

AN OVERVIEW OF LEGUME CULTIVATION IN JAPAN

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MAKITA HAJIKA holds a doctorate degree in Agriculture from the University of Hokkaido (Japan) and is the director of Field Crop Research Division, NICS (Institute of Crop Science, NARO), Japan. His expertise is in soybean breeding, especially component improvement breeding. He worked as a soybean breeder at the Kyushu Agriculture Experiment Station (Kyushu Okinawa Agricultural Research Center, NARO) and the NICS, and as a research coordinator at the Agriculture, Forestry and Fisheries Research Council, Japan.



ABSTRACT

The volume of legumes produced by Japanese agriculture is small, but in Japanese traditional food culture, their presence is significant. Soybeans and adzuki beans are processed into Japanese traditional foods such as tofu, natto, soy sauce and adzuki bean paste (bean jam). Furthermore, other legumes introduced recently, such as green pea and sugar pea, have already become very popular in Japanese menus. In my lecture, I will explain the present situation of legume cultivation in Japan.

Soybean is the most planted legume in Japan in terms of acreage (141,800 ha). Most soybeans are cultivated for dry seeds. To prevent the overproduction of rice, the Japanese government recommends the cultivation of soybean instead of rice. Hence we commonly see soybeans in Japanese paddy fields. About 20-30 years ago, Japanese farmers usually planted soybeans on a small scale, and seeding and harvesting were performed manually. But recently, mechanization of soybean cultivation became more widespread at production sites, encouraging the cultivation scale of soybean to become larger as well.

Another soybean type is edamame (green soybeans). Edamame, i.e, the boiled young soybean pod, is a very popular snack in Japan, often served as a partner or appetizer to beer. Edamame's planted acreage is only 1/10 of dry seeds, but total production value is almost the same as those of dry soybean seeds. The main production areas of edamame are Kanto and Tohoku (East and Northeastern) regions.

Adzuki bean is the second most important legume in Japan (32,300ha). Most of the adzuki beans are produced in Hokkaido region. Outside Hokkaido, we can find economical cultivation of adzuki beans at some small areas only, such as those in Kyoto and Hyogo prefectures. In other regions, economical cultivation of adzuki bean are few, and they are often planted for personal production and consumption.

The cultivation area of kidney beans is about 9,000 ha, with over 95% of Japanese kidney bean production coming from Hokkaido region. Kidney beans are mainly used for making bean jam and as boiled beans. For vegetable grade (green bean), the planted acreage is about 5,800 ha and the main producing regions are Kanto and Tohoku.

Peanut came to Japan in 18th century. Currently, the total production acreage is about 7,000 ha. It is mainly processed as snacks like roasted pods and beans. The main production area of peanut is Southern Kanto (East) region, especially Chiba prefecture. The scale of peanut cultivation is small, so harvesting and drying operations are still done manually.

Pea and broad beans are mainly used as vegetables. Podded peas and green peas, with a total production acreage of about 3,000 ha, find major usage in Japan. Dry pea production is little and limited mainly to Hokkaido. It is used for snacks such as bean paste and fried beans. Broad bean, with about 2,000 ha cultivation area, is used like edamame.


About other legumes, there are not enough statistical data. Surely, we can find other legumes, such as cowpea and winged bean, in farmers' fields. However, the production scale is not large and they are cultivated much like those in kitchen gardens. In the Southwest region, cowpeas are often confused with and planted instead of adzuki beans. Winged bean is mainly planted at Okinawa region and used for vegetable dishes. Mung bean is popular as a bean sprout, but most mung beans are imported and there are none or only little cultivation in Japan.

KEYWORDS

beans, legumes, soybean, production, cultivation

REFERENCES

Ministry of Agriculture, Forestry and Fisheries, Japan (2014), e-Stat (Statistics), <http://www.e-stat.go.jp/SG1/estat/List.do?lid=000001141603>




Institute of Crop Science, NARO

An Overview On Legumes Cultivation In Japan

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National Agriculture and Food Research Organization

