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The Long Term Change of Agricultural Production in Okayama Prefecture in terms of Rice, Wheat and Barley

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The current ratio of dependence on food in Japan has remarkably grown and the significance of food self-sufficiency by concurrent agriculture may decline, while importantly conserving the natural environment, appropriate management of farmland. Okayama prefecture has an agricultural trend over more than 100 years of rice, barley and wheat cropping area with the rise and fall of its agricultural land use from the prior to the Industrial Revolution in Japan. Although rice reduction policy in Japan is scheduled to end in 2017, Japan is strongly subject to rice compared to other grains. In order to understand the role and scope of the agricultural sector in Okayama pref., it is necessary to review the changes in the related agricultural products for the long term. In Okayama pref., the cultivation and processing of some industrial crops including sericulture sector were thriving in the past, but, commercial agriculture was not well developed and the meaning of the production of cereals was greater than current production. Considering the part of agricultural characteristics by examining the cultivation of crops over the long term, planting area survey by variety confirmed that the greatest feature of rice cultivation in Okayama pref. is the diversity of varieties. In addition to various rice varieties, agriculture in Okayama pref. has a high sustainability, resistance and flexibility against changes on climate, policies and land use.

Keywords: *cultivated area, rice, wheat, barley, Okayama prefecture*

1 INTRODUCTION

There are many factors that affect agricultural activities, including agricultural land area, quantity and quality of agricultural labor force, crops and their combinations. Agricultural production is also very closely linked with the economic theories based on some subjects as "*Goals and objectives of the farm manager, Choice of outputs to be produced, Allocation of resources among outputs, Assumption of risk and uncertainty, The competitive economic environment in which the farm firm operates*" (Debertin, 2012: 7-8). Success in agricultural activities based on crop production depends on the development of new technologies with the adoption of farmers as much as economic, social and environmental factors (Hijmans et al., 2003; Allen and Rajotte, 1990) including soil and weather conditions (Wang et al., 2003: 986). Developments or improvements in crop management technologies have an impact on productivity by directly affecting farmers (Jagtap and Abamu, 2003: 1068). In the basic arable land protection planning, there are key factors such as administration system in land use planning, balanced policies, purpose association between local and central governments (Zhong et al., 2012: 435-436). Rice cultivation in Japan with terraced fields greatly affects regional landscape in mountainous regions; however, the decrease in number of agricultural labourers because of different purposes is necessitated a new management system for maintaining the landscape (Iiyama, Kamada, and Nakagoshi, 2005: 311).

As studies on crops are very common in the literature, we restrict the study to cereals, legumes and potatoes which have formed agricultural land use in Okayama pref., Japan. Therefore, the aim of the research is to clarify agricultural land use and landscape in terms of basic crops in Okayama prefecture. As the research method, we collect the long-term statistics to examine the transition by presenting a regional

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difference in Okayama pref. in a certain crop with a certain time on a map. Therefore, we specifically analyze the information on crop statistics such as rice, wheat and barley in a spatiotemporal manner.

2 MAIN CEREALS

2.1. Overview

When we consider the current agriculture in Japan, the representative of grains is rice which is regarded as the staple food. However, if we recall the agricultural land-use or landscape half a century ago or earlier, we should add barley, wheat, foxtail millet, Chinese millet, barnyard grass and buckwheat. Although details of the temporal change of each grain will be explained later, we happen to list the cultivated area and yield of each grain in Okayama pref. in 1913 (**Table 1**).

About half of the cultivated area of cereals was occupied by non-glutinous rice, about 20% by hulless barley and about 10% by barley and wheat, respectively, and subtotal of rice, barley and wheat made up about 93% of the total. How should we consider the complementary significance of glutinous rice of about 4% and grains of low ratio to food? The ratio of harvested amount of cereals also shows a similar structure to that of the area. Among these, it should be noted that the harvest yield ratio of non-glutinous rice is 56% and the ratio of Chinese millet is 2.4%, which exceed the ratio in the case of cultivated area, respectively.

Thereafter, the area and yield of food crops increased due to the necessity of increased food production and the improvement of the level of agricultural technology, but due to the change of agricultural policy and the decrease of the area of cultivated land and of agricultural workers, they are largely remarkable diminished.

Table 1 Cultivated area and crop yield on cereals in Okayama prefecture in 1913

Cereals	Cultivated area		Crop yield	
	ha	%	ton	%
Non-glutinous rice	81,382	50.9	235,215	56.1
Glutinous rice	6,077	3.8	15,299	3.7
Rice grown in a dry field	257	0.2	422	0.1
Barley	15,741	9.9	37,272	8.9
Hulless barley	34,130	21.4	78,003	18.6
Wheat	16,797	10.5	35,431	8.5
Foxtail millet	1,976	1.2	4,012	1.0
Chinese millet	802	0.5	10,099	2.4
Barnyard grass	17	0.01	30	0.007
Buckwheat	2,599	1.6	3,150	0.8
Total	159,779	100.0	418,933	100.0

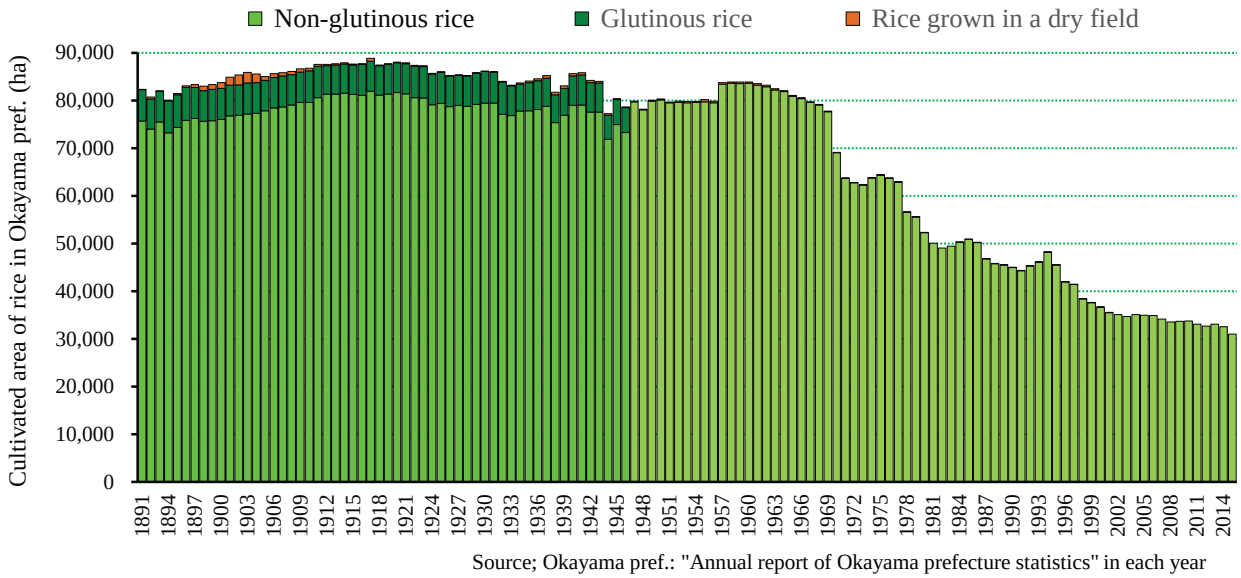
Source; Okayama pref. : "Annual report of Okayama prefecture statistics in 1913"

2.2. Rice

Rice has been a representative crop of agriculture in Japan and it is a basic crop along with wheat and barley among grains. However, the land productivity of rice in Japan before World War II was around 300 kg/10a, about half of the present, and was badly hit by frequent irregular weather and the occurrence of pests. Until the first half of the 20th century, many people lived on miscellaneous crops and potatoes, and in reality most Japanese could not have rice as a staple. In the 1960s, rice production technology was improved by the introduction of chemical fertilizer and agricultural machinery, the self-sufficiency of rice was finally realized, and rice became substantially staple food. However, at that time, the wheat strategy by the U.S.A. succeeded, the consumption of rice was reduced due to progress of the Westernization of Japanese meals by school bread meals and nutrition improvement campaign, so rice surplus occurred.

Fig.1 shows the transition of rice cultivation area in Okayama prefecture. Until 1946, non-glutinous rice and glutinous rice had been separately displayed, but in 1947 and later, they have been displayed without being distinguished. In addition, there are very few rice cultivated fields which are agricultural lands other than paddy fields, and they are called upland rice. The area of rice production in Okayama pref. did not show any significant changes until the 1960s, but it has been declining since 1970, when the nation's policy on rice decline and transformation began. In 1970, rice production area was 69,180 ha (100%), but it fell to 45,004 ha (65%) in 1990 and to 33,800 ha (48.9%) in 2010. The main cause of these declines is the rhetoric policy of rice. In the rice production adjustment policy since 1971, if farmers plant wheat, beans, grass, etc. instead of rice, they were awarded the subsidy of conversion incentives. Rice production adjustment policies continued to be strengthened for about half a century, but the budget amount for conversion incentives has been steadily decreasing, problems of idle fields and abandoned cultivation began to emerge. Japanese citizens who have become wealthy, especially those residing in cities, do not seem to correctly understand the circumstances of rural areas, which are food production

areas. There was no significant difference in the composition of rice production area, and in 1917, the rates of non-glutinous rice, glutinous rice, and upland rice were 92.2%, 7.1% and 0.7%, respectively. In addition, the area of upland rice cultivation decreased remarkably after the 1960s, and it has not been almost produced in the 21st century. The price of rice which is being sold to consumers in Japan has been said to be considerably more expensive than those in Asia, Southern Europe, and the US, although it varies significantly depending on the year and varieties. Ministry of Agriculture, Forestry and Fisheries of Japan has reduced the production of rice in order to adjust the rice price, but the rice price has not declined as planned.



