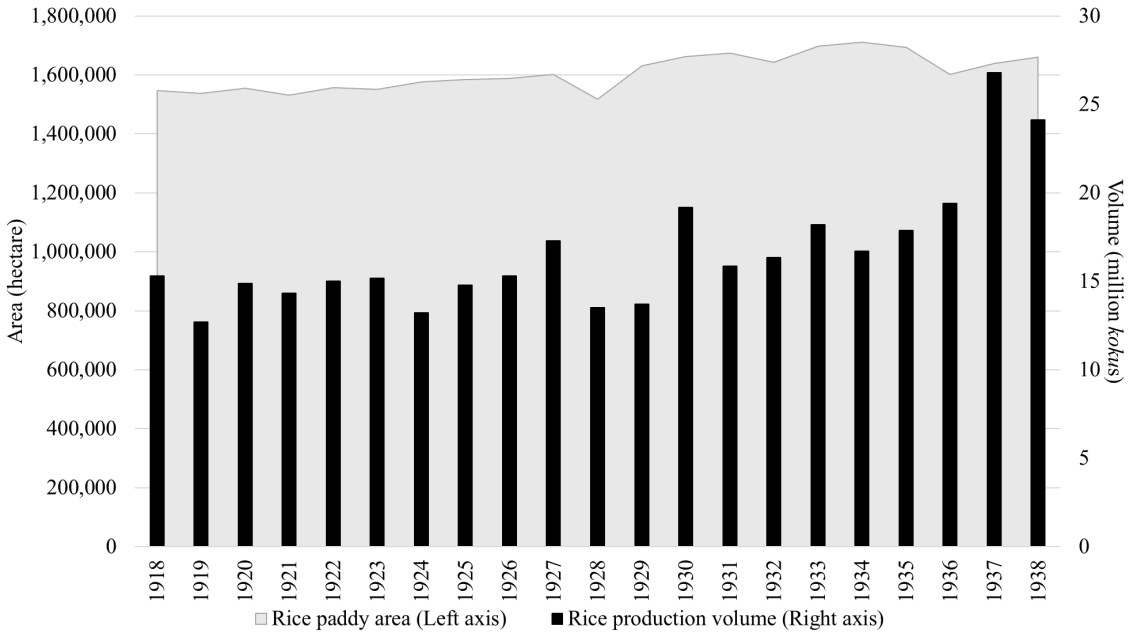


Fig. A.1 Korean rice production, 1918–38

Note: "*Koku*" is a standard unit of measurement in Japanese agriculture. One *koku* is defined as 180.39 liters. One *koku* of Korean brown rice equals 141 kilograms (Governor-General of Taiwan, Rice Bureau 1940: 154).

Sources: Governor-General of Korea 1919: 126–29, 1920: 110–11, 1921: 6–7, 1922a: 6–7, 1924a: 6–7, 1925a: 6–7, 1926a: 6–7, 1927a: 94, 1928a: 89, 1929a: 87–88, 1930a: 89–90, 1931a: 90, 1932a: 92, 1933a: 94, 1934a: 38, 1935a: 74, 1936a: 74, 1937a: 74, 1938a: 75, 1939a: 63, 1940: 55.

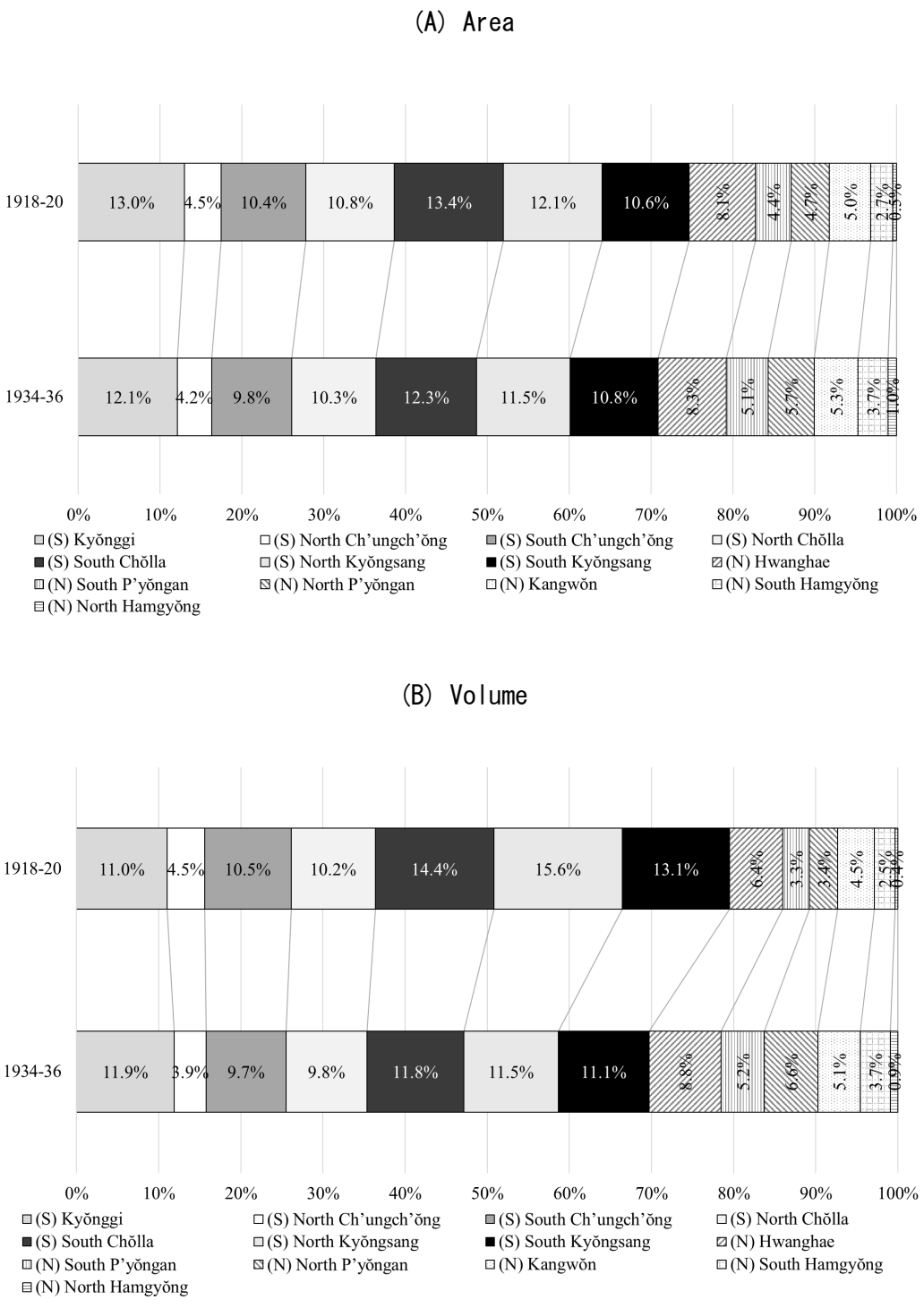


Fig. A.2 Proportion of rice production area and volume by province, 1918–36

Note: (S) and (N) denote southern and northern Korea, respectively.