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Today's contents

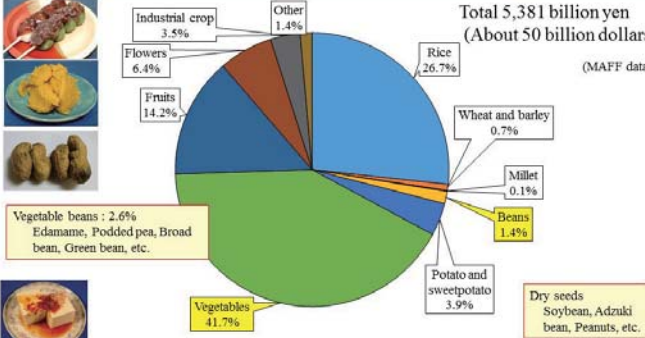
1. Present situation of legume production in Japan
2. Production of seed legumes in Japan
3. Production of vegetable legumes in Japan
4. Cultivars of Japanese legumes

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1. Present Situation of Japanese Legumes

Total 5,381 billion yen (About 50 billion dollars) (MAFF data)



| Category | Percentage |
|---------------------------------------------------------------------|------------|
| Rice | 26.7% |
| Wheat and barley | 0.7% |
| Millet | 0.1% |
| Beans | 1.4% |
| Potato and sweetpotato | 3.9% |
| Dry seeds (Soybean, Adzuki bean, Peanuts, etc.) | 1.4% |
| Vegetables | 41.7% |
| Vegetable beans (Edamame, Podded pea, Broad bean, Green bean, etc.) | 2.6% |
| Fruits | 14.2% |
| Flowers | 6.4% |
| Industrial crop | 3.5% |
| Other | 1.4% |

Gross agricultural production value

Though total legume production value is only 4%, legume presence is not small. Legumes are becoming indivisible in Japanese diet, such as tofu and soy source.

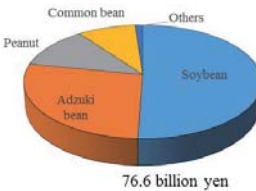
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Agricultural production value of legumes

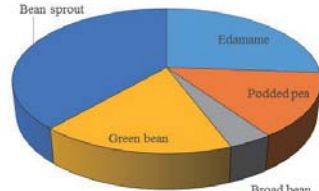
(MAFF data)

Production of dry bean



76.6 billion yen

Production of vegetable bean



137.9 billion yen

(Note) Most of dry beans are processed to factory products, such as Tofu and Natto. For example, production value of tofu and fried tofu is more than 280 billion yen.

Total agricultural production value of legumes is more than 200 billion yen. In addition to that, the economical value as the factory product is higher.

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Legume position in the field crops

Production of field crops

| Item | Year | Planted area (ha) | Yield (kg/10a) | Production (t) |
|--------------|------|-------------------|----------------|----------------|
| ○ Soybean | 2015 | 141,800 | 171 | 242,400 |
| ○ Azuki bean | 2013 | 32,300 | 211 | 68,000 |
| ○ Peanut | 2015 | 6,700 | 184 | 12,300 |
| Sweet potato | 2015 | 36,600 | 2,220 | 814,200 |
| Potato | 2014 | 78,300 | 3,140 | 2,456,000 |
| Sugarcane | 2015 | 29,600 | 5,380 | 1,260,000 |
| Sugar beet | 2015 | 58,800 | 6,680 | 3,925,000 |
| Buck wheat | 2015 | 58,200 | 60 | 34,700 |
| Sesame | 2007 | 216 | 46 | 96 |
| Rapeseed | 2015 | 1,630 | 194 | 3,160 |
| Rice | 2017 | 1,506,000 | 531 | 7,989,000 |

○ Circles show crops really listed in NICS (By MAFF data)

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Self-sufficiency ratio (%) of dry beans