Source; Okayama pref.: "Annual report of Okayama prefecture statistics" in each year

Fig.1 Cultivated area of rice in Okayama prefecture (See **Table 5**)

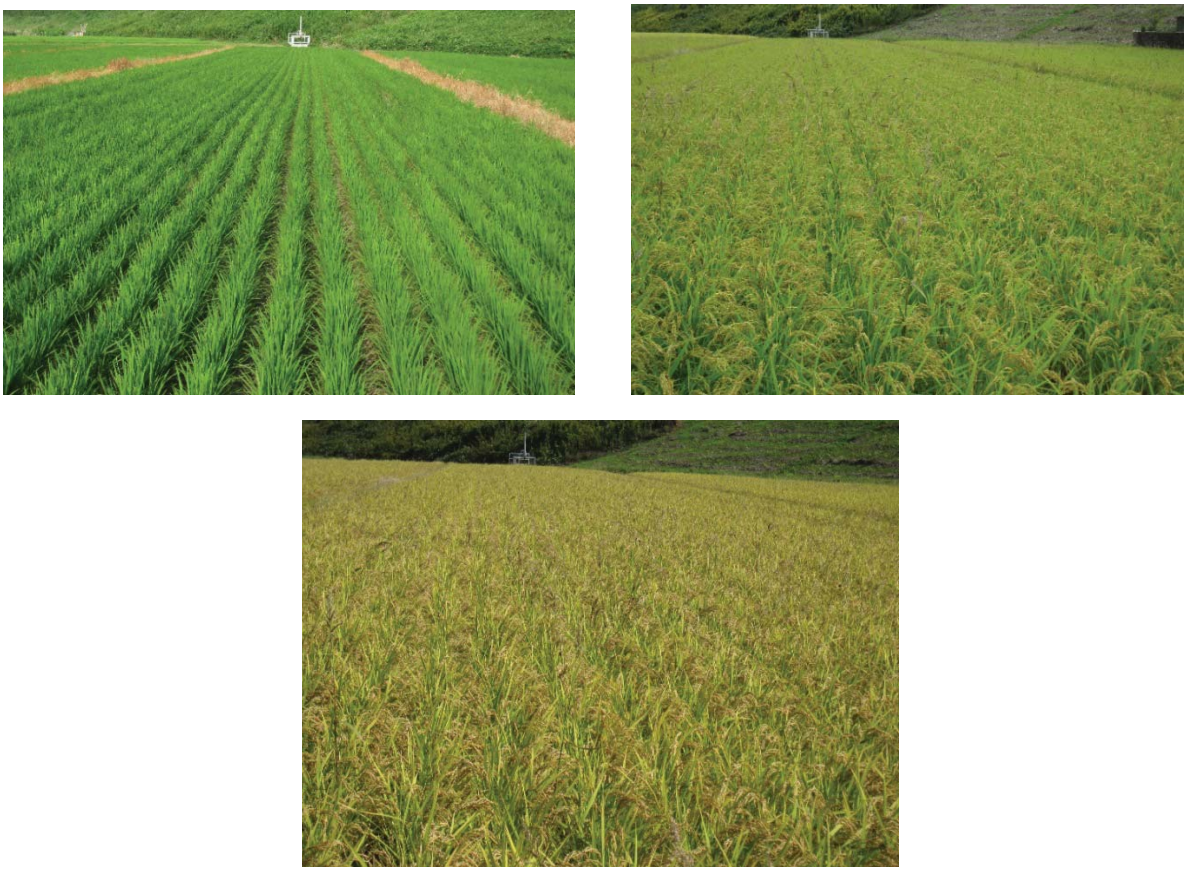


Fig.2 Landscape of paddy fields in Okayama city on Aug. 5 (top left), Oct. 18 (top right) and Nov. 3 (bottom), 2017

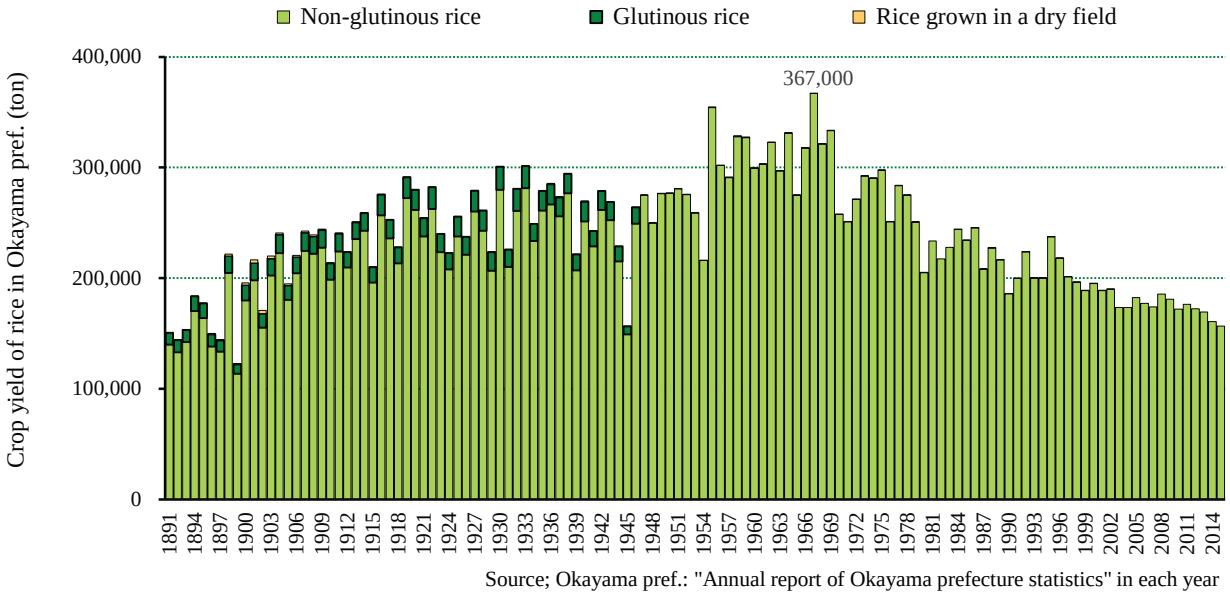
Since the season of transplanting rice is from late June to early July in southern part of Okayama pref., the height of rice is still small, rice is not blooming yet (**Fig.2**, top left), and there is no water on the paddy field. Rice planted with rice trans-planter machine seems to be regularly aligned. When autumn becomes full, rice harvest season comes. Rice in the image on the top right and bottom in **Fig.2** seems likely to be harvested by agricultural machines, from late Oct. to early November.

The long-term trend of rice yield is roughly similar to that of cultivated area. However, the short-term trend of increase and decrease is complicated, as the differences in harvesting may become noticeable due to weather conditions. Broadly, the yield of rice in Okayama pref. had increased until the 1960s with minor increases and decreases (**Fig.3**). However, it has been decreasing since then. Specifically, the yield of rice in 1891 was about 150,000 tons, but in 1967 it increased by about 2.4 times to about 367,000 tons. However, it has generally continued to decline since then. Rice yield in Okayama pref. was 156,600 ton in 2015, which means that it returned to the level at the end of the 19th century. **Fig.4** depicts the cultivated area of rice (the sum of paddy rice and upland rice, including glutinous rice) by municipality in 1960.

In Japan, paddy fields exist widely everywhere except forests and hilly areas. Rice is cultivated throughout Okayama pref., but in general, rice is widely planted in the southern part of the pref. where the altitude is low, surrounding the Okayama plain. Specifically, rice was planted at 5,368 ha in Okayama city, 4,300 ha in Kurashiki city, 4,048 ha in Tsuyama city, and 3,569 ha in Saidaiji city, etc. The cultivation area of rice should correspond to the population size.

On the other hand, rice field is small in the middle and upstream areas of the river where there are few wide plains, but rice has been planted in small cultivated land for a long time. Paddy fields of a certain size or more, where the average slope is one twentieth or more, are said to be rice terraces. On July 26, 1999, the Ministry of Agriculture, Forestry and Fisheries approved the rice terraces in 134 districts throughout Japan as "*one hundred Japanese rice paddies*", and four districts were certified in Okayama prefecture. These are the *Oohaga-nishi* (The area of rice terraces is 42.2 ha and the number of paddy fields is about 850. For the following, the order is the same.) and the *Koyama* (5.5 ha, 30 fields) areas in Misaki town and the *Kita-sho* (88 ha, 2,700 fields) and *Kami-momi* (22 ha, 1,000 fields) areas in Kume-nan town and they are distributed in the central part of Okayama prefecture. In Okayama pref. there are 13,000 hectares of rice terraces equivalent to about 20% of paddy field area in 1997 (Kanda, 2007).

Also, Okayama pref. began a project to preserve a beautiful village with emphasis on rice terrace landscapes and conservation consciousness in 7 towns in 1992. Its contents have organic cultivation, cultivation using only a few pesticides, cultivation which does not use pesticides at all, weeding by duck, the improvement of agricultural infrastructure, the enhancement of rice



Source; Okayama pref.: "Annual report of Okayama prefecture statistics" in each year

Fig.3 Crop yield of rice in Okayama prefecture (See **Table 6**)

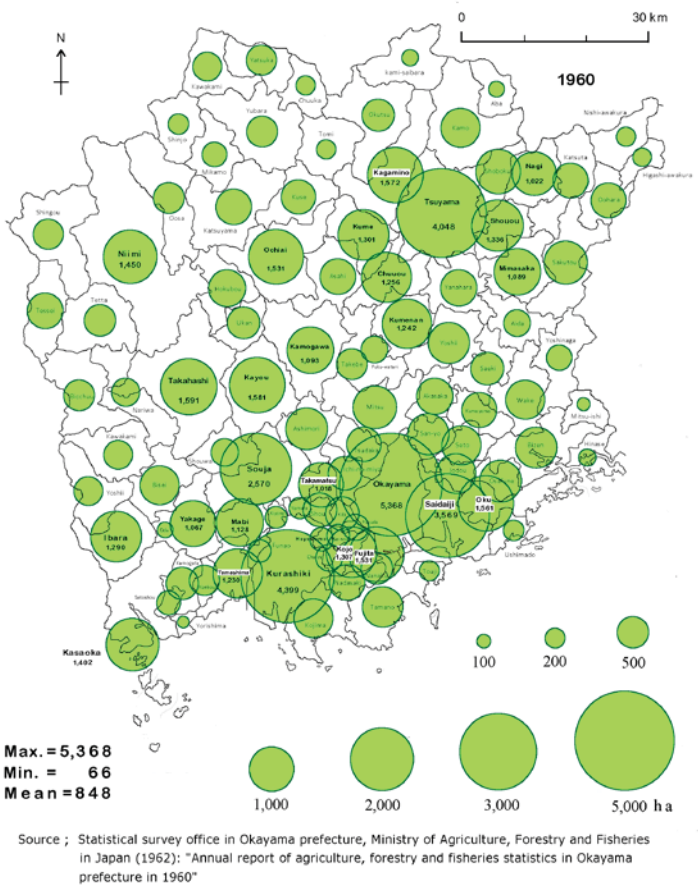


Fig.4 Cultivated area of rice in Okayama prefecture in 1960 (See **Table 7**)

production organization and the promotion of exchange with urban residents. The target area of the project were the *Oo-haga* area in Chuou town, the *Oku-shiota* area in Saeki town, the *Ue-yama* area in Aida town, the *Une-higashi* area in Takebe town, the *Hoshiko* area in Tessei town, the *Chimori* area in Kamo-gawa town and the *Kita-sho* area in Kume-nan town. Kanda (2007) carefully researched the organization of conservation activities directed at terraced paddy fields for the *Oo-haga-nishi* area in Chuou town and the *Kita-sho* area in Kume-nan town. Besides these, there are many small terraced paddy fields in Okayama pref., which have existed since ancient times.

Table 2 shows the summary of the cultivation area and crop yield of major agricultural crops in Okayama prefecture in 1960. The Japanese economy at this time was developed steadily, the agricultural labor force was also large, the farmland was fully utilized, and the yield of agricultural products was also high. First of all, 39% of the cultivated area is rice, followed by leaf tobacco (12.7%) and wheat (11.1%). These three account for 63.2%. Leaf tobacco is a plant native to the Solanaceae in the tropics and contains nicotine with strong addiction. In the mountainous area of Okayama prefecture, leaf tobacco has been cultivated widely in the field. In order to cultivate leaf tobacco, it is necessary to do "sales contract" with Japan Tobacco Inc. (JT).