Source: See fig. A.1.

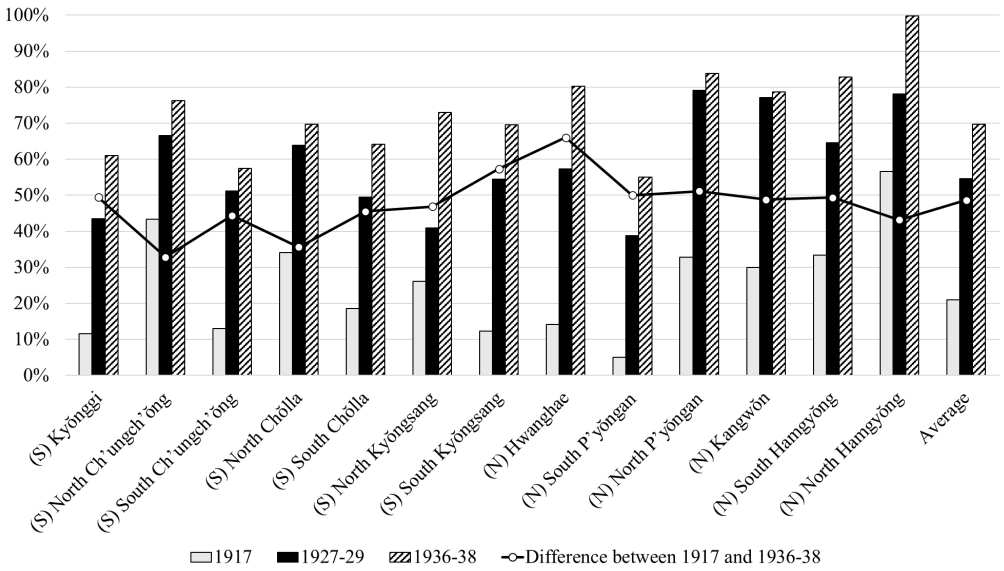


Fig. A.3 Irrigation ratios by province, 1917–38

Notes: The bar charts show the irrigation ratios in 1917 and the three-year average irrigation ratios from 1927 to 1929 and 1936 to 1938. There is no data on irrigated rice paddy areas from 1918 to 1926 and 1932 to 1933. The line chart demonstrates the difference in the irrigation ratios between 1917 and the three-year average from 1936 to 1938 by province. (S) and (N) denote southern and northern Korea, respectively.

Sources: Governor-General of Korea 1937a: 74–75, 1938a: 74, 1939a: 62; Governor-General of Korea, Department of Agriculture, Commerce, and Industry 1919: 33; Governor-General of Korea, Department of Land Improvement 1928: 2–3, 1929: 2–3, 1930: 2–3.

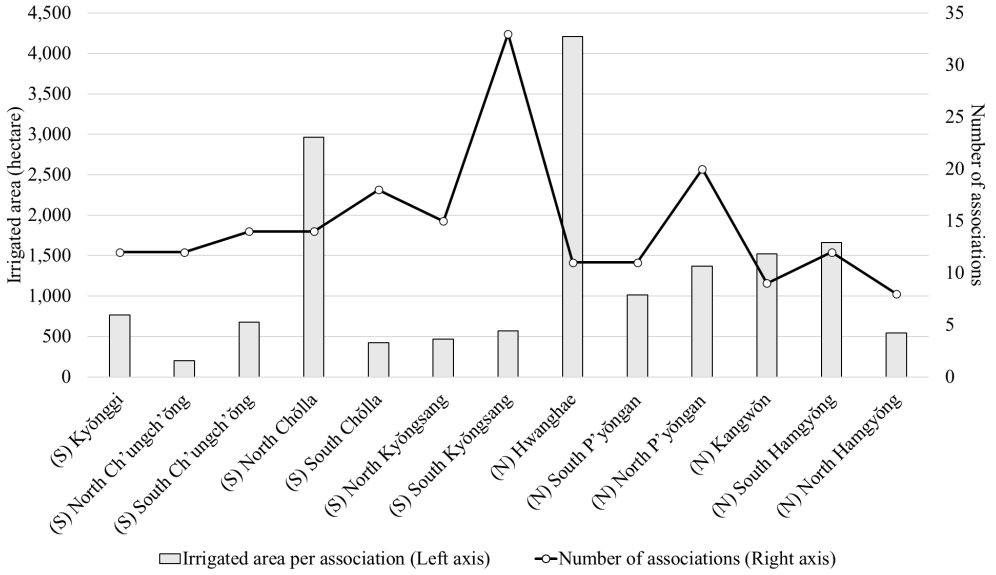


Fig. A.4 Size of irrigated areas and the number of irrigation associations, March 1939

Note: (S) and (N) denote southern and northern Korea, respectively.

Source: Governor-General of Korea, Bureau of Agriculture and Forestry 1940b: 10–23.