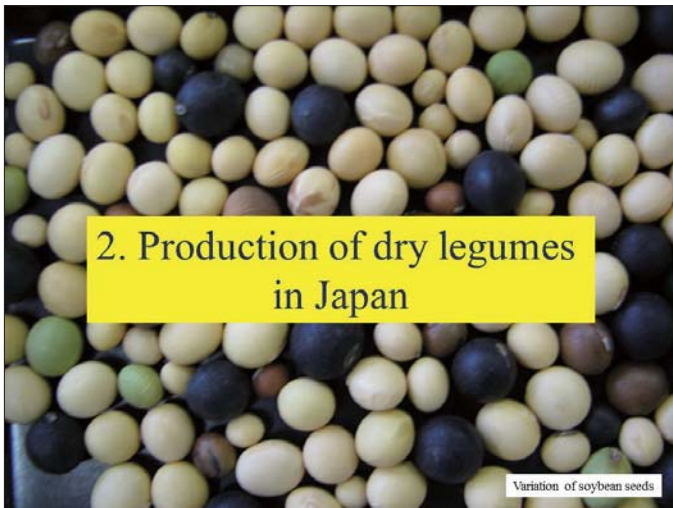
| Item | Domestic production (t) | Import (t) | self-sufficiency ratio(%) | year |
|-------------|-------------------------|------------|---------------------------|------|
| Soybean | 231,700 | 2,828,000 | 7.6 | 2014 |
| | (231,700)* | (836,000) | (21.7) | 2014 |
| Adzuki bean | 67,500 | 28,300 | 70.5 | 2013 |
| Common bean | 19,100 | 31,300 | 37.9 | 2013 |
| Pea | 700 | 15,200 | 4.4 | 2013 |
| Broad bean | 100 | 5,000 | 2.0 | 2013 |

*Characters in the parenthesis is for food grade (MAFF data)

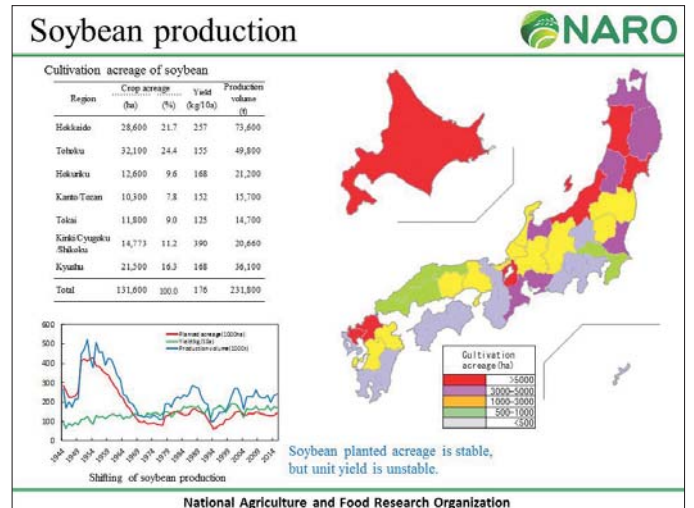
Because adzuki bean is local bean from the worldwide view point, so the import volume is little.