In addition, hulless barley (7.5%) and barley (4.8%) stand out. The total of barley and wheat constitutes 23.4%. The area ratio of legumes is 4.5%, of which the area of soybeans is the largest. The area ratio of vegetables also shows 4.5%, and the proportion of Japanese white radish and Chinese cabbage is particularly conspicuous. In industrial crops, besides tobacco, peppermint (mentha herb) and rapeseed are also cultivated. For feed crops, 3.4% of Chinese milk vetch is outstanding.

Next, we briefly explain the characteristics of the harvest amount namely, crop yield. The ratio of grains is large, but rice is about 30%, the total of barley and wheat is only 12.7%. The ratio of feed crops including Chinese milk vetch (17%) occupies 22.6%, and the presence is strong. The ratio of vegetables is 12.3%, the one of potatoes is 7.9%, both of which are increasing their presence. Especially, 5.4% of sweet potatoes stand out.

Table 2 Cultivation area and yield of main crops in Okayama prefecture in 1960

Main crops in Okayama pref.		Cultivation area		Crop yield	
		ha	%	ton	%
Rice		83,927	39.4	299,810	28.4
Barley and wheat	Barley	10,215	4.8	23,800	2.3
	Hulless barley	16,086	7.5	44,300	4.2
	Wheat	23,762	11.1	65,900	6.2
Other cereals		1,238	0.6	1,065	0.1
Potatoes	Sweet potato	3,590	1.7	57,000	5.4
	Potato	2,111	1.0	26,550	2.5
Pulses	Soybean	5,227	2.5	7,430	0.7
	Red beans	1,984	0.9	1,620	0.2
	Cowpea	1,021	0.5	880	0.1
	Other beans	1,328	0.6	1,232	0.1
Vegetables	Pumpkin	693	0.3	10,400	1.0
	Watermelon	663	0.3	9,890	0.9
	Cabbage	584	0.3	9,450	0.9
	Japanese white radish	1,864	0.9	50,900	4.8
	Chinese cabbage	1,068	0.5	21,660	2.1
	Other vegetables	4,666	2.2	57,280	5.4
Industrial crops	Rush	3,699	1.7	39,500	3.7
	Rapeseed	1,597	0.7	1,810	0.2
	Mentha herb	2,727	1.3	5,530	0.5
	Leaf tobacco	27,174	12.7	5,458	0.5
	Other industrial crops	2,296	1.1	20,558	1.9
Fruits	Peach	2,043	1.0	15,500	1.5
	Grape	1,706	0.8	19,700	1.9
	Persimmon	1,349	0.6	10,700	1.0
	Other fruits	1,253	0.6	8,870	0.8
Fodder and fertilizer crops	Chinese milk vetch	7,150	3.4	179,400	17.0
	Other crops	2,249	1.1	59,302	5.6
Total		213,269	100.0	1,055,495	100.0

Source; Okayama statistical survey office, Ministry of Agriculture and Forestry (1968): "Annual report on Okayama agriculture, forestry and fisheries statistics in 1967"

By dividing the harvest amount by the cultivated area, we can obtain the average land productivity of rice in Okayama pref. (**Fig.5**). The productivity of rice was less than 200 kg per 10a at the end of the 19th century, but it gradually increased while repeating increase and decrease. It reached 300 kg in the 1920s, exceeded 400 kg in the 1970s and 500 kg after the latter half of the 1990s. Generally, rice varieties were increasingly improved, mechanization has largely advanced and fertilization methods have changed significantly in the period of about 100 years. As a result, the land productivity of rice increased about 2.5 times in Okayama prefecture.

By the way, rice productivity differs by municipality. To illustrate this, **Figs.6-1** and **6-2** show the cases in 1960 and 2000. In 1960, the average land productivity of rice in Okayama pref. was 346 kg/10a, and the areas of 350-400 kg/10a exceeding the average were distributed without remarkable bias. However, the areas of 400 kg/10a or more were distributed only in the southern part of the pref. Regions with land productivity of less than 300 kg/10a were distributed in the limited area of the northeastern part and the western part of Okayama prefecture.

