Agriculture was one of the most important economic bases of classical Japan and there were two main types of plant farming: paddy rice cultivation and dry field cultivation. There is no doubt that paddy rice cultivation was dominant in almost all of regions in classical Japan. At the same time, a lot of Japanese historians and historical geographers have disserted that farming in classical Japan was managed combining paddy rice cultivation and dry field cultivation. Classical Japanese state often recommended cultivating millets and beans beside paddy rice against a poor crop. Furthermore, in the 8th century, the state established the public relief stocking system (義倉制) for taking precautions of food shortage caused by bad weather, flood and earth quake and so on. In this system, foxtail millet was regulated to be stocked in warehouses. Therefore, agricultural policies of the state had obviously a close relationship not only with paddy rice cultivation, but also dry field farming. It is likely that combination balance ought to differ from region to region and it should reflect land use strategy of each settlement.

However, there are just few written records on dry field farming in classical Japan especially before the 11th century. Even if there are fragmentary descriptions on farming, they show only kinds of grain and their crop totaled in each province or county. Therefore, it is very difficult to approach to micro-scale land use and plant use in classical Japan. Nevertheless, pictorial diagrams and wooden strips have begun to play an important role to reveal these problems. Slide 2 pictures a famous pictorial diagram known as “Nukatadera Garan Narabini Jori Zu” (額田寺伽藍並条里図). The figure on the right side is a model of land use restored from the original diagram. In this figure, a patchy land use combining paddy field and dry field in a small area can be obviously seen.

However, the number of such a diagram is less than forty, and their date concentrates to the 8th century. In addition, the area described is only around Nara and Hokurikudo street. It is sure that these materials
are very useful to restore micro-scale land use. At the same time, they are not suitable to approach to diachronic change of farming and spatial diversity of agriculture in a synchronous phase. Wooden strips are also important materials, but they are not necessarily excavated in everywhere. Each material has advantages and disadvantages. This study demonstrates that archaeological evidences can also provide effective clues to reveal regional characteristics of farming in classical Japan through analyses of plant remains and site location in Sagami province. Of course, there are also disadvantages of archaeological records, however, we should get over constrains of materials, and put a large puzzle of classical Japan together using various pieces. This is a trial study from archaeological point of view.

AGRICULTURE IN SAGAMI

Sagami province in classical Japan was consisted of eight counties: Ashinoshimo, Ashinokami, Osumi, Yoroki, Aiko, Takakura, Kamakura and Miura (Slide 3). Its area corresponds to the present Kanagawa prefecture with the exception of Tachibana, Tsuzuki and Kuraki counties. These administrative districts were officially set up in the eighth century; however, it had already been established by the division of Sobu (相武) kori and Ashikaga (足利) kori in the latter half of the 7th century.

According to “Sagamikoku Fuku So Koeki cho” (相模国封戸租交易帳), in 735 (Tenpyo 7), there were 1300 households of “fuku” which should pay tax in grain for royalty, high-level bureaucrat and large temples. Unfortunately, it is impossible to know the entire area of cultivating field because a part of the document has been already lost. However, according to an estimation based on remained part of the document, the total area of paddy field in Sagami at that time was 10720 chobu (Kanagawa prefecture 1981). In the classical times, one chobu is correspond to about 100 are. In the 9th century, Wamyoruijusho indicates that the total area of paddy field of Sagami province was 11,236 chobu.

Comparing with neighboring provinces, area of paddy field in Sagami is just one third of Musashi province where there are some large rivers and vast alluvial plain in its territory (Slide 4). On the other hand, area of paddy filed in Sagami is roughly same as Kai province and larger than Suruga province. Crop of paddy rice in Sagami was not necessarily small comparing with neighboring provinces.

However, in Sagami province, the alluvial plain suited for large-scale paddy field is restricted to the middle and lower basin of the Sagami-gawa, Sakai-gawa and Sakawa-gawa rivers (Slide 3). It is notable that almost all of other area is hill, terrace and mountain. This topographical feature was a constraint
condition for paddy field. Therefore, there is no doubt that dry field cultivation is one of the most effective means to utilize land for agriculture in this province.

Can we find out descriptions in documents about dry field cultivation in Sagami province? The answer is no. According to Engishiki (延喜式), a lot of kinds of plant such as mandarin orange, hemp, safflower, cotton and medical herbs were presented to the central polity from Sagami province. However, there is no written record indicating cultivation of millets except a waka-poetry in the Manyoshu volume fourteen.