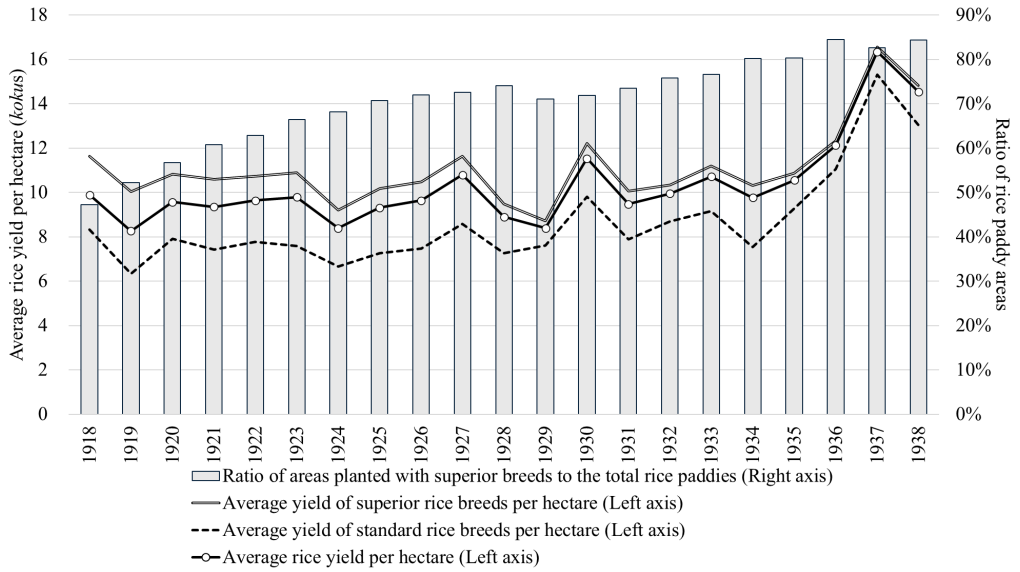


Fig. A.5 Land productivity of superior rice breeds, 1918–38

Sources: Governor-General of Korea 1927c: 13–14, 1929c: 13, 1930c: 13, 1931c: 13, 1932c: 14, 1933c: 43–46, 1934c: 43–48; Governor-General of Korea, Bureau of Agriculture and Forestry 1935: 22–23, 1937: 26–27, 1939: 28–29, 1940a: 28–29; Governor-General of Korea, Industrial Bureau 1923: 4, 1927: 13–14; Korea Agricultural Society 1921: 75

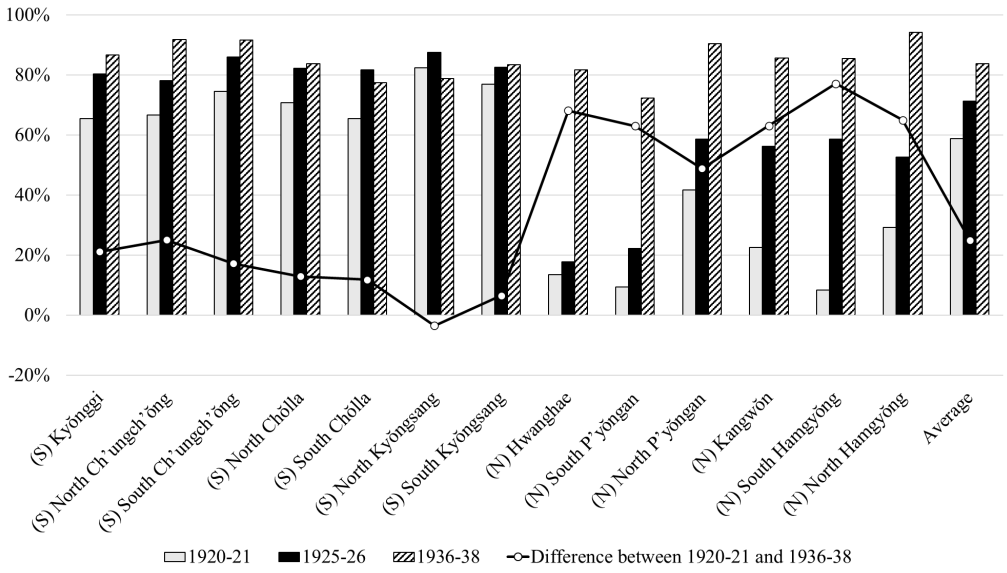


Fig. A.6 Ratio of areas planted with the superior breeds as a percentage of total rice paddy area by province, 1920–38

Notes: The gray and black bar charts indicate the two-year average ratios of areas planted with the superior breeds to the total rice paddy from 1920 to 1921 and 1925 to 1926. The shaded bar charts illustrate the three-year average ratios of areas cropped with the superior breeds to the total rice paddy from 1936 to 1938. There is no data on the areas cultivated the superior breeds by province before 1919, and during 1922–24 and 1935. (S) and (N) denote southern and northern Korea, respectively.

Sources: Governor-General of Korea 1927c: 13–14; Governor-General of Korea, Bureau of Agriculture and Forestry 1937: 26–27, 1939a: 28–29, 1940a: 28–29; Governor-General of Korea, Industrial Bureau 1923: 4, 1927: 13–14; Korea Agricultural Society 1921: 75

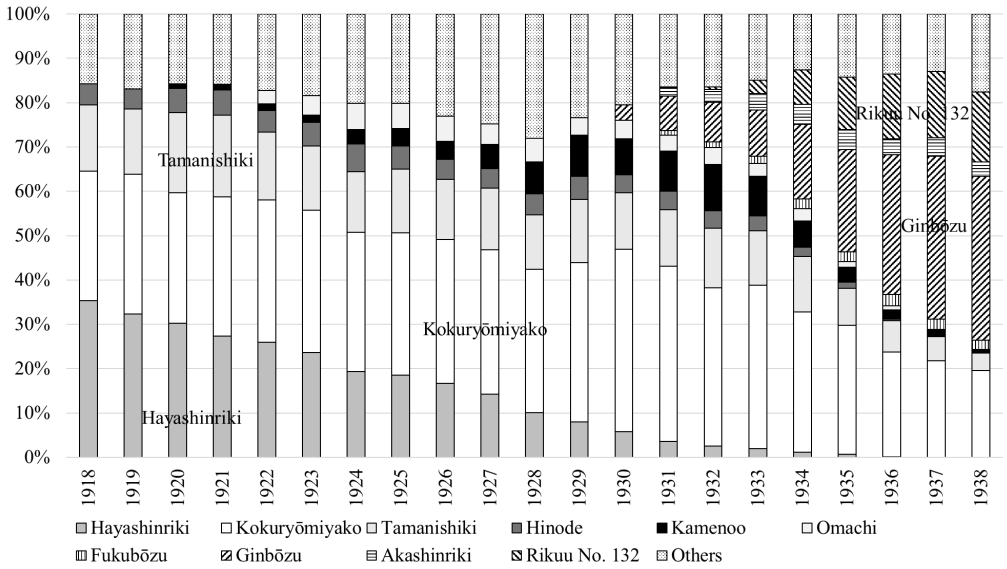
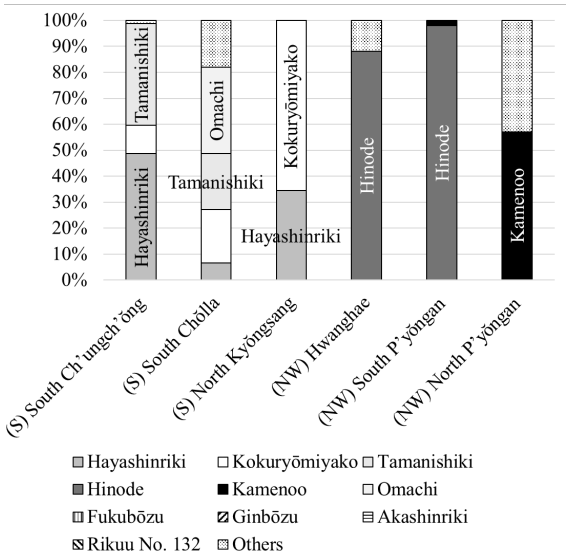