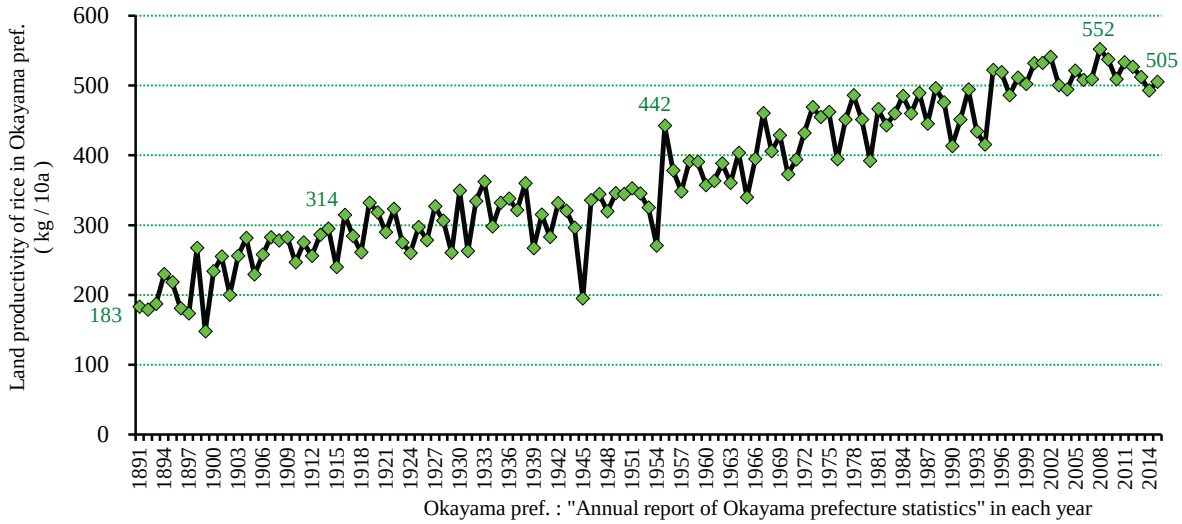


Fig.5 Land productivity of rice in Okayama prefecture

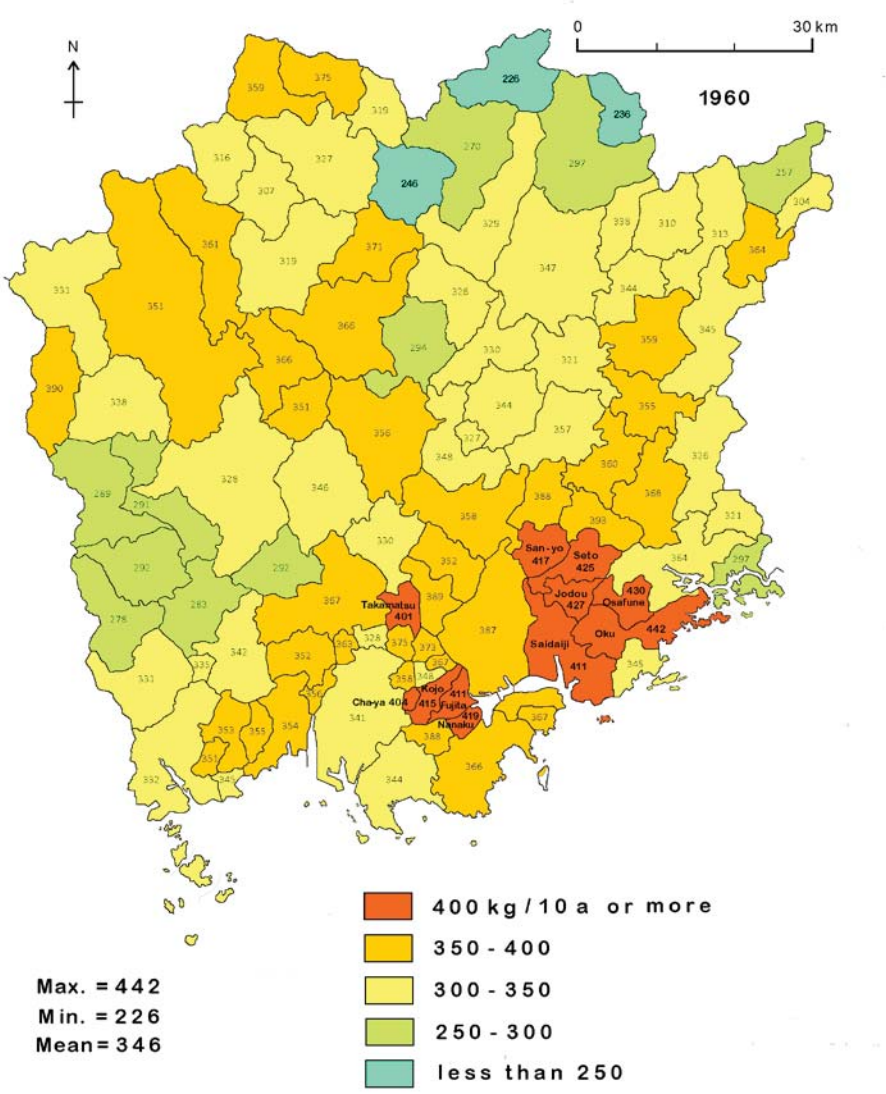


Fig.6-1 Land productivity of rice by municipality in 1960 in Okayama prefecture

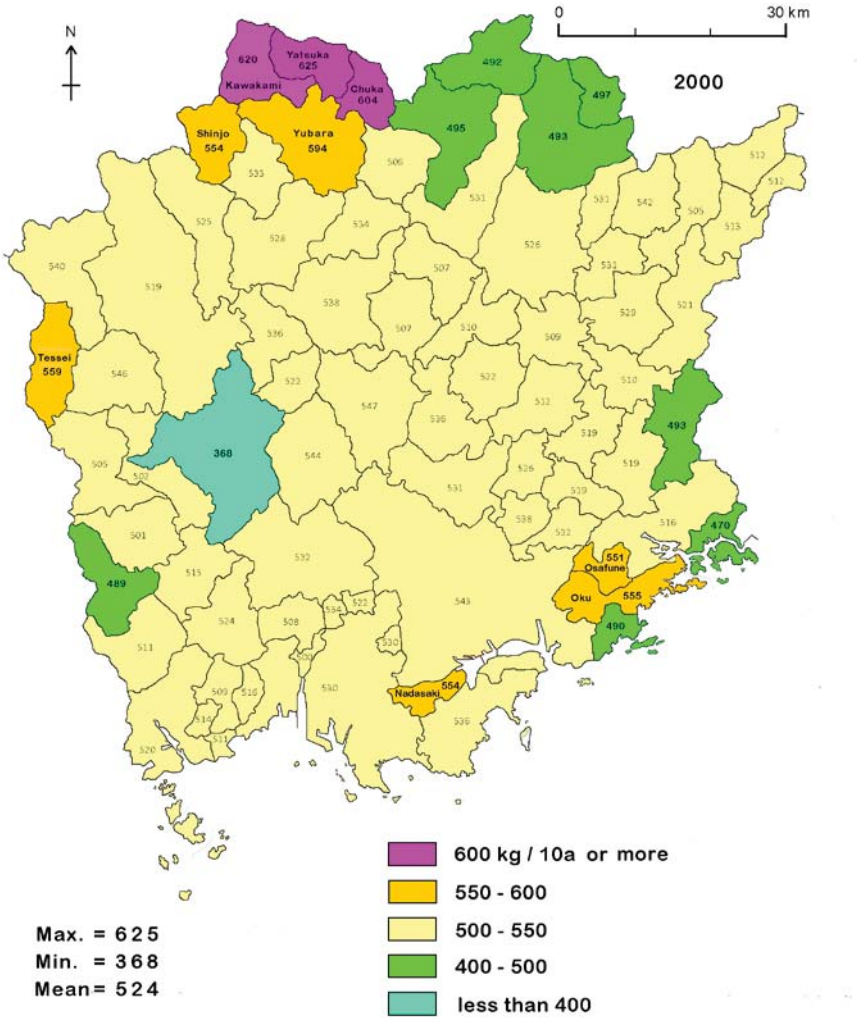
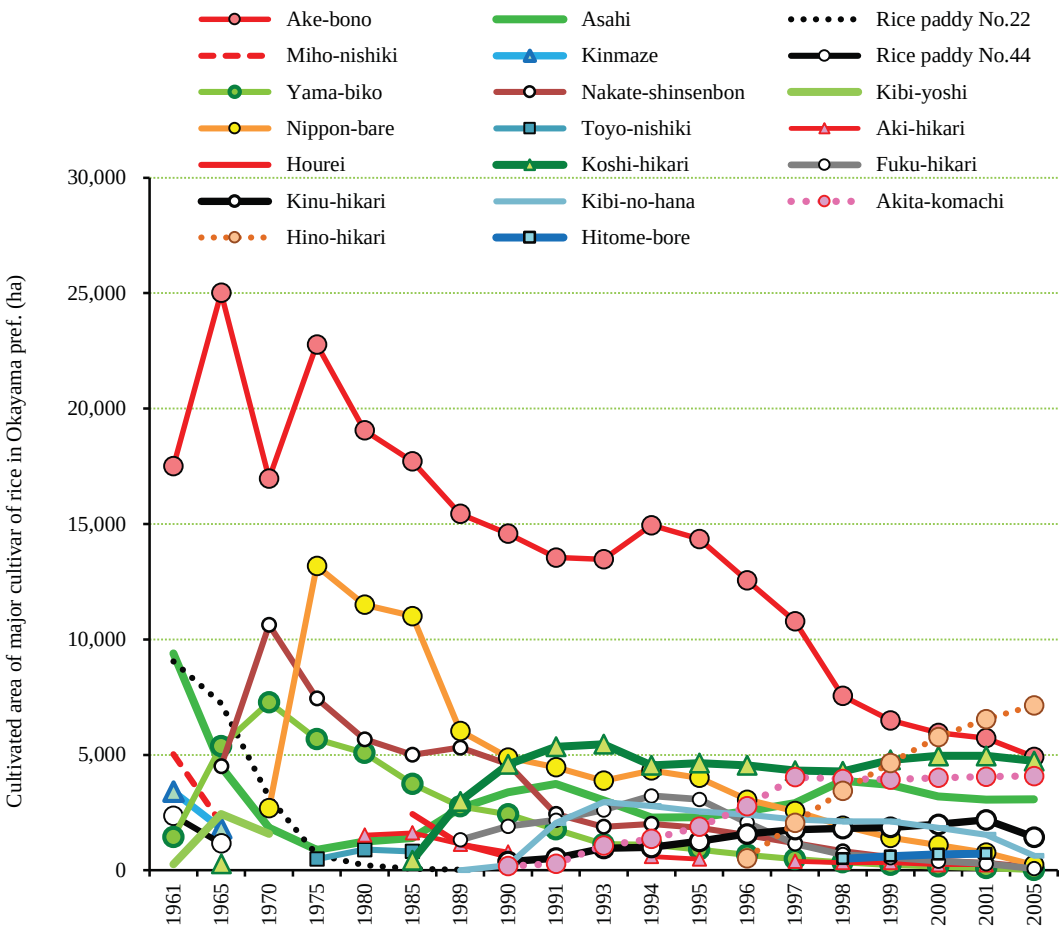


Fig.6-2 Land productivity of rice by municipality in 2000 in Okayama prefecture

In 2000, the average land productivity increased to 524 kg/10a, but the regional difference has a less noticeable impression. A distinctive feature was that the areas of 600 kg/10a or more were concentrated in the southern part of the pref. and the districts less than 500 kg/10a were distributed in the northern part of Tsuyama city. Although there seems to be little importance to the regional difference of the land productivity of rice, the agricultural base in the region with low productivity is weak, and there is concern that the decline of paddy rice production will further progress.

Fig.7 shows the cultivated area of major rice varieties in Okayama prefecture. The area of "*Akebono*" was the largest in the 20th century, but the decrease was also very noticeable. The areas of "*Nippon-bare*" and "*Nakate-shinsenbon*" were more than 5,000 hectares until around 1990, but the decrease is also noticeable. Although the area of "*Asahi*", familiar in Okayama pref. showed a similar trend, it has an increasing trend since 1985. The areas of "*Koshi-hikari*", "*Akita-komachi*" and "*Hino-hikari*" have increased in recent years. However, the one of "*Hino-hikari*" in the central and southern part of Okayama pref. has greatly reduced due to high temperature disorder in 2010.

The number of rice cultivars cultivated in Okayama pref. is larger than that of other prefectures, and single variety can never occupy an overwhelming proportion. The main varieties in the northern part of Okayama pref. are "*Akita-komachi*" and "*Koshi-hikari*", in particular, "*Koshi-hikari*" has strong domestic consumption for Okayama prefecture. The main varieties in the southern part of Okayama pref. are "*Akebono*" and "*Asahi*", and the demand for business mainly outside Okayama pref. is strong. Also, "*Asahi*" has high awareness in Okayama pref., there is a demand for sushi rice for business use, and for home and school feeding. "*Koshi-hikari*" has a



Source; Food Agency: "Cropping by rice varieties" (Digitized books, Ministry of Agriculture, Forestry and Fisheries in Japan)
Note; The statistical annual are not necessarily regular.

Fig.7 Cultivated area of major cultivar of rice in Okayama prefecture

high degree of publicity, so there is a certain demand, but it is harder to cultivate than other varieties. Also, since the price difference between *Koshi-hikari* and other varieties is shrinking, the cultivated area of "*Koshi-hikari*" is decreasing. Recently, the cultivation area of "*Niko-maru*" is increasing in the southern part of Okayama pref., but there are problems in cultivation technology and distribution. The greatest characteristic of non-glutinous rice cultivation in Okayama pref. is the diversity of varieties.

According to Kawata (2013), the price and taste of rice cultivar were particularly important. As opinions of dealers in Okayama pref. purchasing rice, *Bento* (Probably the most used at lunch) business other than convenience stores tend to use "*Hino-hikari*" and "*Akebono*" considering the price. In the hotels, various varieties such as "*Koshi-hikari*", "*Hino-hikari*" and "*Asahi*" etc. were used. For meals suppliers to schools, companies, etc., there is a tendency to select "*Hino-hikari*" with emphasis on price, and rotary *sushi* restaurants used "*Asahi*" and blended rice. Motoki (1999) analyzed the history of rice varieties in northeastern Japan from 1970 to 1995 in detail. He pointed out that research on rice varieties change had certain significance not only to know the influence of changes in the socio - economic environment on rice production but also to predict future rice cultivation.

In rice varieties, glutinous rice like "*Hime-no-mochi*" and rice such as "*Yamada-nishiki*" and "*Omachi*" for brewing alcoholic beverages are also cultivated in Okayama prefecture. However, these areas and crop yields are very small compared to non-glutinous rice. Considering the bundle of papers, they were not handled here.

3 BARLEY AND WHEAT

Both six-rowed barley and hulless barley are the varieties cultivated in Japan from ancient times. Although six-rowed barley is a raw material for barley tea and is often eaten mixed with rice, it was eaten by roasting it in powder in the past. Hulless barley is often

used for the production of *miso*. Because six-rowed barley is strong against cold, it is cultivated mainly in eastern Japan, and since two-rowed barley and hulless barley are weak against cold, they are cultivated mainly in western Japan.

In Okayama pref. we can refer to the statistical record of three kinds of barley and wheat. From the end of the 19th century to the beginning of the 20th century, the acreage of hulless barley was the largest. Hulless barley was mixed with rice to be eaten or used as raw material for barley tea, but in recent years it has been used as raw material for *miso* and *shochu*. However, the cultivated area of hulless barley gradually decreased in the long term. In contrast, the government's production promotion policy gradually increased the cropped area of wheat, the cultivation area of wheat adhered to the rise period especially from the 1930s to the 1950s. However, the area of hulless barley and wheat sharply decreased after the 1960s due to the influence of massive import of wheat, especially from the USA. Although the cultivated area of barley has been kept constant for a while, it has a slight declining trend in the long term and there is a demand as a raw material for beer.

As in the case of rice, the variation tendency of barley and wheat yield is accompanied by a finer change than that of their cultivation area. However, in general, the variation trend of the area of barley and wheat and the one of the yield is similar. The sharp decline of barley and wheat cultivation after the 1960s is because the income from work other than agriculture surpassed the benefits of double-cropping as a post-production of rice. Agriculture became more and more subsequently hired, leading to a decline in the number of farmers and farm households.