-----Ashigara no hakone no yama ni awa makite mi towanareru wo awanakumo ayashi 「足柄の箱根の山に粟蒔きて実はなるを逢はなくもあやし」

There is one more instance showing production of food made from plant cultivated in dry field. Slide 5 pictures pottery with ink writings from Inari-mae A site in Hiratsuka city. This area is estimated to be provincial office in Sagami. Fragments of pottery written as Kanikuriya (国厨) are very important, and they will be elaborated later. Here I would like to pay attention to a piece of pottery written as Kyuu Kuki Ichi (旧豉一). Kuki is thought to be a kind of miso. According to Engishiki, it was an tribute only from Sagami and Musashi provinces.

In Heijo-kyo, there are nine wood strips concerning Kuki (Slide 6). They all show that Kuki was made in Sagami and Musashi provinces. These materials demonstrate that a food made mainly from soybean was produced in Sagami province. This is an indirect evidence of dry field in this region.

However, it is very difficult to back up farming of millets in Sagami province by documents, even though they are primary grains of the public relief stocking system and agricultural policies of classical Japan.

**PLANT REMAINS FROM SAGAMI PROVINCE**

According to corpus of charred seed excavated so far in Sagami province after the 7th century, grains such as rice, foxtail millet, barnyard millet, broomcorn millet, barley, wheat and beans have been found. Furthermore, some kinds of nut, grape, hemp, Japanese pepper, peach, plum and other weeds are also involved. Slide 7 pictures charred seeds recovered from sites in Hiratsuka city. Slide 8 also pictures excavated plant seeds in Hiratsuka and Chigasaki cities which is situated on the opposite side of Sagamigawa river.

3
In this study, I would like to classify complex of seed into following five types with special reference to rice, millets, beans, nuts, perch and plum (Slide 9). The first is the “Rice type” which is consisted of rice and other plants, but without millets and beans. The second is the “Rice-millet type”. In this type, various kinds of grain can be involved. The third is the “Millet type”. This type of seed complex is consisted of millets, beans and other plants, while rice is never involved. The fourth is the “Nuts-fruits type”. This type is characterized by nuts and fruits. In particular, peach and plum are dominant, while rice, millets and beans cannot be seen. The fifth is the “Weeds type”. This is consisted of other miscellaneous plants seed except major grain and fruits.

In addition, site location is also roughly classified into two types, because topographical feature of site is indispensable information to examine micro-scale spatial diversity of farming (Slide 10). The first is the “Plain type”. In this type, alluvial plain, alluvial fun, back marsh and dune are included. The second is the “Mountain type”. This type includes further inland topographical surfaces such as hill, terrace and mountainous land.

Slide 11 shows distribution of sites where plant seeds were excavated in Sagami province. There are some sites in mountainous area as well as plain and coastal zone. Slide 12 summarizes the relationship between types of seed complex and site location. Data sets are based on all excavated charred seeds from 204 archaeological features found at 25 sites after the 7th century in Sagami province. Please note that unit is archaeological feature such as dwelling pit, not the number of seed.

There are some important reminders to interpret this table. First, degree of recovery of charred seed from sites depends upon the methodology of excavation. It is impossible to find all plant seeds by naked eye observation at sites except large fruits or concentration of grains. To recover all charred seeds, a special method known as water-flotation technique is efficient. When you excavate a dwelling pit, you take all burned soil from furnace. If you wash the soil in the water and screen using sieve, almost all of charred seed can be recovered. However, this method has not yet been introduced in all archaeological excavations in Japan. Therefore, accuracy of seed recovery differs from site to site.

The second problem is about dating of seeds. As well known, there are many factors which trigger vertical movement of small archaeological materials in the ground, such as activity of small animals and insects, disturbance by frozen and melting of soil, and crack made by earthquake and drying. However, it does not mean that reliability of charred seed is too low to examine past plant use. Recent results of AMS radiocarbon dating of recovered charred seed from archaeological sites of the classical and
medieval Japan have demonstrated that their dates are consistent to date estimation based on artifacts.

The last point is differences of function of archaeological features from which seeds are excavated. In the classical times, almost all of seeds are excavated from furnace of dwelling pit where food was processed. However, in the medieval times, seeds are excavated from various places such as a water well, pool and channel. This might be a reason why the “nuts-fruits type” was dominant after the 12th century.