Fig. A.7 Proportions of superior rice production volume, 1918–38

Sources: Governor-General of Korea, Bureau of Agriculture and Forestry 1937: 28–35, 1940a: 30–37

(A) 1925–26



(B) 1936–38

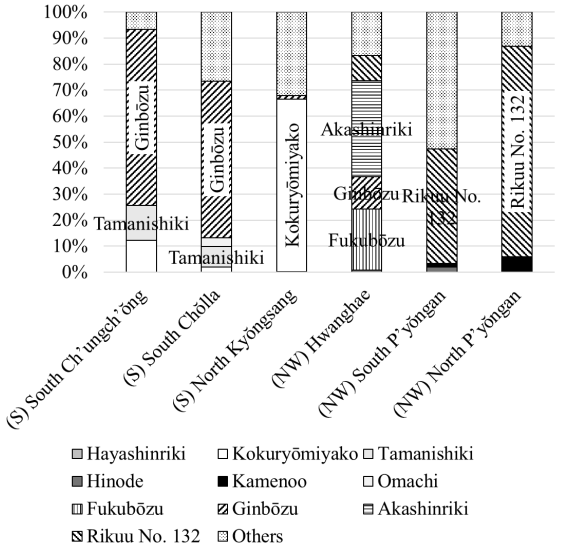


Fig. A.8 Northwestern and southern provinces' proportions of superior rice production volume, 1925–26 and 1936–38

Note: (S) and (NW) denote southern and northwestern Korea, respectively.

Source: See fig. A.7.

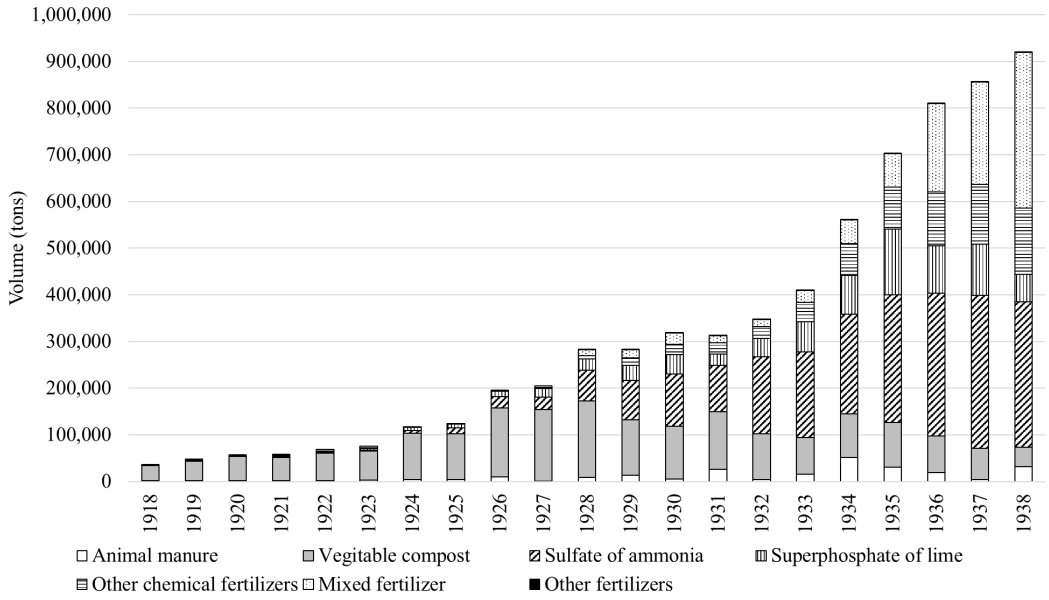


Fig. A.9 Consumption volume of fertilizers in Korea, 1918–38

Source: Governor-General of Korea 1941b: 5–6, 107–10.