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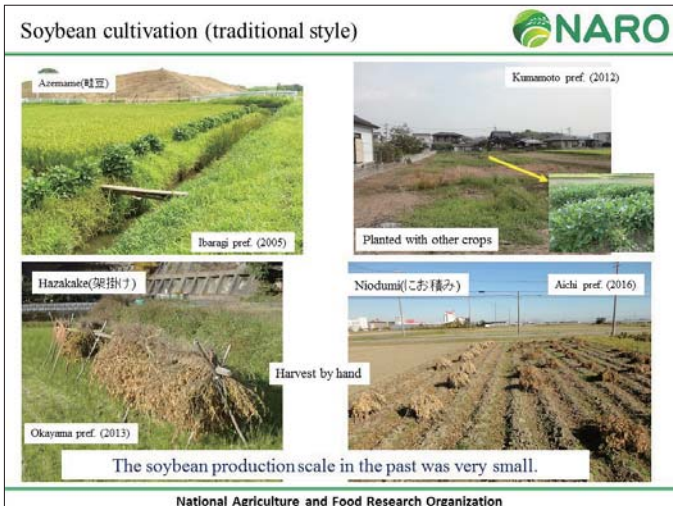
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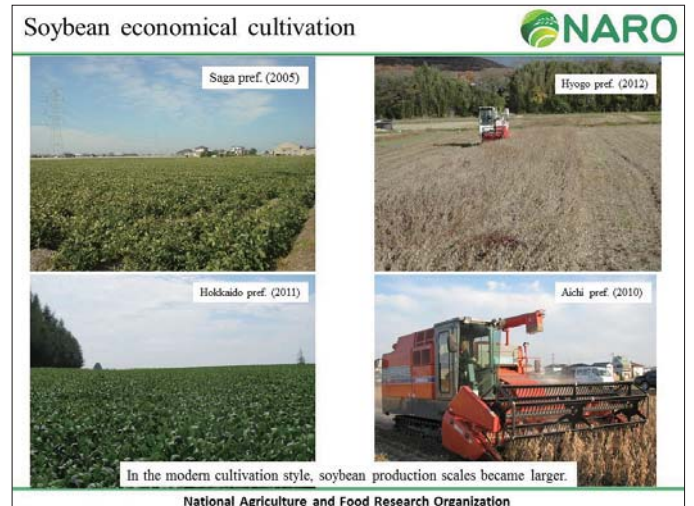
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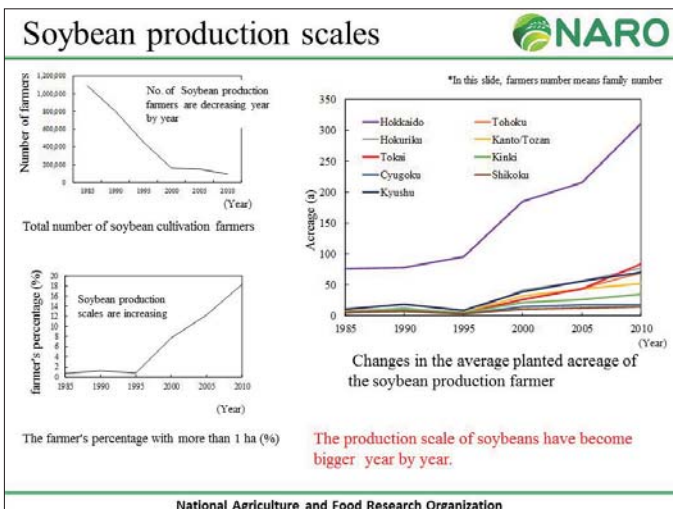
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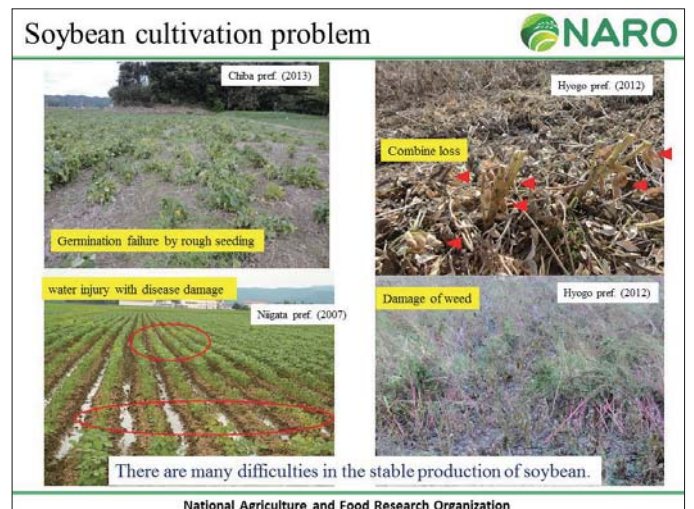
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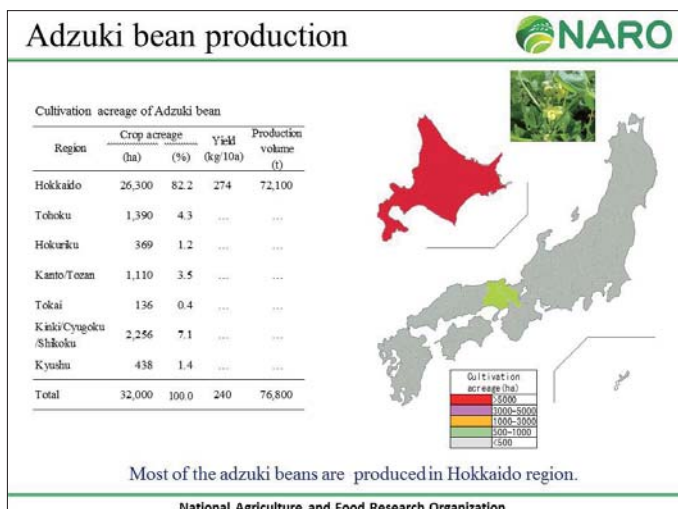