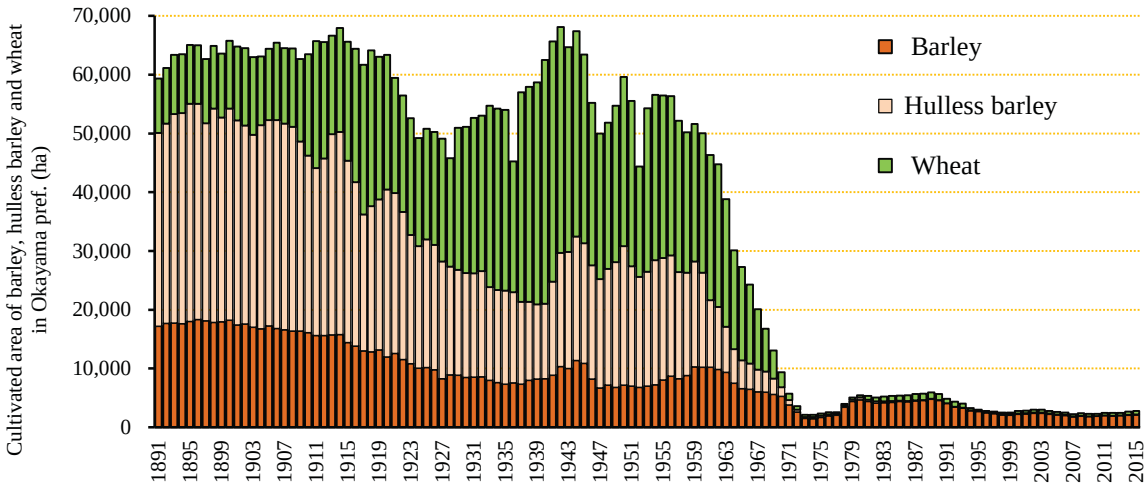
The seeds of harvested wheat are milled and used as flour. Wheat flour is raw material such as bread, *udon*, Chinese noodles, confectionery, pasta and *somen* (very thin Japanese noodles) etc. Beer is usually made from barley, but white beer is made using a lot of wheat malt. Wheat is also a raw material for whiskey and industrial alcohol. When raising two crops a year began in the 13th century, cultivation of wheat, which is the second crop immediately after rice also increased rapidly. In Japan, the flour milling technology was underdeveloped, so foods using flour such as wheat were considered to be luxuries for a long time. People started to eat powdered foods such as noodles after the 17th century when a hand mill was popularized.

Consumption of wheat increased after various wheat dishes like bread were transmitted from Europe and the United States at the end of the 19th century. The area of wheat cultivation in Japan was 360,000 ha in the mid-19th century and 500,000 ha in the 1910s. However, it increased to the level of 700,000 ha during the Second World War and recorded the maximum value (**Figs. 8 and 9**).

After the World War II, school meals started, bread-based school lunch and Westernization and diversification of foods further expanded the consumption of wheat. On the other hand, wheat cultivation area continued to decrease rapidly due to the massive importation of cheap wheat from the United States and others, the decline of double cropping itself, heavy rain in summer of 1963 and heavy snowfall. In 1963, the cultivation area of wheat was 600,000 hectares in Japan, and its self-sufficiency rate was about 20%, but in 1973 the cultivation area of wheat decreased to 75,000 ha, the self-sufficiency rate of wheat in Japan decreased to 4%. Thereafter, production of wheat was encouraged by the policy of deterrence of rice, and its production was slightly recovering. In 2005, the area of wheat cultivation was 210,000 ha in Japan, and the self-sufficiency rate of wheat was 14%.

In Okayama pref., most of the wheat is supplied mainly to the millers through agricultural cooperatives. Approximately 80% of the cultivation area in Okayama pref. is planted in Okayama city, followed by Tsuyama city. **Fig.10** shows the distribution of cultivated area of wheat in Okayama pref. in 1960. It is clear that the planted area of wheat is concentrated considerably in municipalities in the southern part of the prefecture with wide plains. Wheat variety of *Shira-sagi* has been mainly planted in Okayama pref. since Feb. 1957. However, in order to avoid competition with paddy rice work, "*Fuku-honoka*" was selected as an encouraged variety in Aug. 2012, and it was switching from full production to production in 2014. *Fuku-honoka* is a breed that has a fast maturity phase and a high crop yield (PCHWO and ARCO, 2015).

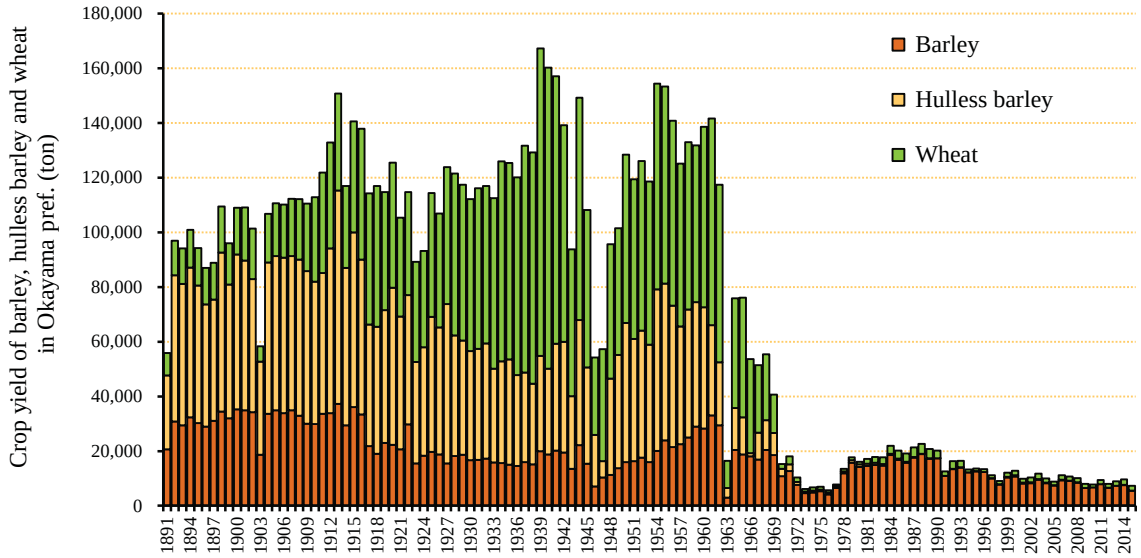
The optimum period for seeding of wheat is from the mid-Nov. to late Nov. in the southern part of Okayama pref. and in early Nov. to the mid-Nov. in the northern part. About 90% of wheat is planted in paddy fields in Okayama pref. and wheat is mainly used for noodles such as *udon* and confectionery.



Sources; Okayama pref.:"Statistical annual report in Okayama pref." and Agricultural bureau of Chugoku and Shikoku regions: "Statistical annual report on agriculture, forestry and fisheries in Okayama pref." in each year.

Fig.8 Cultivated area of barley, hulless barley and wheat in Okayama prefecture (See **Table 8**)

Note; Barley is the sum of six-rowed barley and two-rowed barley.



Sources ; Okayama pref. : "Statistical annual report in Okayama pref. " and Agricultural bureau of Chugoku and Shikoku regions: "Statistical annual report on agriculture, forestry, and fisheries in Okayama pref. " in each year

Fig.9 Crop yield of barley, hulless barley and wheat in Okayama prefecture (See **Table 9**)

According to the food supply and demand table in Japan, wheat production in Japan in 2015 is 1,004 thousand tons, the import volume is about 5 times, that is, 5,660 thousand tons. Therefore, the proportion of wheat produced domestically is about 15%, imports account for 85%. Also, in 2011, the proportion of imported wheat in Japan was about 58% for America, 21% for Canada and 20% for Australia. In the main application of wheat flour, Canadian and American wheat are processed into strong flour and are consumed as bread. Wheat from Canada is processed into semolina flour (durum wheat), and is consumed as macaroni and spaghetti. USA wheat processed into flour is a raw material for Castella, cake, tempura powder and biscuits. Australian and American wheat is used for Chinese noodles and the skin of dumpling (*Gyoza*) and domestic wheat and Australian wheat are used for *udon*, instant noodles and biscuits.

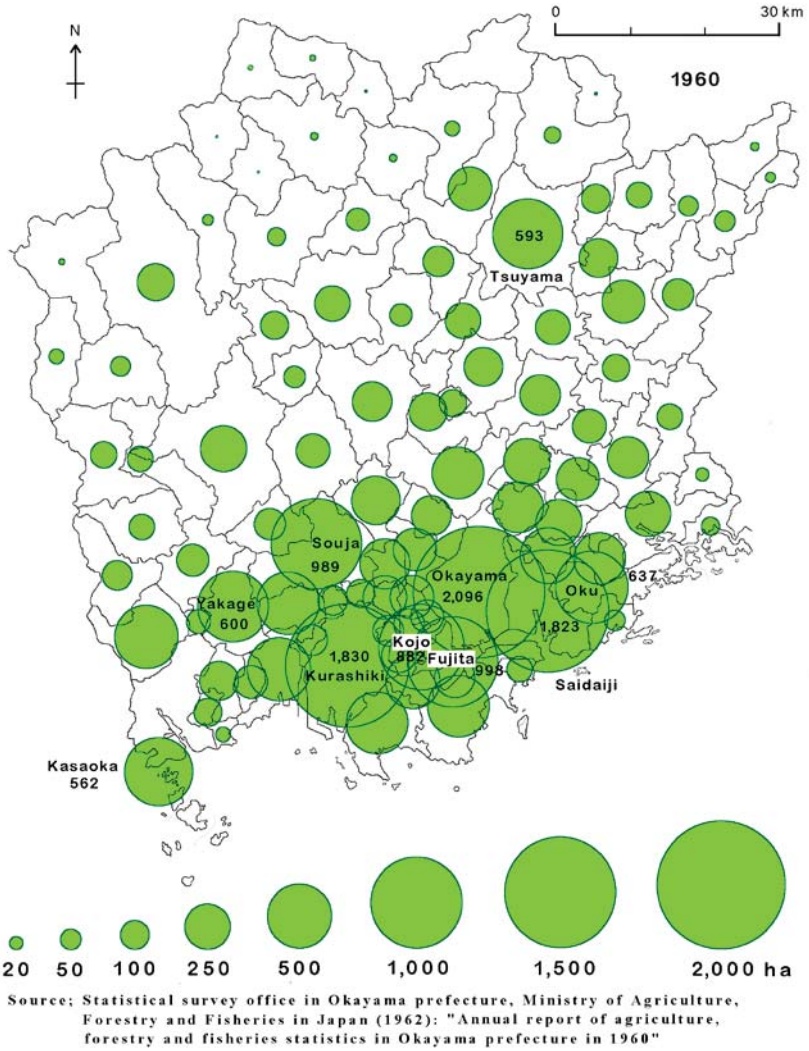


Fig.10 Cultivated area of wheat by municipality in Okayama pref. in 1960

When double-cropping spread after the 13th century, the barley cultivation expanded in Japan. Barley which likes coldness and drying, was suitable as a crop following rice. Since barley can be eaten as grain, there is no need for milling. In addition, barley grew faster than wheat and was suitable for increasing rice, so its cultivated area also expanded. It seems that the seeds of two-rowed barley were introduced to Japan for beer brewing at the end of the 19th century.

Around the same time, the planting area of barley reached nearly three times the wheat planting area in Japan. Major applications of barley are for staple food until the beginning of the 20th century, especially in rural areas barley was mixed with rice and was eaten as barley rice. After that, as the yield of rice increased, wheat cultivation increased and the planting area of barley decreased. In the middle of the high economic growth period in the middle of the 20th century, double-cropping were hardly done, especially the cultivation of edible six-rowed barley and hulles barley decreased sharply. In contrast, the production of two-rowed barley kept a certain amount because there was a large demand for beer brewing. **Fig.11** depicts the distribution of barley in Okayama pref. in 1960. Barley was grown more widely in the inland area such as Takahashi city, Tsuyama city and Ochiai town, etc. than coastal areas of the Seto Inland Sea. However, as the imports of wheat for beer ingredients increased after the 1970s, the production of two-rowed barley also declined.

