

A Historical Sketch of Millets in Japan

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Plants and People Museum

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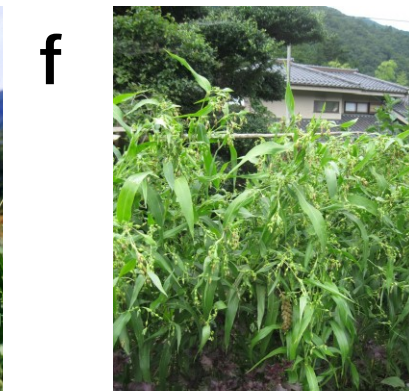
Dear Chairman and participants, thank you for your kind invitation to this FAO webinar.

I am Dr. Mikio KIMATA, an ethnobotanist of millets. I have been to many places for field research, such as most of the Japanese islands, Indian subcontinent, Central Asia, China, Europe and so on.

I would like to show especially a historical sketch of millets in Japan, today.

Table 1. Six species of millets and buckwheat

English name	Scientific name	Japanese name	Growth habit	Endosperm starch	Wild type	Geographical origin	Dispersal period
a foxtail millet	<i>Setaria italica</i>	awa, 粟	annual	waxy/non-waxy	<i>S. italica</i> ssp. <i>viridis</i>	Central Asia	late Jomon
b common millet	<i>Panicum miliaceum</i>	kibi, 黍、稷	annual	waxy/non-waxy	<i>P. miliaceum</i> ssp. <i>ruderales</i>	Central Asia	late Jomon
c sorghum	<i>Sorghum bicolor</i>	morokoshi, 蜀黍	annual	waxy	<i>S. bicolor</i> var. <i>verticilliflorum</i>	Africa	AD500~800
d finger millet	<i>Eleusine coracana</i>	shikokubie, 四国稗	annual	non-waxy	<i>E. coracana</i> var. <i>africana</i>	East Africa	ancient ?
e Japanese barnyard millet	<i>Echinochloa utilis</i>	hie, 稗	annual	non-waxy	<i>Ec. crus-galli</i>	Japan	early Jomon
f Job's tear	<i>Coix lacryma-jobi</i> var. <i>ma-yuen</i>	hatomugi, 鳩麦	perennial	waxy	<i>Coix lacryma-jobi</i> var. <i>lacryma-jobi</i>	South East Asia	AD1716~1735
g buckwheat	<i>Fagopyrum esculentaum</i>	soba, 蕎麦	annual	non-waxy	<i>Fagopyrum esculentum</i> ssp. <i>ancestralis</i>	South West China	early Jomon



Note: Jomon, the historical period in Japan, ca. 17000BC~1000BC

We have grown traditionally six species of millets, foxtail, common, finger, Japanese barnyard millet, sorghum, and Job's tear. They are mostly annual C4 plants self-fertilized.

Ancient people had grown Japanese barnyard, foxtail, and common millet in the Jomon period, about several thousand years ago in Japanese Islands.

Eight species have waxy varieties, which are foxtail, common millet, sorghum, Job's tear, barley, maize, rice, and amaranths.



a



b

**North
Japan**



c



d

The remains of ancient Jomon village Sannaimaruyama restored in Aomori Pref.: a ; a big house and tower, b ; village, c ; plant artifacts excavated, d ; straw rope-patterned potteries in Jomom period.

This slide shows the remains of Jomon village (about five thousand years before the present) restored in north Japan.

Japanese barnyard millet might have been the domestication process in north Japan after the Holocene.



The remains of ancient Jomon village, Katsusaka restored in Kanagawa pref.: a ; village, b ; straw rope-patterned potteries in the middle Jomon period, c ; a grindstone excavated, d ; inside of a house, e; traditional processing method of grains.

Also, these potteries contained the figures of ancient soybean seeds inside.