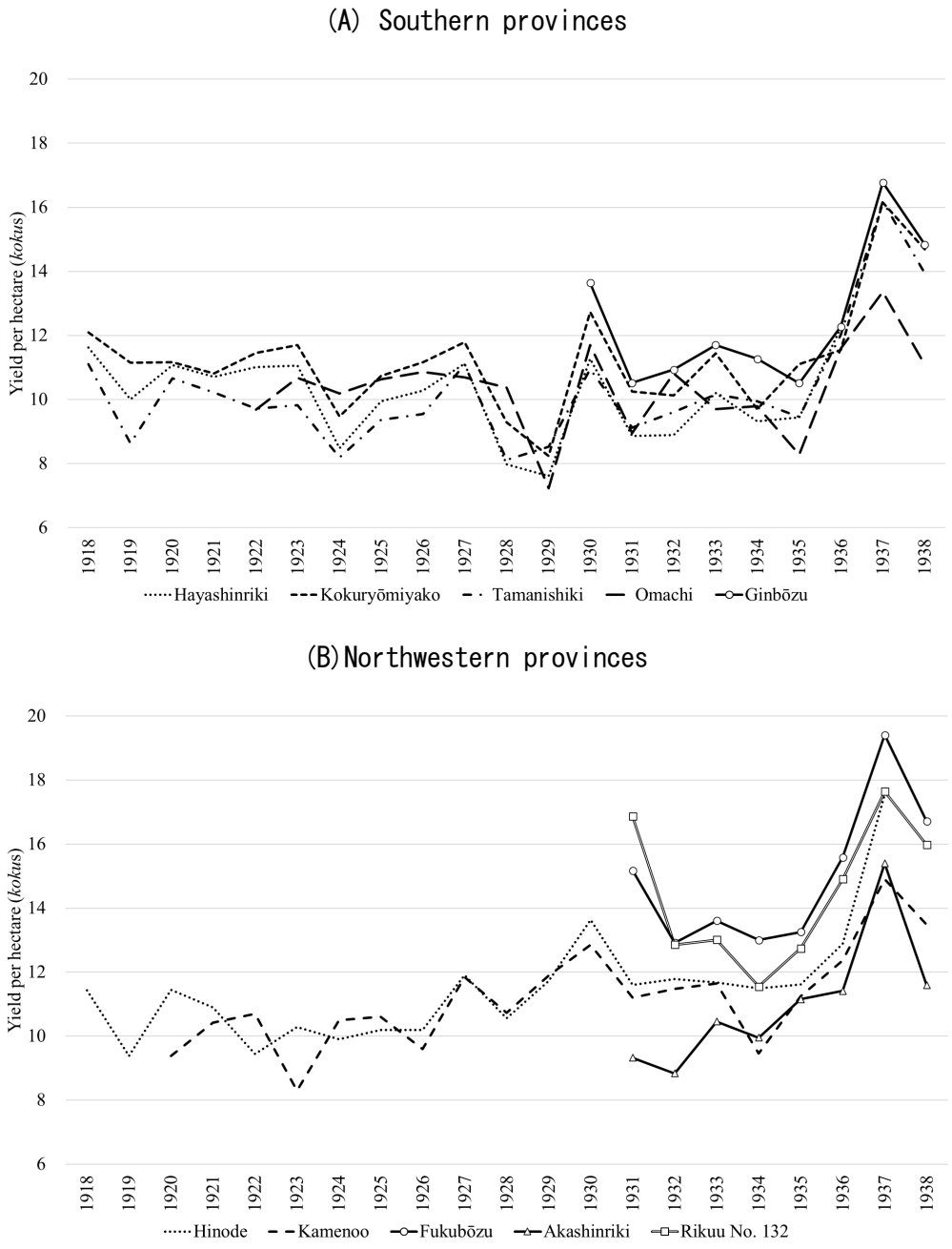


Fig. A.10 Yield of superior rice species per hectare, 1918–38

Source: See fig. A.7.

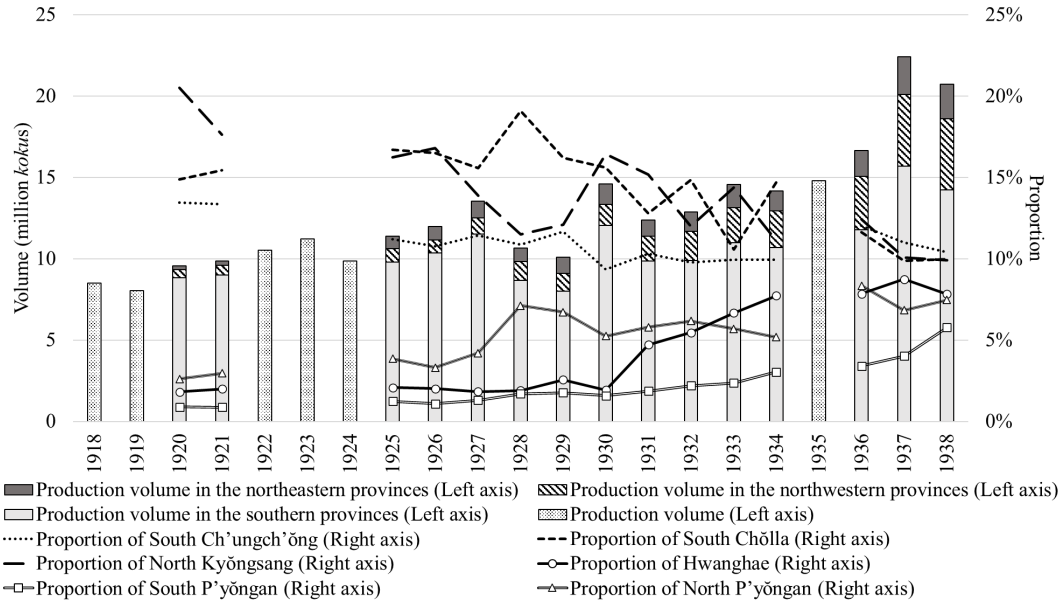


Fig. A.11 Korean production of superior rice breeds, 1918–38

Note: There is no data showing the breakdown of superior rice breeds by province in 1918–19, 1922–24, and 1935.

Source: See fig. A.6.

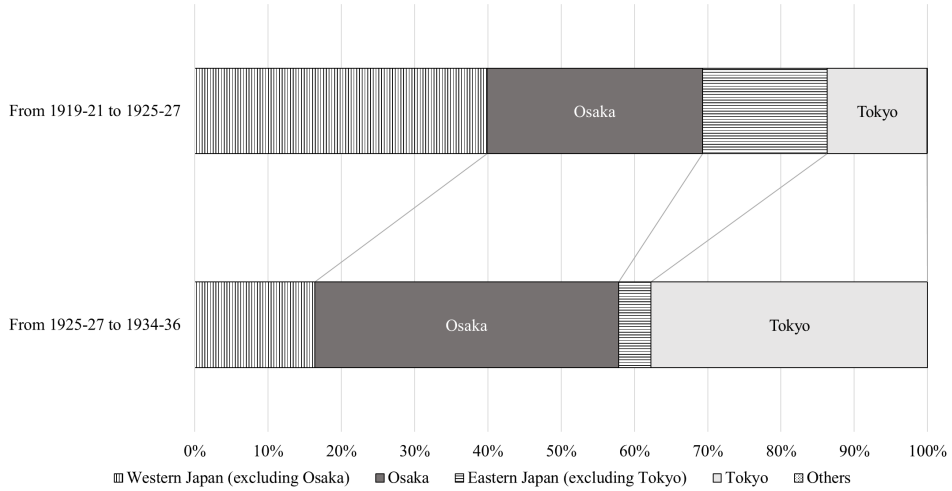


Fig. A.12 Contribution ratio of Korean rice exports by destination, 1919–36

Sources: Governor-General of Korea 1923: 744–53, 1924b: 966–97, 1927b: 716–51, 1930b: 678–89, 1936b: 774–81, 1939b: 830–37.

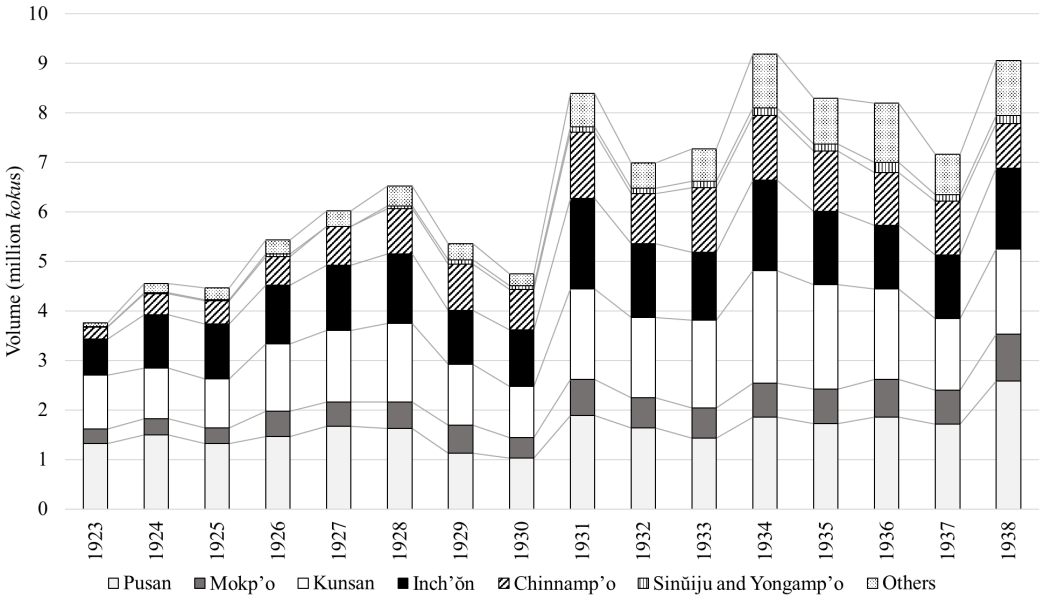


Fig. A.13 Korean rice exports by departure port, 1923–38

Note: There is no data on the rice volume exported from Korea by departure port before 1922.