According to PCHWO and ARCO (2015), In Okayama pref., the two-rowed barley is cultivated mainly in the southern part and has the fourth largest production volume in Japan. About 70% of the cultivated area of barley in Okayama pref. is planted in Okayama city, followed by Setouchi city and Tamano city. The optimum period for sowing of two-rowed barley is from

the middle of Nov. to the beginning of Dec. From 2006, two varieties of "*Omi-yutaka*" and "*Michal Gold*" have been planted. However, instead of "*Omi-yutaka*", "*Sky Golden*" was selected as a regionally adaptable excellent variety in Aug. 2013, and it has switched to full production since 2015. The main uses are for beer (Kirin beer) and for large grains (*shochu*, *miso*, barley tea and pressed barley). In 2013, the cultivated areas of two-rowed barley variety in Okayama pref. were 1,196 ha for *Michal Gold* , 666 ha for *Omi-yutaka* and 128ha for *Sky Golden*, respectively.

In Okayama pref., "*Kikai-hadaka*" had been adopted from Mar. 1963 until Sept. 2013 as an encouraging variety of hulless barley. In addition, "*Ichiban-boshi*" was adopted in Aug. 1994. The acreage area of hulless barley recorded a peak (356 ha) in 1980, but it continued to decrease after that, it became 10 ha in 1994. Thereafter, although the cultivation area gently recovered, the area of 2014 production is 30 ha, which has decreased again in recent years. The varieties of hulless barley are mainly "*Ichiban-boshi*" and are planted in Okayama city and Kasaoka city, etc. The area of 2013 was 20 hectares (PCHWO and ARCO, 2015). **Fig.12** presents the distribution of hulless barley in 1960. Until around 1960, the area and yield of hulless barley had been generally much higher than in the present. It was obvious that the hulless barley was cultivated not much in the northwestern part of Okayama pref., but it was cultivated actively in other areas. Acreage area was particularly high in Kasaoka city, Ibara city, Tamashima city, Kurashiki city, Saidaiji city, Tsuyama city, among others.

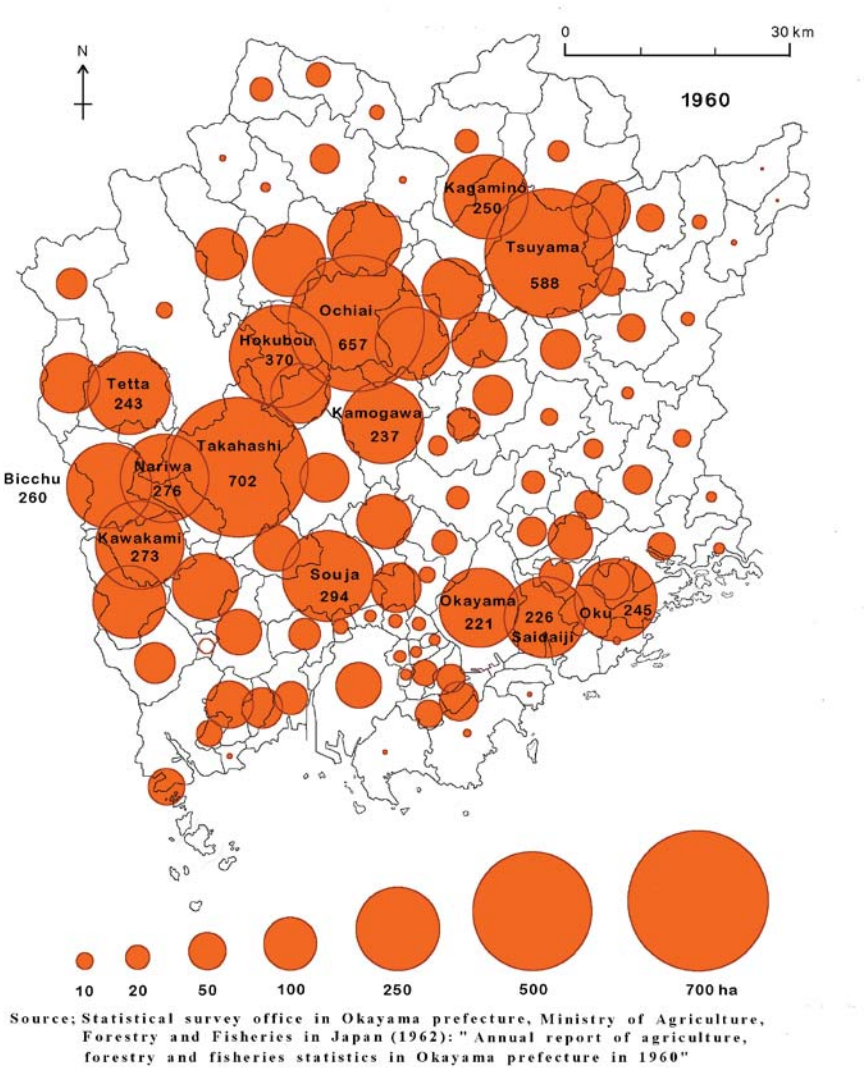


Fig.11 Cultivated area of barley by municipality in Okayama pref. in 1960

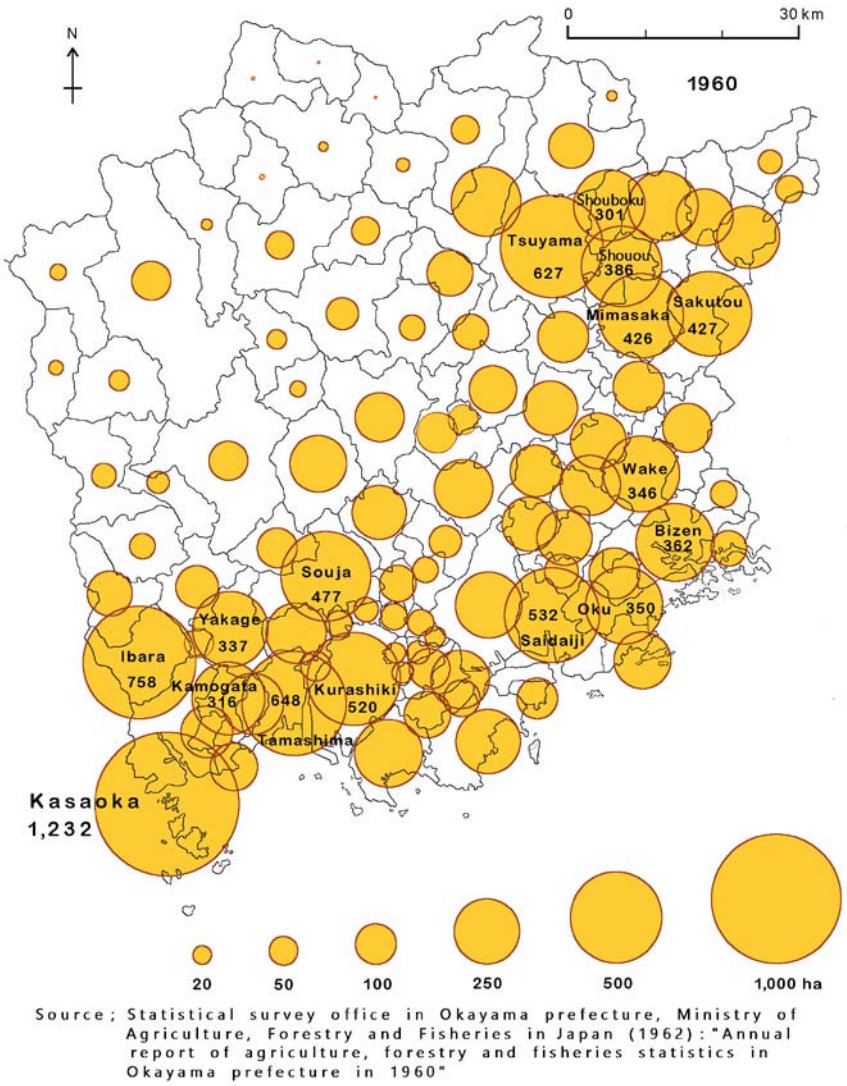


Fig.12 Cultivated area of hulless barley by municipality in Okayama pref. in 1960

Because cereals such as wheat and barley are weak in acidity, and they tend to be poor in growth when it falls below pH 5.0 to 5.5, so calcium material is applied for soil pH of 6.0 to 7.0. Large-scale management and village farming organization, etc. produce the majority of the wheat cultivation in Okayama pref., but as with other agricultural crop cultivation, the number of producers is decreasing due to the aging of agricultural workers.

When farm households join the stabilization measures of income related to wheat production, they can receive direct payment grants in Okayama prefecture. According to the Okayama prefectural headquarters of the National Agricultural Cooperative Federation in 2014, the sales price is 3,306 yen / 60 kg for wheat, 7,318 yen / 50 kg for two-rowed barley (beer barley), 2,327 yen / 50 kg for two-rowed barley (large grain barley) and 2,982 yen / 60 kg for hulless barley. Although rice is a basic crop of Japanese agriculture and it is a major grain, wheat and barley have been supporting the food demand for some time.

4 CONCLUDING REMARKS

In this paper, we mainly focused on the areas of rice, wheat and barley in Okayama prefecture. We often handle the information on workers engaged in agricultural production and production technology as well as the cultivated area.

In 2015, 49.4% of the farm households in Okayama pref. grew rice with 56.5% of the total cultivated land (**Table 3**). It was also clear that compared to rice, wheat and barley were only cultivated in a small part. In other words, 0.5% of the farm households grew wheat with 1.8% of the total cultivated land, and 0.9% of the farm households grew barley with 4.9% of the whole cultivated area. Rice production has gradually decreased

Table 3 Number of farm households and cereals farming in Okayama pref. in 2015

Cereals	Number of cultivated farm households and their percentage (%)	Cultivated area (ha) and its percentage
Rice	30,780 (49.4)	23,992 (56.5)
Wheat	338 (0.5)	763 (1.8)
Barley	591 (0.9)	2,093 (4.9)
	Number of farm households	Area of arable land (ha)
Total of farm households	62,356 (100)	4,2432 (100)
Source ; Agricultural census in 2015		

since the 1970s. Compared to other grains, it shows clearly that Japan is strongly obsessed with rice. Although rice reduction policy in Japan is scheduled to end in 2017, it seems that subsidies will be provided separately when farmers systematically produce rice for livestock feed. There are opinions that such complex policies are desirable for sustainable farmland use, but criticism is strong as well.

According to the ratio of the number of farmers (or farm households) harvesting each grain to the total number of farmers and its temporal change (**Table 4)**, rice was cultivated by most farmers in Okayama pref., and the ratio of farmers to harvest rice had held more than 90% until 1970, but it decreased to 60% after 1990.