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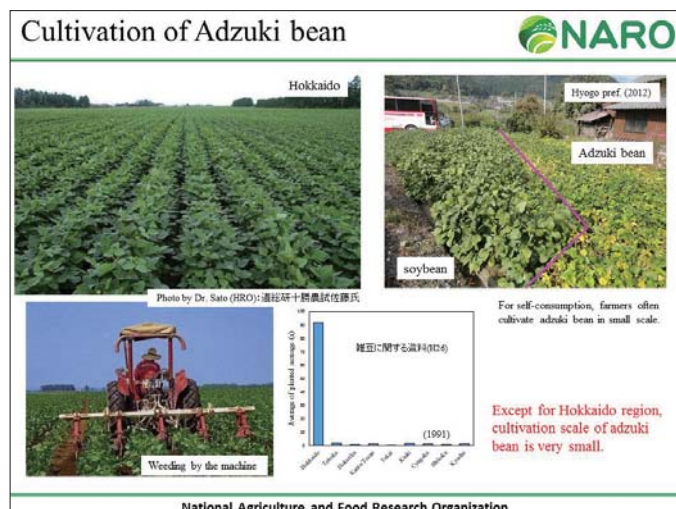
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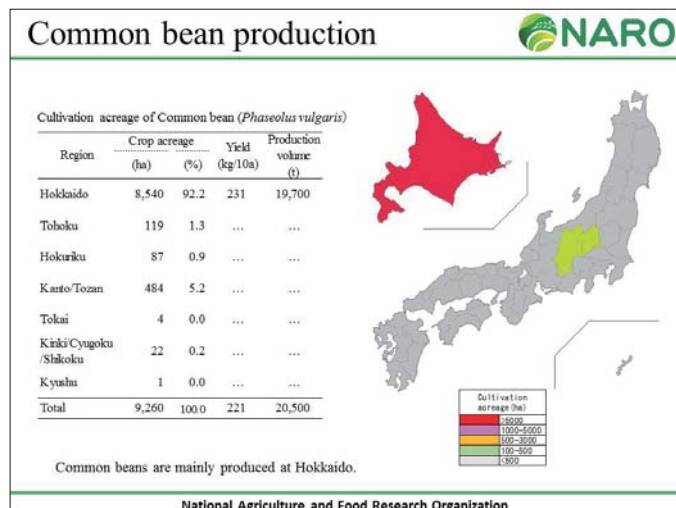
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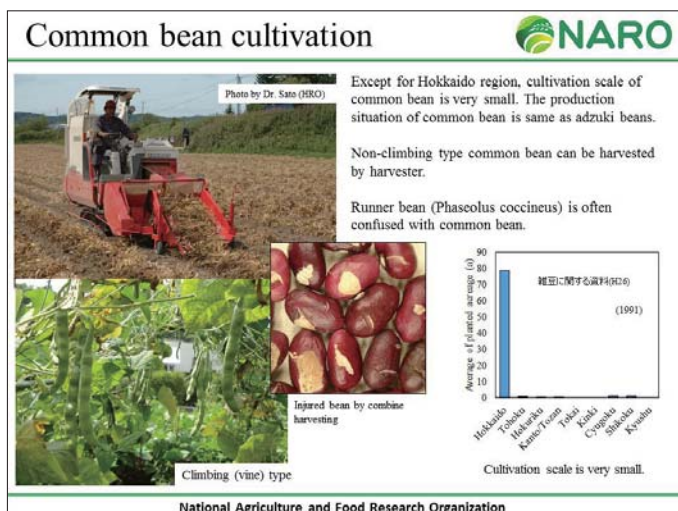
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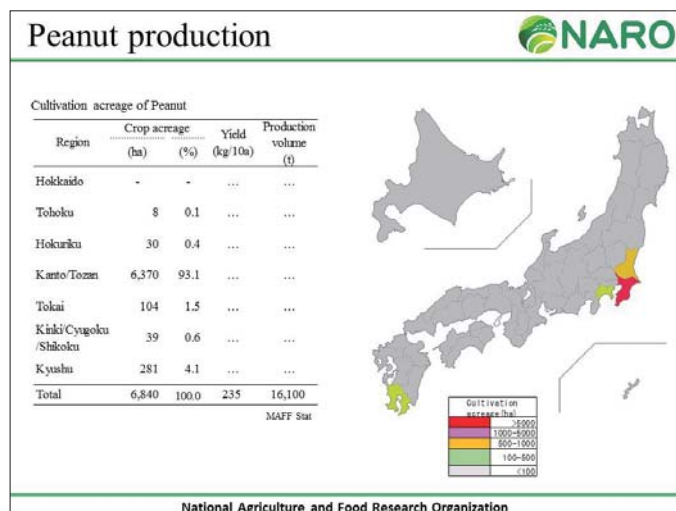
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Production of other beans