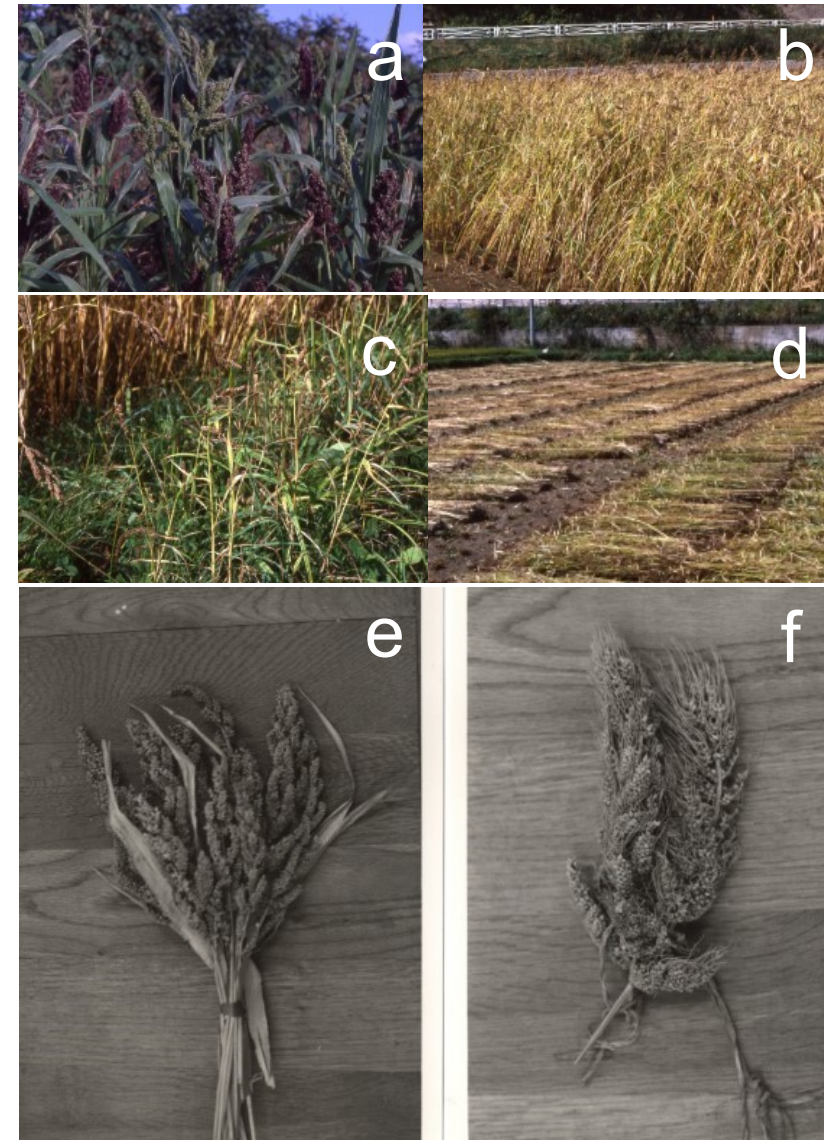


The remains of early Yayoi village: a, a paddy field of rice and upland field of foxtail millet at Nabatake restored in Saga pref.; b, a paddy of rice at Itatsuke, Fukuoka pref.; c ; a large village surrounded by trench at Yoshinogari in Saga pref.

Note: Yayoi period, ca.1000BC~AD300.

Next slide shows the remains of Yayoi village (about nine hundred years BC) restored in south Japan.

The ancient people had grown foxtail millet on the mound, while they had grown rice in the paddy at the same time.



Hokkaido: a, Japanese barnyard millet on upland; b, in paddy field; c, *Echinochloa crus-galli* on levee; d, base cut and drying; e, Nanbubie, a variety from Tohoku region; f, Ainubie (*piyapa*), a local variety of Ainu tribe. Iwate pref.: g, Japanese barnyard millet in paddy field; h, *E. crus-galli* on levee. Miyazaki pref.: i, a burn yard; j, a field burnt; k, base cut and drying : l, buckwheat on the field.



Even today, some farmers cultivate Japanese barnyard millet at both upland and lowland fields in north Japan.

Also, the other farmers cultivate it on the burnt field in south Japan.



Karnataka, India: d, a nursery of finger millet; e, transplanting seedlings of finger millet in paddy fields.

Ymanashi pref.: a, a nursery of finger millet among maize; b, a honest farmer, Shizuo FURUYA with finger millet; c, a paddy field in the mountainous area.

Farmers sow the seeds of finger millet at a nursery and then they transplant their seedlings in paddy or upland field in Japan and India.



Saihara, Yamanashi pref.: e, many varieties of millets at the entrance of a farmer's house; f, upland field mixed with many species of crops.

Sagamihara, Kanagawa pref. : a, an old storehouse ; b, the inside, *kokuso* stored seeds against famine; c, foxtail millet and d, upland rice.

A farmer has prepared the food grains of foxtail millet and rice in the storehouse for famine.

Another farmer has still cultivated many local varieties of millets for conservation of their seeds today.



a, sorghum at Tabayama; b, finger millet at Uenohara: c, an exhibition at Sagamihara: d, an exhibition booth of millets at the CBD/COP10 in Nagoya, Aichi pref.

Many researchers have visited villages in this area of Kanto mountains, central Japan.

We have held the exhibitions of millet cultural complex in the many places.



Many researchers visited Uenohara, Yamanashi pref.: a, A. MATSUTANI (archeology), T. KOMORI (healthy longevity) and A. SEETHARAM (Millets) from India; b, TV program on their longevity at Yuzurihara village; c/d, K. HASHIMOTO had conserved many local varieties of millets; e/f, Mr. & Mrs. FURUYA had grown many crops. Many researchers visited their fields.

These villages were very famous, because the area was noted for their villagers' longevity and health.

The exemplary farmers have still held local varieties of millets and their excellent practices on farming.



a



c



b



d

a, pounding *mochi*, a kind of waxy cake; b/c, dumplings made from sorghum in Japan; d, boiled grain made of sorghum and foxtail millet in Karnataka, India.