Table 4 Number of harvest farm households of main cereals and its ratio in Okayama prefecture

Year		**Total** number of farm households	Number of **harvest** farm households and its ratio				
			Rice	Wheat	Barley	Hulless barley	Two-rowed barley
1950	Number of farm households	177,078	164,772	147,492	43,092	131,902	
	Percentage to total farm households		93	83	24	74	
1960	Number of farm households	172,533	161,495	122,196	46,214	89,249	
	Percentage to total farm households		94	71	27	52	
1970	Number of farm households	154,081	145,141	26,789	26,568		12,108
	Percentage to total farm households		94	17	17		7.9
1980	Number of farm households	134,799	120,282	3,308	3,240		8,577
	Percentage to total farm households		89	2.5	2.4		6.4
1990	Number of farm households	110,451	76,680	2,292	654		4,819
	Percentage to total farm households		69	2.1	0.6		4.4
2000	Number of farm households	90,053	53,704	387	119		1,229
	Percentage to total farm households		60	0.4	0.1		1.4
Note; In the case of 2000, it is not the number of harvest farm households, but the number of planted farm houseiholds.							
Source ; Ministry of Agriculture, Forestry and Fisheries in Japan : " Census of world agriculture " in each year							

Although this ratio fell considerably, about half of the farmers still grew rice. This is partly related to the national policy on rice including subsidies, but even a part-time farmer who does not spend much time on farming operations involves advanced agricultural techniques which can cultivate rice relatively easily.

There was a big change in the proportion of farmers related to wheat. This ratio had held more than 70% until

1960; however, it decreased to 17% in 1970 and remarkably decreased thereafter. The number of harvested farmers of barley and hulless barley had been separately reported until 1960, but changed after 1970 as reported together. After 1990, the number of farmers producing barley declined to less than 1,000 and continues to decrease conspicuously thereafter. In contrast, the number of harvested farmers of two-row barley which are used as a raw material for beer has been announced since 1970 (12,108 farms and 7.9%), however, the number and ratio of harvest farmers continues to decrease and in 2000 it showed 1,229 farms and 1.4%, respectively.

The number of farm households to cultivate rice has decreased remarkably than the trend of the total number of farmers. However, the number of farmers growing wheat and barley has decreased more remarkably than the case of rice farmer.

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Appendices:

Table 5 Cultivated area of rice in Okayama prefecture (ha)

Year	Nonglutinous rice	Glutinous rice	Rice grown in a dry field	Year	Nonglutinous rice	Glutinous rice	Rice grown in a dry field
1891	75,754	6,531	41	1954	79,637		198
1892	74,035	6,299	419	1955	79,736		486
1893	75,505	6,429	104	1956	79,548		357
1894	73,235	6,688	163	1957	83,447		300
1895	74,376	6,842	264	1958	83,625		307
1896	75,862	6,890	383	1959	83,574		337
1897	76,244	6,558	588	1960	83,614		313
1898	75,670	6,399	949	1961	83,217		343
1899	75,811	6,524	1,021	1962	82,909		307
1900	76,086	6,499	1,214	1963	82,235		254
1901	76,822	6,389	1,728	1964	81,900		218
1902	76,928	6,401	2,065	1965	80,900		214
1903	77,212	6,475	2,228	1966	80,400		191
1904	77,338	6,467	1,769	1967	79,600		146
1905	77,842	6,399	824	1968	79,100		133
1906	78,488	6,361	783	1969	77,700		105
1907	78,687	6,470	672	1970	69,100		80
1908	79,055	6,382	710	1971	63,700		42
1909	79,598	6,425	654	1972	62,800		25
1910	79,642	6,624	528	1973	62,300		19
1911	80,626	6,582	378	1974	63,800		17
1912	81,337	6,029	255	1975	64,400		13
1913	81,382	6,077	257	1976	63,700		9
1914	81,561	6,131	254	1977	62,900		8
1915	81,264	6,215	207	1978	56,600		7
1916	81,120	6,499	147	1979	55,600		3
1917	81,987	6,263	637	1980	52,300		3
1918	81,163	6,201	129	1981	50,100		
1919	81,342	6,287	129	1982	49,100		
1920	81,702	6,238	147	1983	49,500		
1921	81,453	6,253	228	1984	50,300		4
1922	80,644	6,579	181	1985	50,900		6
1923	80,586	6,533	200	1986	50,200		5
1924	79,172	6,395	133	1987	46,800		3
1925	79,393	6,546	128	1988	45,800		3
1926	78,770	6,395	84	1989	45,500		3
1927	78,984	6,340	64	1990	45,000		4
1928	78,822	6,340	85	1991	44,300		5
1929	79,231	6,520	100	1992	45,300		6
1930	79,503	6,592	104	1993	46,100		6
1931	79,485	6,486	101	1994	48,200		7
1932	77,138	6,783	127	1995	45,500		6
1933	76,891	6,196	167	1996	42,000		4
1934	77,781	5,678	230	1997	41,400		2
1935	77,847	5,912	338	1998	38,400		2
1936	78,122	6,049	409	1999	37,600		1
1937	78,832	5,865	529	2000	36,700		1
1938	75,420	5,779	568	2001	35,500		1
1939	76,910	5,635	542	2002	35,100		0
1940	79,017	6,154	479	2003	34,700		0
1941	79,071	6,344	444	2004	35,100		0
1942	77,616	6,133	469	2005	35,000		0
1943	77,616	6,083	378	2006	34,900		0
1944	71,867	5,095	293	2007	34,200		x
1945	74,973	5,217	247	2008	33,600		–
1946	73,293	5,246	155	2009	33,700		–
1947	79,734		139	2010	33,800		–
1948	78,099		128	2011	33,100		–
1949	79,885		179	2012	32,700		–
1950	80,123		258	2013	33,100		–
1951	79,538		119	2014	32,600		–
1952	79,637		278	2015	31,000		–
1953	79,528		278	The maximum values are indicated by red numbers.			

Source; Okayama pref.: "Annual report of Okayama prefecture statistics"

Table 6 Harvest of rice in Okayama prefecture (ton)

Year	Nonglutinous rice	Glutinous rice	Rice grown in a dry field	Year	Nonglutinous rice	Glutinous rice	Rice grown in a dry field
1891	139,863	10,719	76	1954	215,900		130
1892	132,994	10,918	578	1955	354,200		510
1893	142,279	10,845	142	1956	301,800		390
1894	170,301	13,429	256	1957	290,900		480
1895	163,889	13,222	516	1958	327,997		611
1896	138,163	11,155	732	1959	327,000		550
1897	133,645	10,060	848	1960	299,300		510
1898	204,840	15,210	1,767	1961	302,900		530
1899	113,602	8,336	877	1962	322,600		450
1900	179,823	13,772	2,274	1963	296,900		430
1901	198,149	15,401	2,877	1964	331,100		230
1902	155,301	12,644	2,782	1965	275,100		276
1903	202,268	15,401	2,240	1966	317,600		321
1904	222,742	16,659	1,547	1967	367,000		204
1905	180,311	13,114	1,451	1968	321,100		247
1906	204,333	14,912	1,367	1969	333,300		130
1907	224,780	16,375	1,357	1970	257,700		118
1908	221,908	15,814	1,413	1971	251,000		64
1909	227,410	16,065	893	1972	271,300		39
1910	198,639	14,696	595	1973	292,200		23
1911	224,057	16,077	601	1974	290,300		22
1912	209,736	13,788	403	1975	297,500		21
1913	235,215	15,299	422	1976	251,000		11
1914	242,862	15,975	323	1977	283,700		12
1915	196,078	13,863	303	1978	275,100		5
1916	256,851	18,789	278	1979	250,800		5
1917	235,786	16,770	219	1980	205,000		5
1918	213,303	14,639	198	1981	233,500		
1919	272,434	18,755	223	1982	217,500		
1920	261,558	18,397	296	1983	227,700		
1921	237,689	16,594	381	1984	244,000		9
1922	262,662	19,499	245	1985	234,100		11
1923	223,489	16,395	213	1986	245,500		9
1924	207,924	14,834	52	1987	208,300		6
1925	237,568	17,977	176	1988	227,200		7
1926	221,117	16,146	109	1989	216,600		6
1927	260,280	18,594	102	1990	185,900		5
1928	242,862	18,100	162	1991	199,800		11
1929	206,593	16,804	77	1992	223,800		14
1930	280,003	20,783	167	1993	200,100		13
1931	210,151	15,680	162	1994	200,100		8
1932	260,858	19,955	215	1995	237,500		13
1933	281,257	20,043	314	1996	218,000		8
1934	233,588	15,451	317	1997	201,200		4
1935	261,180	17,466	575	1998	196,200		4
1936	266,525	18,287	745	1999	188,800		3
1937	255,827	17,212	866	2000	195,200		2
1938	276,590	17,794	18	2001	188,900		2
1939	207,091	14,276	117	2002	189,900		1
1940	251,267	17,920	645	2003	173,500		0
1941	228,620	13,884	418	2004	173,400		0
1942	261,739	16,930	294	2005	182,400		0
1943	252,393	16,500	402	2006	177,300		0
1944	214,984	13,594	165	2007	174,100		x
1945	149,045	7,497	80	2008	185,500		–
1946	249,145	14,813	79	2009	181,000		–
1947	274,961		108	2010	172,000		–
1948	249,942		129	2011	176,400		–
1949	276,480		227	2012	172,300		–
1950	276,600		255	2013	169,500		–
1951	280,850		41	2014	160,700		–
1952	275,398		420	2015	156,600		–
1953	258,855		390	The maximum values are indicated by red numbers.			

Source; Okayama pref.: "Annual report of Okayama prefecture statistics"

Table 7 Cultivated area (ha) and crop yield (ton) of rice in Okayama prefecture in 1960

Name of municipality	Cultivated area (ha)	Crop yield (ton)	Name of municipality	Cultivated area (ha)	Crop yield (ton)
Okayama	5,368	20,756	Oda	123	412
Kurashiki	4,399	14,995	Bisei	768	2,176
Tsuyama	4,048	14,037	Yakage	1,067	3,646
Tamano	833	3,048	Yoshii, S.	429	1,194
Kojima	788	2,709	Mabi	1,128	3,973
Tamashima	1,230	4,353	Shouwa	381	1,112
Kasaoka	1,402	4,655	Takamatsu	1,018	4,086
Saidaiji	3,569	14,657	Ashimori	875	2,887
Ibara	1,290	4,274	Ukan	538	1,890
Souja	2,570	9,433	Kayou	1,581	5,470
Takahashi	1,591	5,222	Hokubou	695	2,545
Niimi	1,450	5,083	Nariwa	406	1,180
Ichi-no-miya	582	2,264	Kawakami, K.	415	1,214
Tsudaka	591	2,081	Bicchuu	476	1,374
Mitsu	954	3,416	Singou	459	1,523
Takebe	489	1,704	Tessei	634	2,474
Kamogawa	1,093	3,887	Tetta	494	1,672
San-you	869	3,621	Oosa	477	1,723
Akasaka	673	2,615	Katsuyama	655	2,087
Yoshii, A.	873	3,121	Ochiai	1,531	5,598
Kumayama	629	2,474	Mikamo	317	972
Seto	776	3,299	Shinjou	216	681
Bizen	872	3,172	Kawakami, M.	411	1,478
Hinase	153	455	Yatsuka	452	1,696
Mitsuishi	90	288	Chuuka	187	595
Yoshinaga	335	1,095	Yubara	484	1,584
Wake	781	2,871	Kuse	587	2,182
Saeki	540	1,946	Kagamino	1,572	5,180
Ushimado	215	741	Tomi	193	474
Oku	1,561	6,906	Okutsu	531	1,434
Osafune	885	3,806	Kami-saibara	138	312
Joudou	791	3,377	Kamo	776	2,309
Koujo	1,307	5,429	Aba	128	303
Fujita	1,531	6,299	Shouboku	994	3,356
Nadasaki	655	2,544	Shouou	1,336	4,593
Touji	196	720	Katsuta	620	1,944
Nanaku	503	2,108	Nagi	1,022	3,165
Kibi	584	2,180	Mimasaka	1,089	3,908
Shou	579	2,172	Sakutou	957	3,305
Chaya	354	1,429	Aida	360	1,278
Hayashima	278	995	Oohara	616	2,243
Senoo	265	922	Higashi-awakura	176	535
Fukuda	340	1,249	Nishi-awakura	188	484
Kiyone	238	862	Kume	1,301	4,240
Yamate	232	762	Chuuou	1,256	4,144
Funao	259	920	Asahi	641	1,884
Konkou	460	1,633	Yanahara	682	2,190
Kamogata	536	1,892	Kumenan	1,242	4,277
Satoshou	258	905	Fukuwatari	372	1,216
Yorishima	66	229	The maximum values are indicated		
			by red numbers.		
Source; Okayama pref.: "Annual report of Okayama prefecture statistics"					