Within these limitations, a table in slide 12 shows following tendencies of plant use in Sagami province. First, in the “Plain type” sites, seed complex of the “Rice type” and the “Rice-millet type” consistently account for 50 to 60 percent. These are followed by the “Nuts-fruits type”, not by the “Millet type”. These results indicate that rice was the most important grain in the “plain type” sites. On the other hand, in the “Mountain type” sites, only seed complex without rice such as the “Millet type”, the “Nuts-fruits type” and the “Weed type” can be seen during the 7th to the 8th centuries.

In the subsequent stage, seed complex including rice appeared. Nevertheless, the major type is still the “Millet type” and the “Rice-millet type”. In the “Mountain type” sites, degree of dependence on rice is estimated to be lower than the “Plain type” sites. In mountainous region, grains except rice are more important than rice. In short, it is safely to say that there is a difference in degree of dependence of rice between the “Plain type” and the “Mountain type” sites.

Such a spatial diversity of farming in Sagami province was initially indicated by Koji Kobayashi (1991). He compared components of plant remains from coastal area and inland basin. In the Mitsumata site, which is situated on coastal area, the primary types of seed complex are the “Rice type” and the “Rice-millet type” classified in this study. In contrast, the “Millet type” and the “Rice-millet type” are definitely dominant in the Kusayama site located in the inland basin. In the Kusayama site, bones of sardine and anchovy were also found. Therefore, it is no doubt that marine fish was consumed even in inland basin. However, there is a difference in seed complex between coastal area and inland basin. In particular, it is notable that frequency of occurrence of millets in inland is much higher than coastal area.

This Kobayashi’s opinion is supported by current archaeological evidences from the entire Sagami province. Slide 13 shows a reconstructed image of micro-level land use around the Kusayama site.

**FARMING IN PLAIN AND MOUNTAIN**

Spatial diversity of farming has a close relationship with the development of the territory of Sagami
province. In the middle and late Yayoi period, about from the 1st century B.C.E to the 3rd century C.E., distribution of archaeological sites restricted to the lower and middle basin of main rivers (Slide 14). The solid line shows the distribution of site of the Yayoi periods. After the Kofun period, distribution of sites has a tendency to expand to inland area along main rivers. However, in this phase, use of hilly and mountainous areas has not yet been active. Dashed lines indicate distribution of sites of the Kofun period.

After the 8th century, archaeological sites expand to further inlands as chain line shows. In this stage, stable and large settlements appear not only in plain and hilly areas, but also in real mountainous area more than 20km far from the coast. This tendency indicates that the development of inland was fully in progress especially in the Heian period. Plant seeds strongly suggest that millet farming is incorporated in the system of subsistence in this area at that time.

What is the reason why settlements began to be formed in real mountainous area from the Heian period? Ken Noto (2002) points out that these are settlements formed by escapees from the ritsuryo regime based on analyses of sites on foot of the Shiranesan Mountain in Gunma prefecture (Slide 15). This is an attractive hypothesis, however, it is notable that settlement on around the Shiranesan Mountain is highly isolated topographically, and its height above sea level is more than 1000m.

On the other hand, in Sagami province, sites in mountainous area are not necessarily difficult to access and altitude is only about 300m. Even in sites in mountainous area, we can find a number of glazed ware, sue earthenware and many kinds of iron tools. They indicate active exchange with settlements in the lower and middle basin. In Sagami province, inland settlements probably have a close relationship with political purposes for forming trading hub or increasing the effectiveness of land use in inland area as a cultivating filed.

A number of cultivating fields in the classical times have been excavated in plain and hilly areas especially in Sagamigawa river basin (Slide 16). They usually found parallel grooves of furrows between ridges. The Ohara site is a representative example of dry field made on dune in the Heian period. On hilly area, dry field excavated at the Mizujiri site has a possibility to go back to the classical times. Unfortunately, there is no evidence of dry field in mountainous area. We have to examine the existence of dry field with ridges and furrows, and other types of cultivating fields, for example made on the slope without ridges and furrows in this area.