Moreover, farmers have practiced many kinds of cookery.

They make the waxy variety of sorghum into many kinds of food, *mochi*, dumpling and boiled grains.



a, *oneri*, a kind of mash made from finger millet; b, from buckwheat in Japan; c, *mude* from finger millet in Karnataka, India. d, *dango*, a kind of dumpling in Gunma pref.; e, *mochi* made from finger millet in Tokyo. f, *ganji*, gruel made from finger millet in Karnataka: g, *kayu* made from Japanese barnyard millet in Yamanashi pref.

Also, they make finger millet into a kind of mash, dumpling and so on.

These are very similar foods in Japan and India.



Parboil processing: a/b/c/d, *kuromushi-hou* to grains of Japanese barnyard millet, via boiling, to drying grains in Gunma pref., Japan; e, from *samai* grains in Tamil Nadu, India. **wet milling:** f/g/h, *shito*, made from Japanese barnyard millet and foxtail millet by *Ainu* people in Hokkaido; i/j, *mavu* made from kodora, foxtail millet and rice, k, *pidi mavu* in Tamil Nadu, India.

We have two special ways of parboil processing and wet milling. Farmers boil the grains of Japanese barnyard millet in Japan, and little millet etc. in India before the de-husking. After the parboiling, we can easily de-husk small grains of millets.

They make the flour of grains through the wet milling process to daily use and the offering for their gods in Japan and India. It means that some millets are sacred crops like rice and they are the same status both in Japan and India.



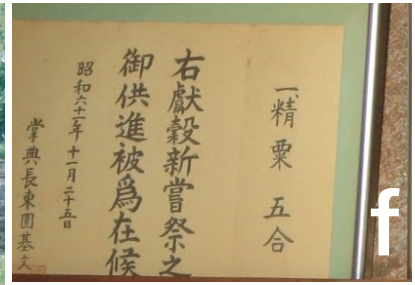
a



b



g



f



c



d



h

a, *katsunbo* gods will promise farmers good harvest in the coming autumn. They have spikes of foxtail and Japanese barnyard millet, also sickle and hoe. b, *Osuwa-sama* god shrine for hunters; c, threshing foxtail millet by hands; d, offer a kind of *sushi*, *yamame* fish staffed boiled grains for the god. e/f/g/h, offer foxtail millet for *niiname-sai*, an important harvest ceremony held by Japanese Emperor at Kosuge, Yamanashi pref. (1986 and 2008) and in the Imperial Palace.

Moreover, many villagers have celebrated traditionally the little new year offerings by making a figure called *kado-otoko* attached the spikes of foxtail and Japanese barnyard millet and farm tools, straw bags, etc., of *nurude*, Chinese sumac for the god of farmers.