Sources: Governor-General of Korea 1924b: 346–7, 1925b: 360–61, 1926b: 372–73; 1927b: 240–43; 1928b: 218–21, 1929b: 224–27, 1930b: 224–27, 1931b: 220–23, 1932b: 220–23, 1933b: 216–19, 1934b: 210–13, 1935b: 222–23, 1936b: 366–67, 1937b: 390–91, 1938b: 392–93, 1939b: 426–27.

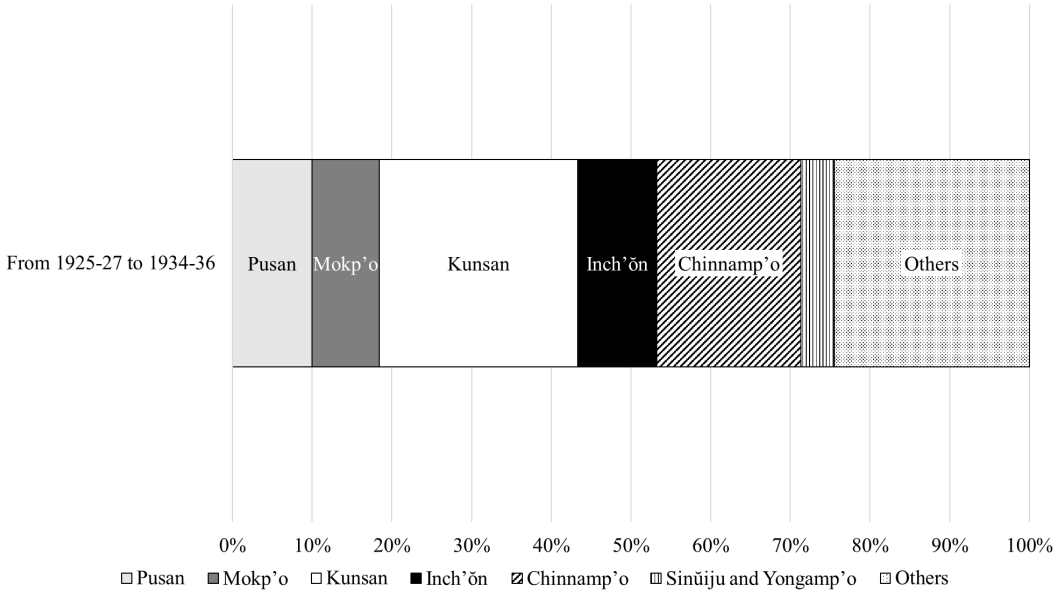


Fig. A.14 Contribution ratio of each departure port to Korean rice exports, 1925–36

Sources: Governor-General of Korea 1926b: 372–73, 1927b: 240–43, 1928b: 218–21, 1935b: 222–23, 1936b: 366–67, 1937b: 390–91.

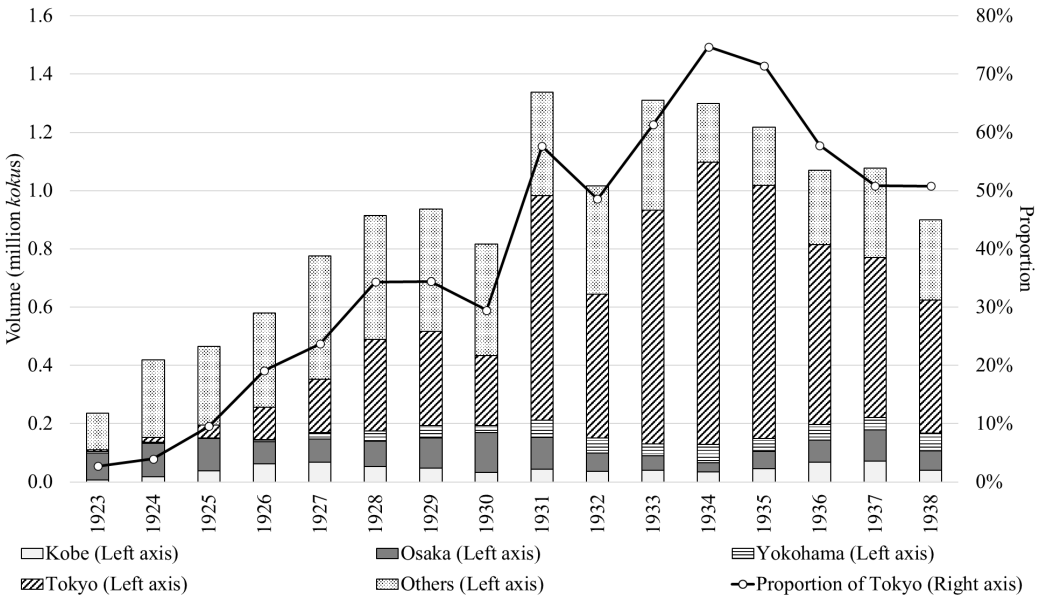


Fig. A.15 Rice exports from the port of Chinnamp'o by Japanese destination, 1923–38

Note: The line showing the proportion of Tokyo denotes the share of rice exported to Tokyo as a percentage of the total rice export volume from the port of Chinnamp'o.

Source: See fig. A. 13.