Source; Okayama pref. : “Annual report of Okayama prefecture statistics”

Table 8 Cultivated area of barley, hulless barley and wheat (ha) in Okayama prefecture

Year	Barley	Hulless barley	Wheat	Year	Barley	Hulless barley	Wheat	Year	Barley	Hulless barley	Wheat
1891	17,224	32,890	9,244	1933	7,978	15,887	30,854	1975	1,697	251	394
1892	17,673	33,979	9,476	1934	7,619	15,763	30,865	1976	1,956	247	336
1893	17,731	35,550	10,069	1935	7,357	15,904	30,755	1977	2,089	200	292
1894	17,629	35,843	10,017	1936	7,589	15,415	22,257	1978	3,440	214	318
1895	18,034	37,037	10,006	1937	7,369	13,985	35,673	1979	4,402	286	367
1896	18,359	36,700	9,963	1938	8,010	13,328	36,616	1980	4,682	356	389
1897	18,154	33,564	10,927	1939	8,243	12,655	37,813	1981	4,412	298	641
1898	17,860	36,360	10,680	1940	8,265	12,762	41,455	1982	4,134	257	666
1899	17,943	34,771	10,867	1941	8,865	15,921	40,854	1983	4,172	222	818
1900	18,240	36,007	11,525	1942	10,324	19,354	38,462	1984	4,259	186	878
1901	17,415	34,827	12,527	1943	10,032	19,826	34,808	1985	4,388	157	844
1902	17,579	33,756	13,197	1944	11,400	21,056	34,972	1986	4,342	126	1,000
1903	17,044	32,712	13,237	1945	10,890	20,404	32,118	1987	4,497	89	1,050
1904	16,747	34,664	11,707	1946	8,234	19,315	27,659	1988	4,561	66	1,080
1905	17,236	35,025	12,139	1947	6,709	18,500	24,762	1989	4,800	40	1,090
1906	16,846	35,410	13,189	1948	7,175	19,762	24,903	1990	4,589	29	1,030
1907	16,604	35,040	12,871	1949	6,813	21,283	26,598	1991	4,086	20	730
1908	16,407	34,695	13,387	1950	7,180	23,623	28,820	1992	3,485	16	858
1909	16,394	32,237	14,056	1951	7,031	20,360	28,146	1993	3,283	14	729
1910	16,099	30,128	17,232	1952	6,792	18,784	18,784	1994	2,853	10	393
1911	15,630	28,449	21,647	1953	7,051	19,428	27,828	1995	2,732	13	255
1912	15,628	30,085	19,860	1954	7,240	21,164	28,156	1996	2,511	15	269
1913	15,741	34,130	16,797	1955	8,043	20,767	27,650	1997	2,361	45	286
1914	15,795	34,462	17,719	1956	8,688	20,529	27,134	1998	2,141	58	330
1915	14,407	30,970	20,249	1957	8,251	18,159	25,736	1999	2,081	85	357
1916	13,808	27,902	22,700	1958	8,807	17,514	23,881	2000	2,231	133	414
1917	13,039	23,163	25,469	1959	10,314	17,871	23,405	2001	2,301	120	431
1918	12,842	24,790	26,531	1960	10,215	16,086	23,762	2002	2,391	102	498
1919	13,165	25,609	24,275	1961	10,235	11,355	24,744	2003	2,380	101	519
1920	11,956	28,496	22,930	1962	9,866	10,591	24,298	2004	2,250	76	470
1921	12,583	27,270	19,619	1963	9,380	7,720	21,700	2005	2,120	58	411
1922	11,564	25,095	19,813	1964	7,490	5,810	16,800	2006	2,040	57	430
1923	10,838	21,870	19,882	1965	6,590	4,800	15,900	2007	1,800	45	411
1924	10,080	20,717	18,408	1966	6,490	4,370	13,400	2008	1,920＋x	34	426
1925	10,176	21,769	18,828	1967	6,040	3,750	10,300	2009	1,860＋x	x	434
1926	9,801	21,207	19,237	1968	5,980	3,490	7,290	2010	1,890＋x	x	422
1927	8,289	19,900	20,908	1969	5,610	2,660	4,790	2011	2,020＋x	x	453
1928	8,935	18,417	18,417	1970	5,270	1,530	2,570	2012	1,950+x	34	482
1929	8,868	17,898	24,172	1971	3,791	830	1,090	2013	1,990+x		480
1930	8,502	17,758	24,847	1972	2,607	374	614	2014	2,070+x	30	548
1931	8,525	17,669	26,472	1973	1,534	213	355	2015	2,130+x	24	629
1932	8,578	17,995	26,440	1974	1,491	247	405	The maximum values are indicated			

Source; Okayama pref.: "Annual report of Okayama prefecture statistics"

by red numbers.

X are confidential values.

Table 9 Harvest of barley, hulless barley, and wheat in Okayama prefecture (ton)

Year	Barley	Hulless barley	Wheat	Year	Barley	Hulless barley	Wheat	Year	Barley	Hulless barley	Wheat
1891	20,685	26,969	8,189	1933	15,801	34,324	62,396	1975	5,282	665	1,020
1892	30,877	53,369	12,627	1934	15,660	37,109	73,107	1976	4,195	610	816
1893	29,399	51,718	13,016	1935	15,061	38,465	71,748	1977	6,522	538	765
1894	32,362	54,737	13,754	1936	14,517	33,264	72,285	1978	11,910	668	951
1895	30,221	50,307	13,658	1937	15,916	32,826	82,950	1979	15,727	935	1,030
1896	28,940	44,668	13,362	1938	15,094	29,477	84,604	1980	14,221	965	945
1897	31,073	44,367	13,353	1939	19,947	34,877	112,382	1981	14,539	811	1,740
1898	34,472	58,104	16,844	1940	18,797	31,372	110,044	1982	14,933	774	2,100
1899	31,999	48,912	15,107	1941	20,175	39,104	97,754	1983	14,650	650	2,380
1900	35,230	56,694	16,999	1942	19,522	40,447	79,135	1984	18,536	519	2,840
1901	34,904	54,729	19,455	1943	13,538	26,502	53,676	1985	16,811	462	2,880
1902	34,202	48,720	18,472	1944	22,111	45,816	81,267	1986	15,782	345	3,010
1903	18,674	34,030	5,635	1945	15,436	35,153	57,514	1987	17,549	259	3,580
1904	33,614	55,359	17,725	1946	7,127	18,838	28,190	1988	18,834	191	3,600
1905	34,936	56,331	19,341	1947	10,357	5,960	40,904	1989	17,228	107	3,460
1906	33,868	56,870	19,418	1948	11,283	35,254	49,093	1990	17,326	78	2,770
1907	34,936	56,348	20,998	1949	13,761	41,370	46,375	1991	10,915	45	1,560
1908	32,895	57,059	22,199	1950	15,965	50,838	61,556	1992	13,414	48	2,820
1909	29,979	55,802	24,695	1951	16,356	44,636	58,418	1993	14,009	41	2,380
1910	29,837	52,048	30,971	1952	17,552	46,523	61,950	1994	12,209	30	1,030
1911	33,579	51,560	36,738	1953	15,932	42,915	59,746	1995	12,606	41	941
1912	33,829	60,249	38,737	1954	20,075	59,056	75,234	1996	12,303	52	1,040
1913	37,272	78,003	35,431	1955	23,946	57,338	71,945	1997	9,964	140	1,020
1914	29,420	57,513	30,007	1956	21,462	51,725	67,555	1998	7,753	169	1,120
1915	36,131	63,851	40,546	1957	22,548	43,016	59,506	1999	10,303	333	1,520
1916	33,420	56,607	47,797	1958	24,956	46,860	61,140	2000	10,703	488	1,620
1917	21,847	44,370	47,950	1959	28,900	45,600	57,300	2001	8,174	322	1,380
1918	18,983	46,503	51,374	1960	28,300	44,300	65,900	2002	8,252	292	1,840
1919	22,946	48,565	43,140	1961	33,070	32,900	75,600	2003	9,520	278	1,930
1920	22,322	57,425	45,669	1962	29,380	23,100	64,900	2004	8,280	192	1,500
1921	20,601	48,562	36,182	1963	2,970	3,470	10,000	2005	7,400	172	1,310
1922	29,729	47,303	37,691	1964	20,380	15,400	40,100	2006	9,300	174	1,700
1923	15,521	37,083	36,582	1965	18,790	13,600	43,700	2007	9,020	156	1,570
1924	18,351	39,606	35,159	1966	18,120	1,100	34,400	2008	8,430＋x	108	1,550
1925	19,761	49,302	45,216	1967	16,910	9,790	24,700	2009	6,510＋x	x	1,530
1926	18,830	46,405	41,617	1968	20,400	10,900	24,100	2010	6,730＋x	x	1,020
1927	15,476	58,307	50,039	1969	18,580	8,030	14,000	2011	7,920＋x	x	1,440
1928	18,204	44,068	59,149	1970	10,860	2,650	1,770	2012	6,530+x	87	1,420
1929	18,597	41,779	57,041	1971	12,640	2,450	3,020	2013	7,270+x	x	1,720
1930	16,626	39,938	55,492	1972	7,670	1,030	1,600	2014	7,600+x	75	1,950
1931	16,782	40,581	58,735	1973	4,666	571	930	2015	5,560+x	40	1,760
1932	17,304	42,041	57,601	1974	4,904	687	1,080	The maximum values are indicated			
Source; Okayama pref.: "Annual report of Okayama prefecture statistics"								by red numbers.			
								X are confidential values.			