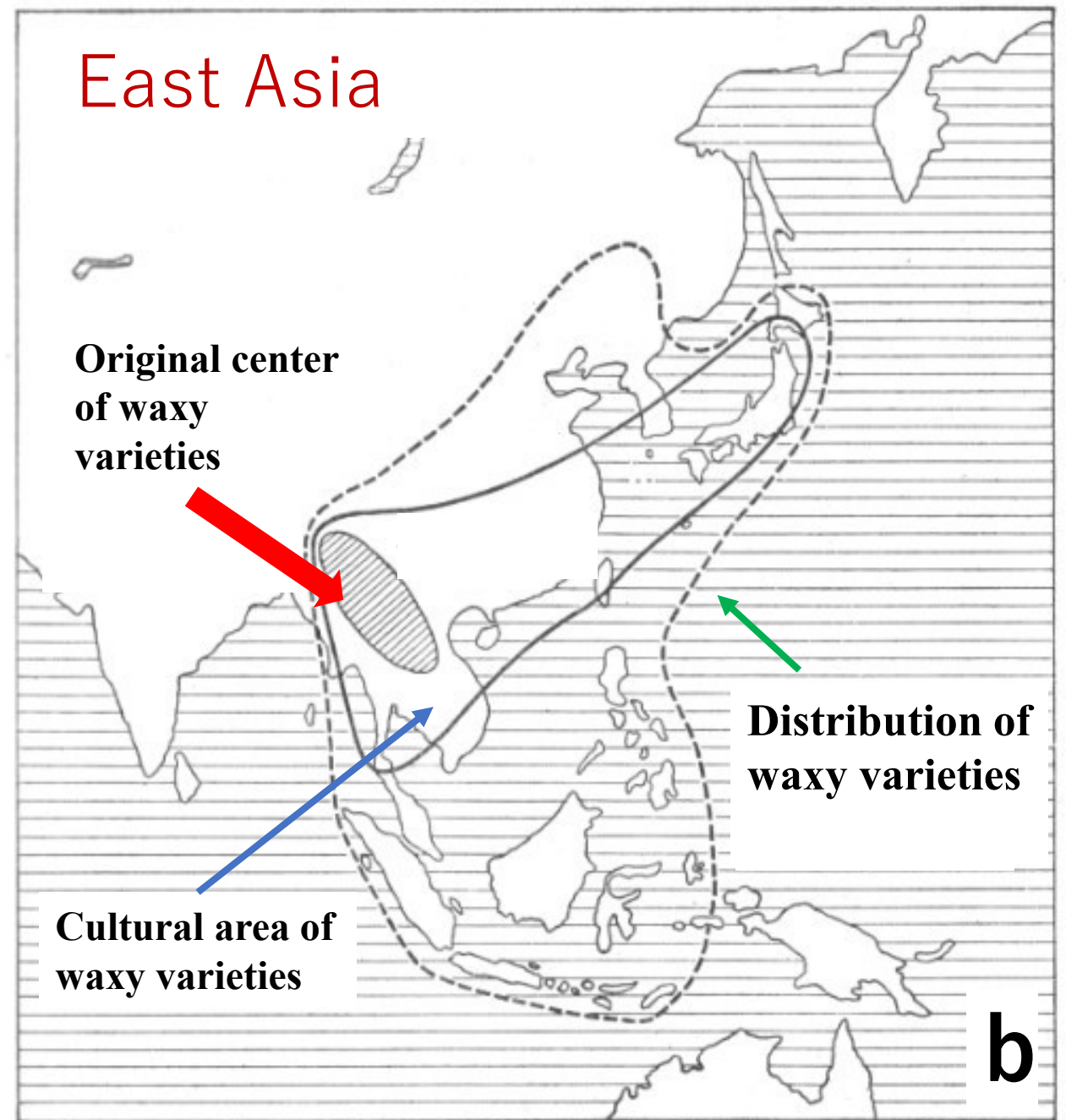
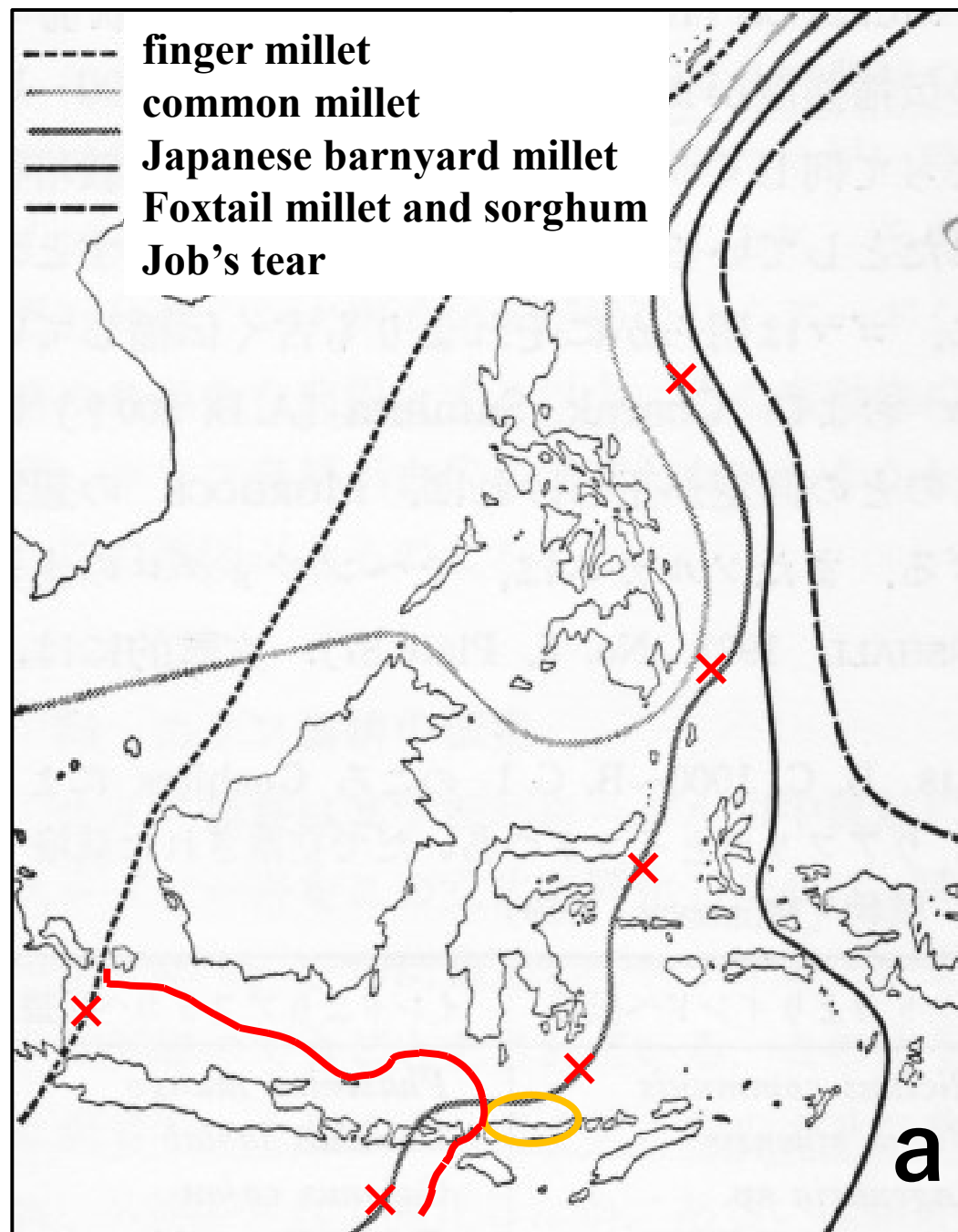
In another case, they have celebrated a special offering by making *sushi* of foxtail millet and *yamame* fish for the god of hunters, called *Osuwasama*.