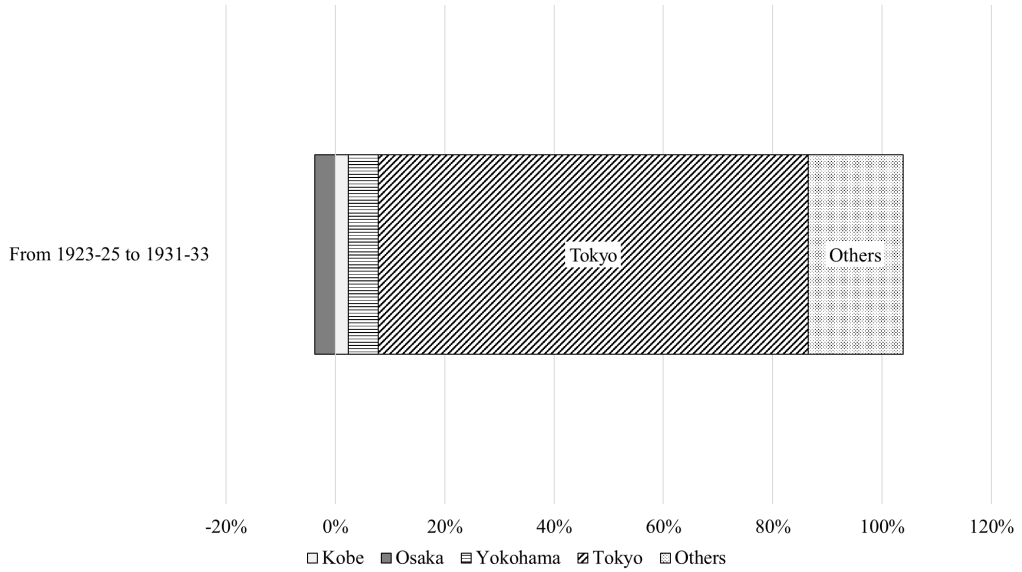


Fig. A.16 Contribution ratio of each Japanese destination as a percentage of the rice exports from Chinnamp'o, 1923–33

Source: See fig. A. 13.

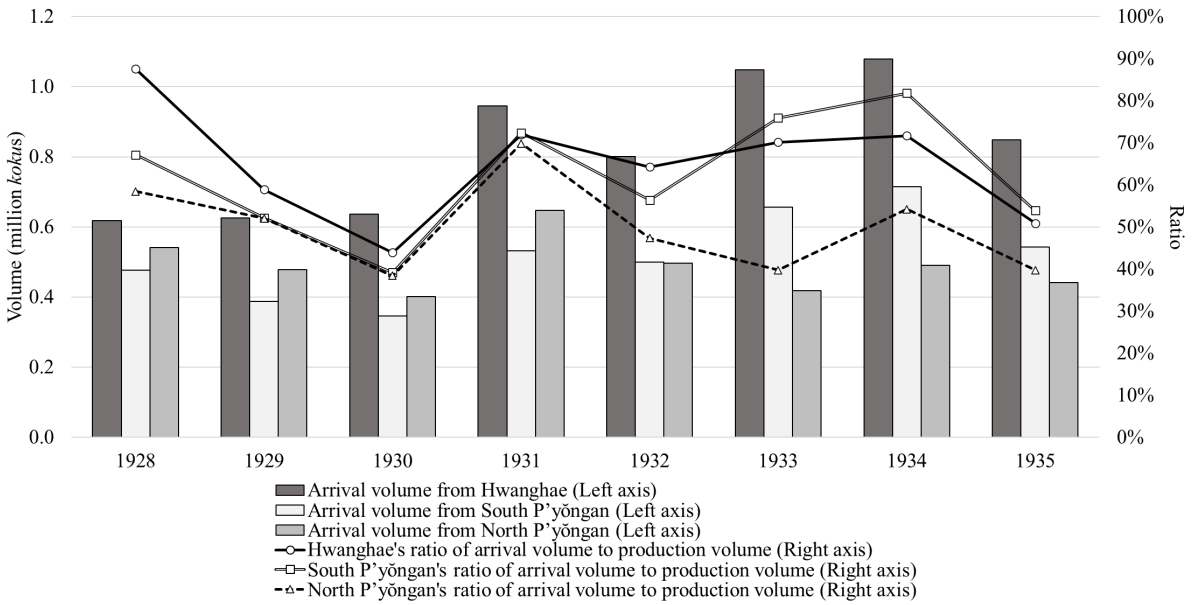


Fig. A.17 Amount and ratio of rice collected in Chinnamp'o from the northwestern provinces, 1928–35

Note: The data includes rice for exports and domestic consumption.

Source: Chinnamp'o Chamber of Commerce and Industry 1936: 7–8.

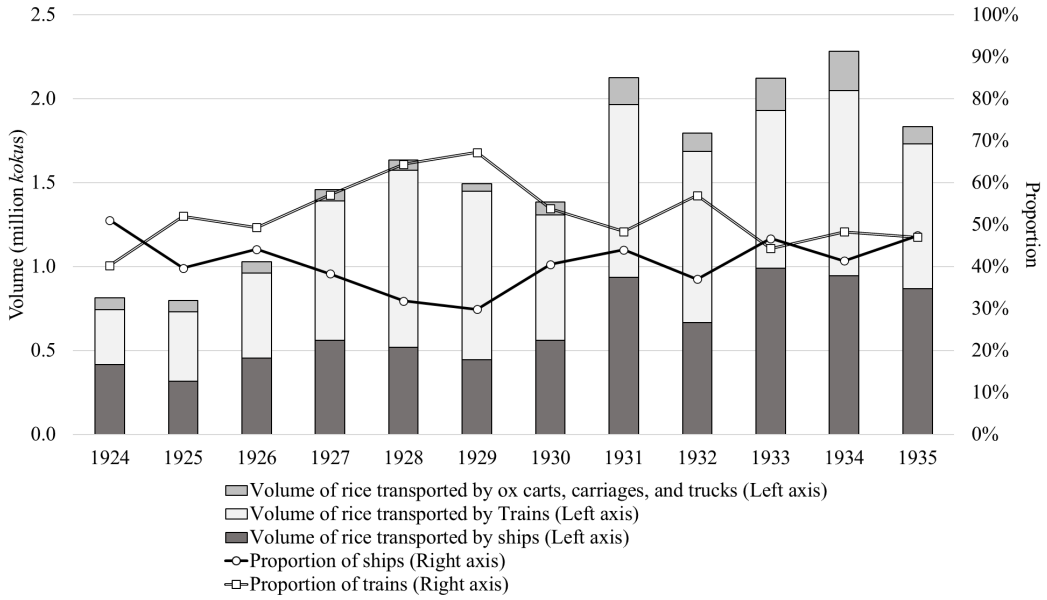


Fig. A.18 Volume of rice arriving at the port of Chinnamp'o by method of conveyance, 1924–35

Note: The data includes rice for export and domestic consumption.

Source: Chinnamp'o Chamber of Commerce and Industry 1936: 7.