Next, relationship between farming and political/regional center is examined. Discovery of the
provincial office is one of the most important topics in recent study of classical Sagami. According to “Wamyo-ruijusho” (和名類聚抄) and “Iroha-azuusho” (色葉字類抄), Sagami provincial office was located in Osumi county till the 10th century. After that, the newer “Iroha-azuusho” (伊呂波字類抄) documents that provincial office had been moved to Yoroki county until the 12th century. The location of the newer provincial office is estimated around Kokufu-hongo in Oiso-machi town. However, the location of the older provincial office has been unclear and there has been a debate for a long time.

In last two decades, archaeological excavations in northeastern part of Hiratsuka city yielded critical evidences to determine dispute (Slide 17). The most important is discovery of buildings of wakiden (脇殿) in kokuchō (国庁) area. Administrative facilities of provincial office are usually consisted of seiden (正殿) and wakiden as shown in figure on the right side illustrating example of Iga province. In Sagami province, these two large buildings are estimated to be wakiden of the 8th century. The upper figure shows wakiden of the older phase and the lower is the newer phase. Although seiden, the real central building has not yet been found, it is sure that it exists just north of wakiden.

Landscape around kokuchō has already begun to be restored on basis of results of archaeological excavations. Slide 18 illustrates an area around provincial office with high density of buildings and workshops and Tokaido street. Other evidences such as pottery ink writings of Kunikuriya, a kitchen on provincial office, large-scale metal workshop, a number of dwelling pits and iron tools also support the existence of provincial office in this area. (Slide 19) This result was surprising, because provincial office was built on a dune in an alluvial plain and it located more than 11 km far from provincial monastery.

If you compare type of seed complex among sites around provincial office and the Hongo site which is situated near provincial monastery, the “Rice type” is clearly dominant in the Hongo site (Slide 20). Around provincial office, rice is certainly major grain but millets are also used. The same situation can be seen in sites in Chigasaki city area, on the opposite shore of Sagamigawa river, where Takakura county office was found in 2002.

In Kai province, Kouichi Kushihara (1999) demonstrates that almost all of the plant seeds collected from sites around provincial monastery for nans is rice. Occurrence rate of rice tends to decrease in inverse proportion to distance from the monastery for nans. In Sagami province, there is also a possibility that the number of rice is overwhelming around provincial monastery. However, in Hongo site, it is notable that the “nuts-fruits type” is the second dominant seed complex type. This tendency indicates that only large plant seed might be recovered from the Hongo site. It is unclear if water
-flotation technique which is efficient to recover millets was performed in the excavations of Hongo site. We should examine if rice-centered tendency around provincial monastery can be still seen after the introduction of water-flotation technique in the future.

Finally, a problem about the transition of dry field farming from the end of the classical to medieval times is examined. In Sagami province, many settlements were abandoned during a period from the middle of the 10th century to the latter half of the 11th century. The open area of settlements seemed to be used as dry cultivating field soon after the abandon of settlements. In almost all cases, we can find characteristic large pits in dry fields of this period (Slide 21). They are circular in a plan view, and its diameter is about 1m. Depth is usually more than 40 to 50cm. In some sites, many pits are arranged in a linear manner along the both sides of a road as shown in figures of slide 21.

There are some opinions about function of these pits such as storage pit of crop, storage pit of water, storage pit of manure. However, many researchers seem to have reached common ground that these pits were used for facilities concerning on dry field. If so, these phenomenon indicates that field area was enlarged not only by clearance of forests, but also by conversion settlements into cultivating area. Studies on historical documents have suggested that cultivation field was rapidly increased in this period. Additionally, double cropping became to be common in dry field in wide area of the Japanese islands. For that, a large amount of manure must be obtained. Pits above mentioned might be used for it.

In Kai province, from the latter half of the 10th century, proportion of rice falls rapidly, while percentage of barley and wheat increases at a tremendous rate (Slide 22). If such a situation can be also seen in Sagami province, we may discuss about expansion of cultivating field and double cropping in this region too. However, it is still difficult to find out archaeological evidences in plant seeds excavated from Sagami province. We should examine if the number of barley and wheat tend to increase from the end of the classical to medieval times. We also have to pursue the function of circular pits in dry fields in the future.

CONCLUSIONS

Though examination of plant remains and site location in classical Sagami, the following conclusions are obtained.

1) There is a difference in component rate of rice and millets among sites on alluvial plain and these
on other geomorphic surfaces.

2) In hilly and mountainous areas, degree of dependence on millet is higher than plain area.

3) Dry field farming was one of the driving forces for the development of inland in the Heian period in Sagami province.