The selected farmers grow foxtail millet, then they dedicate the grains to His Majesty the Emperor. He offers the sacred food like rice and foxtail millet to his ancestors in *Niiname-sai* Ritual at the palace of Emperor.



a, boiled grain mixed with rice (non-waxy) and common millet (waxy); **b**, *mochi* dumpling; **c**, *okowa*, steamed mixed grain (waxy).; **d**, *chimaki* wrapped in bamboo leaf. **e**, *kasha* gruel at a nursery school in Tashkent, Uzbekistan; **f**, milk tea with roasted grains in Inner Mongolia.

We cook many kinds of foods using common millet, for example, boiled grains, waxy dumpling *mochi*, non-waxy gruel in Eurasia.



a; Shikano (1946) modified; b, Sakamoto (1989) modified

Several millets, finger, common, foxtail millet have dispersed up to South East Asia.

East Asian people like waxy foods made from cereals historically.

Uzbekistan



weed



Inner Mongolia

Hokkaido



Kanto



Okinawa



Japan

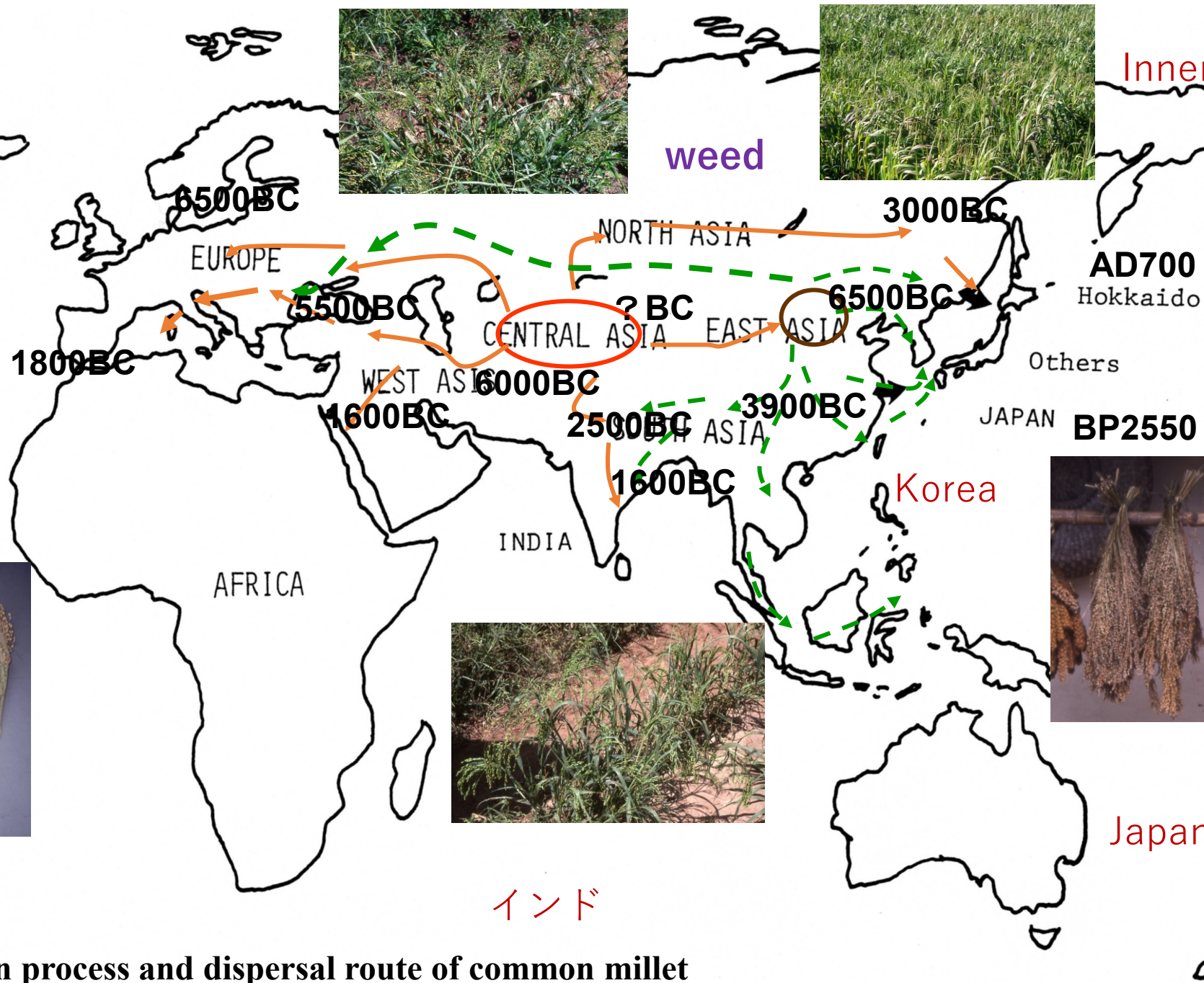
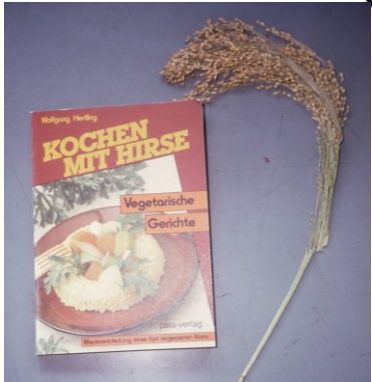
Korea