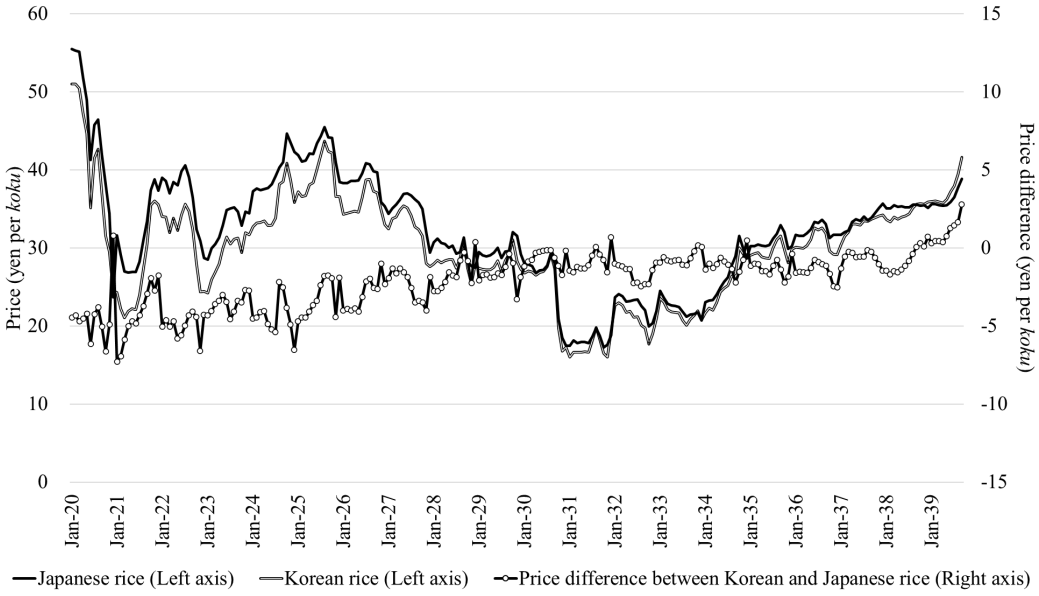


Fig. A.19 Monthly Korean and Japanese rice prices in Osaka, 1920–39

Sources: Governor-General of Taiwan, Rice Bureau 1937: 102–3, 1941: 114–15; Ministry of Agriculture, Agricultural Bureau 1925: 24–25, 1928: 44–54.

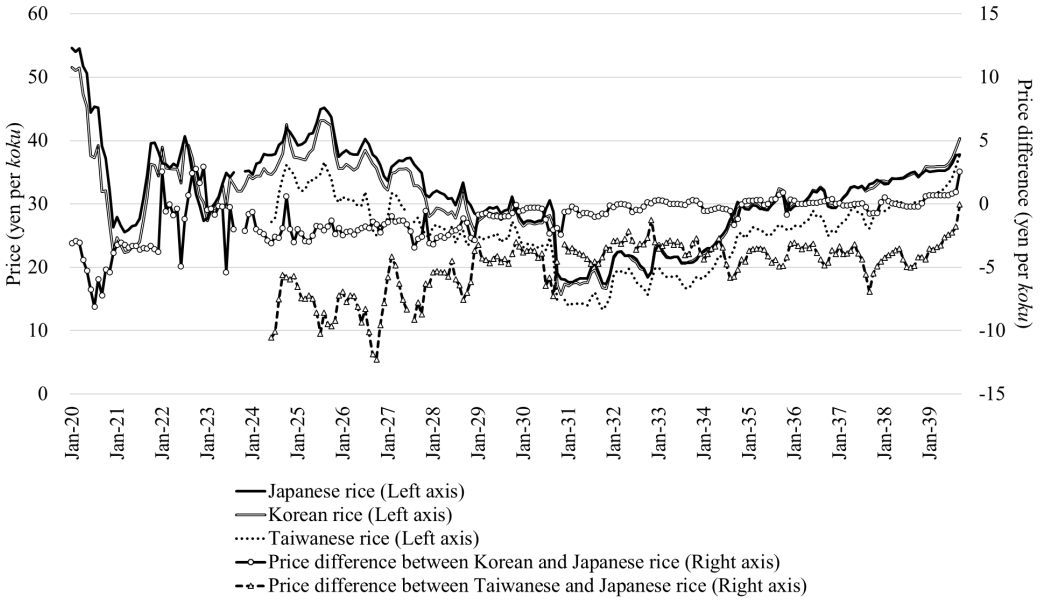


Fig. A.20 Monthly Korean, Taiwanese, and Japanese rice prices in Tokyo, 1920–39

Note: Taiwanese rice prices denote the prices of Hōrai rice (蓬莱米) from Taiwan.

Sources: Governor-General of Taiwan, Rice Bureau 1941: 112–13; Ministry of Agriculture, Agricultural Bureau 1925: 24–28, 1928: 44–54.

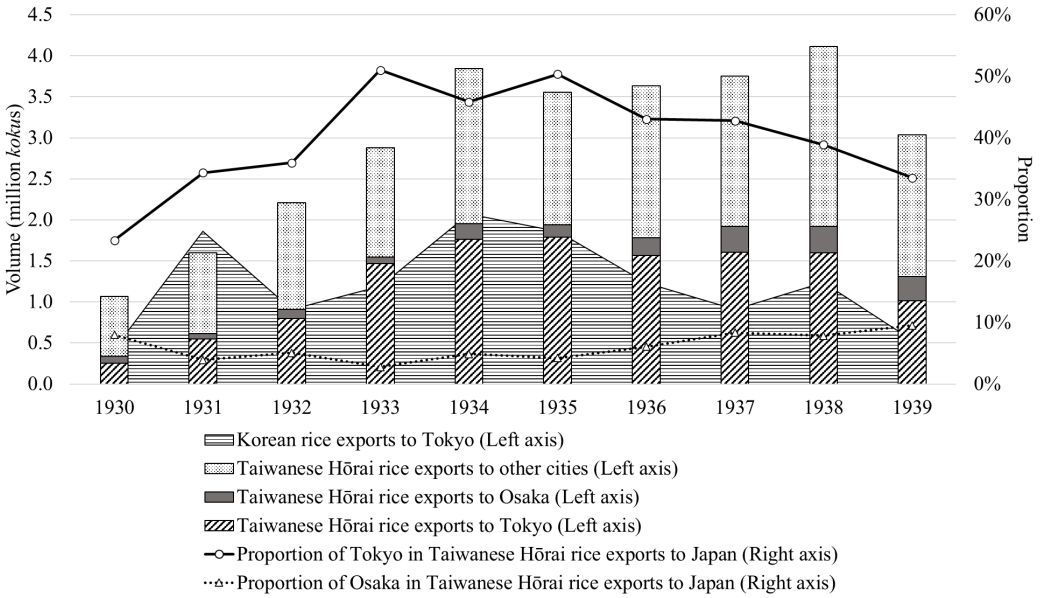


Fig. A.21 Taiwanese Hōrai rice (蓬萊米) exports to Japan by destination, 1930–39

Sources: Governor-General of Korea 1933b: 642–51, 1936b: 774–81, 1939b: 830–37, 1941a: 1034–41; Governor-General of Taiwan, Rice Bureau 1940: 89–91.