4) There is the possibility that rice is exclusive grain around the provincial monastery.

5) In the transition from the classical to medieval times, agriculture seems to be changed in remarkable ways. As conversion of settlement into cultivating field and the use of circular pits, there are some archaeological evidences that partially support this opinion. However, this hypothesis has not yet been backed up by plant seeds collected in archaeological sites.

These perspectives must be important not only in Sagami but also in other provinces, because almost all provinces have various topographical features in their territories. We need recover more information on agriculture from archaeological sites employing every possible means such as water-flotation technique, soil micromorphology, pollen analysis, diatom analysis and minute-charcoal analysis.

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Spatial Diversity and Temporal Change of Plant Use in Sagami Province, Classical Japan: An Archaeological Approach

Restored Image around Sagami Provincial Office
(by Hideto Ichige, Kanagawa Kokogaku Zaidan 2009a)

Katsunori Takase
Faculty of Letters, Meiji University
Meiji University USC Faculty and Graduate Student Research Exchange (8 Dec 2010)
Micro-scale land use around Nukata-dera

額田寺伽藍並条里図（Kinda1999）
Farming in Sagami recorded in documents

■ 735 C.E. (Sagamikoku-fuko-so-koeki-cho『相模國封戸租交易帳』)
10,720 chobu(?)

■ Area of paddy field in the 9th century (Wamyoruijusho『和名類聚抄』)

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<td>Suruga</td>
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■ 足柄の箱根の山に粟蒔きて実とはなれるを逢はなくもあやし
（Manyoshu vol.14）
A fragment of pottery with ink writings

「旧鼓一」
“Kyuu Kuki Ichi...”

Inarimae-A (稲荷前A) site
Hiratsukashi Hakubutsukan Shishi
Hensan Tanato (ed.) 2003
Wooden tablets showing production of Kuki in Sagami province excavated at Heijokyo

1) 「相模國鼓二斗」
   “Sagamikoku Kuki Ni To ”

2) 「相模國鼓二斗」
   “Sagamikoku Kuki Ni To ”

3) 「相模國鼓一斗□升」
   “Sagamikoku Kuki Ichi To □ Sho”

Nara Kokuritsu Bunkazai Kenkyujo(1990, 1999)
Rokunoiki and Daiebara (六ノ域・大会原) site

Takase (2006)
Minamitanihara (南谷原) site

Tsubonouchi (坪ノ内) site

Takase (2006)

Vitis

rice

wheat

barley

Tsubonouchi (坪ノ内) site

Takase (2006)

Pinus

Setaria

Acalypha

Minamitanihara (南谷原) site

Takase (2006)

foxtail millet
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# Classification of site location

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12c- = 12th century - 11th century
After Web Site of Board of Education, Hadano City

**Land Use around the Kusayama Site**

- **hunting territory**
- **graves**
- **dwellings and warehouses**
- **dry field for millets, beans and fruits**

**Paddy field**

**road to other settlements in lower basin**

**Diagram Notes:**
- Hunting territory
- Graves
- Dwellings and warehouses
- Dry field for millets, beans and fruits
- Paddy field
- Road to other settlements in lower basin
Settlements of escapees?

Noto (2002)
Ohara (大原) site
Hiratsukashi Hakubutsukan Shishi Hensan Tanato (ed.) 2003

Mizujiri (水尻) site
Hiratsukashi Hakubutsukan Shishi Hensan Tanato (ed.) 2003
Excavated *Wakiden* (脇殿) of Sagami Provincial Office

Kanagawa Kokogaku Zaidan (2009b)

Suzukashi Kouko Hakubutsukan (2010)
Restored Sagami Provincial Office

Provincial Office

Provincial Office Area

Tokaido street

Sagamigawa river

Hiratsukashi Hakubustukan (2010)
Pieces of pottery with ink writings

「国厨」

Inarimae-A (稲荷前A) site
Hiratsukashi Hakubutsukan Shishi
Hensan Tanato (ed.) 2003
The Hongo site (near provincial monastery) n=23

- Rice type
- Rice-millet type
- Millet type
- Nuts-fruits type

Provincial office area n=23

Kushihara (1999)
Narasasu (ナラサス) site, Ogami (1992)
Uemura (上村) site, Ogami (1992)
Grains from Kai province

- Barley and wheat
- Rice
- Foxtail millet
- Broomcorn millet

Kushihara (1999)