インド



Germany



Domestication process and dispersal route of common millet
based on the botanical data and archaeological excavation

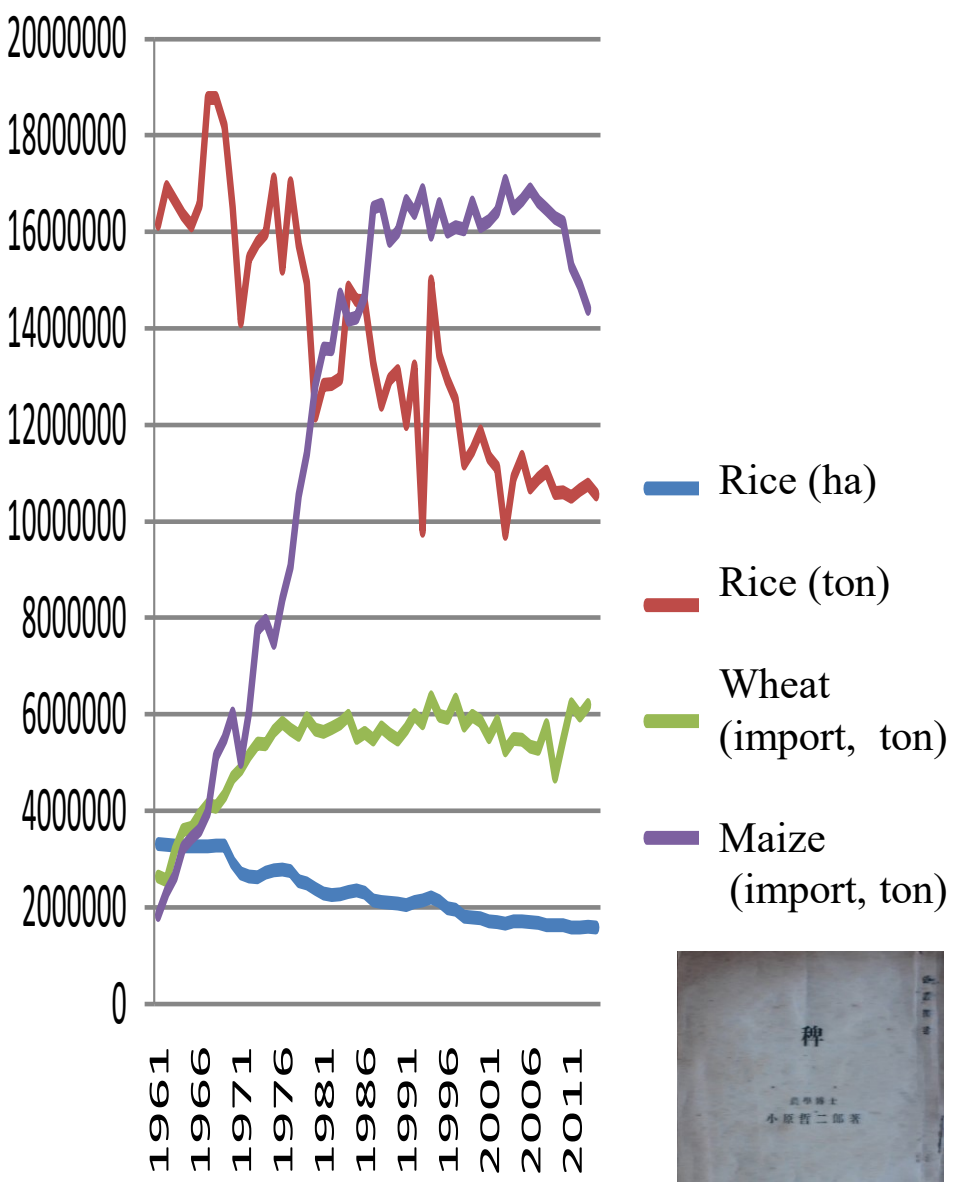
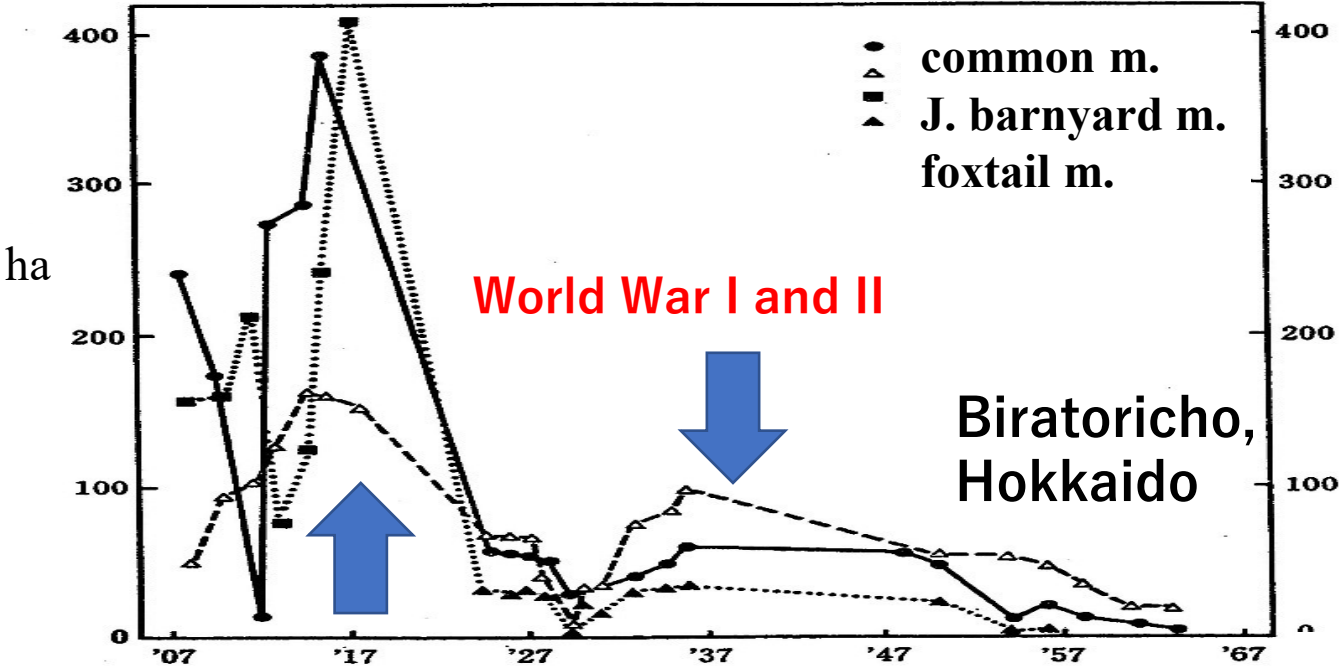
I have studied the domestication process and dispersal route of common millet, based on the ethnobotanical data. This species might have cultivated around Central Asia, and then had dispersed toward both Europe and China before 6500BC.

Cultivation area (ha) of millets as orphan crops

Millet	1900	1950	1990	2001	2002	2003	2022
foxtail millet	243,700	66,100	44	50	53	44	
proso millet	34,100	26,200	146	169	152	121	
Japanese barnyard millet	71,900	33,200	290	110	150	156	
sorghum						22	
finger millet					trace		
Job's tear				344	312	358	
Total	349,700	125,500	480	673	667	701	295
buckwheat				41,800	41,400	34,500	66,600
tartar buckwheat						14	
amaranth				15	11	18	



Wartime



Japanese barnyard millet published in August 5th, 1945



The cultivation area of millets had increased in the wartimes of Japan. The government had encouraged to grow millets by many booklets for enduring hunger in the wartime. That booklet was printed on the day before dropping the first atomic bomb on Hiroshima.

The Anthropocene has started after Hiroshima followed on Trinity Nuclear Test.



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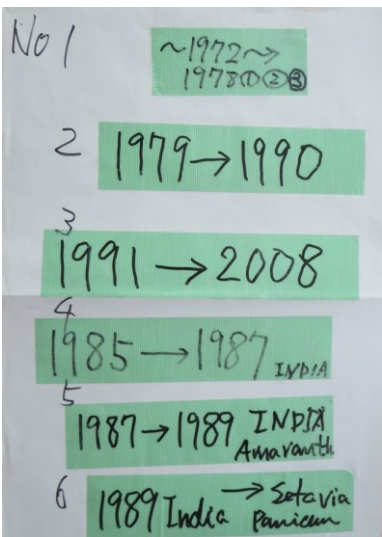
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1. Name and address of consignee/Plant protection organization of the country of origin	Letter of Authority for the introduction and/or movement of harmful organisms, plants, plant products and other objects for vital or scientific purposes and for work on varietal selections (Issued under Directive 2008/15/EC)	
2. Name and address of person responsible for the approved activities Mrs J Terry Millennium Seed Bank, Royal Botanic Gardens, Kew, Weybridge, Surrey, TW20 0EX, UK	3. Name of the responsible official body of the Member State of issue Department for Environment, Food and Rural Affairs (Defra) Welsh Assembly Government (WAG)	
4. Address and description of the specific site or sites for quarantine confinement The Wellcome Trust Millennium Building in the rooms designated in the SOP of 10/01/02 at the above address.	5. Place of origin (documentary evidence attached for material originating in a third country) All countries	
6. Declared point of entry for material introduced from a third country Great Britain	6. Plant passport number: or Phytosanitary certificate number:	
7. Scientific name(s) of the material, including the harmful organism concerned: Fruct of all species Seed of all species, other than <i>Vitis</i> spp., <i>Solanum</i> (Stolon and tuber-forming species) Parts of plants not for planting of all species, other than those listed below; <i>Citrus</i> L. and hybrids <i>Fortunella</i> Swingle and hybrids <i>Poncirus</i> Raf. and hybrids <i>Vitis</i> spp. <i>Phoenix</i> spp. From: Algeria & Morocco	8. Quantity of material As required	
9. Type of material Seeds and fruits		
10. Additional declaration This material is introduced into the United Kingdom in accordance with the Community under Directive 2008/15/EC and Defra plant health licence no PHL 203A/49/02/2011		
11. Additional information Valid until 28 February 2012 ROYAL BOTANIC GARDENS K^{ew} MILLENNIUM SEED BANK		
12. Endorsement by the responsible official body of the Member State of origin of the material Place of endorsement: Date: Signature of authorized officer: Name in BLOCK LETTERS	13. Stamp of the responsible official body of issue Place of issue: YORK Date: 05/02/2011 Signature of authorized officer: Name in BLOCK LETTERS PAUL KILBY 	



After the Great East Japan Earthquake on March 11, we had transferred our millet accessions (ca. 10,000) to Millennium Seed Bank, Royal Botanic Gardens Kew, because we had to prevent them immediately from the scheduled blackout and radioactive rays. (expedited on **June 22, 2011**)

Great East Japan Earthquake attacked North East Japan on March 11, 2011.

Then, I had to transferred immediately about ten thousand accessions of the millets to the Millennium Seed Bank of Royal Botanic Gardens, Kew, the United Kingdom in order to avoid the blackout and radioactive rays.



Textile and a
tale of Millet

**Join us in
saving the
millets**



Contact address: kibi20kijin@yahoo.co.jp or kimatami@u-gakugei.ac.jp
Dr. Mikio KIMATA, Ethnobotany and Principle for Learning Environment,
Emeritus Professor of Tokyo Gakugei University

Thank you !

I greatly appreciate their support of many exemplary farmers, researchers, and colleagues not only in Japan but also in the world.

Thank you so much for your attention.



Bread made from finger millet



Lunch menu at Kosuge restaurant and many kind of foods.



Alcoholic drinks made from common, foxtail and Japanese barnyard millet.



Magazines of millets



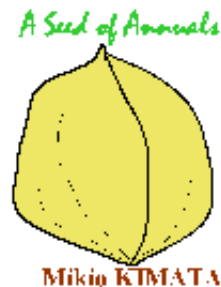
I would like to share what's been going on recently in Japan by two more slides.

As the Chinese proverb goes, “Consult the past if you want to know what the future will bring.”

Today, we are developing many kinds of food items which are for promoting millet production.

Grains	Production/tones (world)	%	No. of Nations	Production/ tones (Japan)
Wheat	907, 827, 755	23. 3	123	1, 097, 000
Rice	996, 185, 847	25. 5	115	10, 525, 400
Maize	1, 472, 362, 404	37. 7	164	167
Barley	147, 623, 057	3. 8	101	234, 800
Millets	100, 475, 245	9. 7	137	249
Others	276, 765, 021		91	315
Total	3, 901, 239, 329	100	193 in 2021	11, 857, 931

Total population of the world is over eight billions. Total production of grains was about 3.9 billion tones. Millets and others were cultivated in 137 nations in 2021. The percentage were 9.7% .



We distribute millet seeds to citizen for their family farming.



Total population of the world is over eight billion.

Total production of grains was about 3.9 billion tones.

Millets and others were cultivated in 137 nations in 2021. The percentage were 9.7%. Millets and others were eaten by over 0.7 billion people in Afro-Eurasia.

On the other side, the population of Japan was 1.6% in the world, while the grain production was only 0.3% in 2021.

Japan must produce more grains for food security. We distribute millet seeds to citizen for their family farming.