| Crop | Planted acreage (ha) | Yield (kg/10a) | Production volume (t) | Main production area |
|------------------|----------------------|----------------|-----------------------|--------------------------|
| Pea | 536 | 222 | 1,189 | Hokkaido, Yamaguchi |
| Cowpea | 90 | 56 | 50 | Okinawa, Okayama, Gunma |
| Broad bean | 81 | (231) | 5 | Kagawa, Okayama, Ehime |
| <i>(remarks)</i> | | | | |
| Soybean | 142,100 | 161 | 229,200 | Hokkaido, Tohoku, Kyushu |
| Adzuki bean | 32,287 | (169) | 53,636 | Hokkaido, Kinki |
| Peanut | 9,765 | (241) | 22,856 | Chiba, Ibaraki |

*The newest statistical data of these beans are 10 years ago. (MAFF, 2006)
**The parenthesis shows the average of some prefecture which correct data was obtained.



Mung bean (green gram)



Adzuki bean

Mung bean is used for bean sprout, but there are few production in Japan.

Cowpea shapes is similar to adzuki bean, and farmers often plant cowpea as adzuki bean. Cultivars, such as "Kuroadzuki" and "Tenko adzuki", are cowpea.

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3. Production of vegetable legumes in Japan

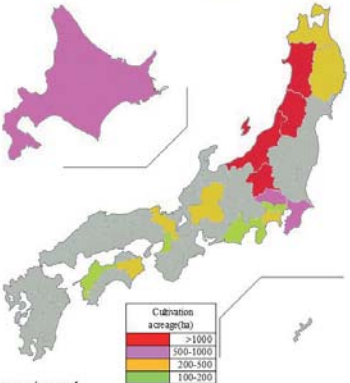
Snap peas (young pea pods)

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Production of Edamame (green soybean)



| Region | Crop acreage (ha) | (%) | Yield (kg/10a) | Production volume (t) |
|-----------------------|-------------------|------|----------------|-----------------------|
| Hokkaido | 854 | 8.5 | 587 | 5,010 |
| Tohoku | 3,155 | 31.6 | 405 | 12,773 |
| Hokuriku | 1,570 | 15.7 | 384 | 6,030 |
| Kanto/Tozan | 3,167 | 31.7 | 710 | 22,490 |
| Tokai | 488 | 4.9 | 561 | 2,740 |
| Kinki/Chugoku/Shikoku | 757 | 7.6 | 578 | 4,375 |
| Kyushu | - | - | - | - |
| Japan | 9,991 (12,500) | 100 | 536 (67,000) | 53,418 (67,000) |




Edamame is mainly cultivated near big consuming region and often sold with a branch.

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Edamame harvesting







Photo by D. Masuda
Saitama



Hokkaido
Harvester for frozen edamame





Photo by D. Masuda
Akita




Edamame sorting machine
Photo by D. Masuda

Recently, machine harvesting is coming popular in edamame production. Sorting process after harvesting is important for economical value.

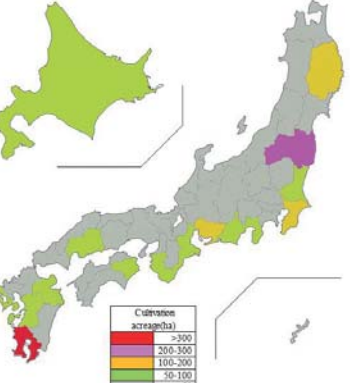
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Production of Snap peas (podded pea)




| Region | Crop acreage (ha) | (%) | Yield (kg/10a) | Production volume (t) |
|-----------------------|-------------------|-------|----------------|-----------------------|
| Hokkaido | 95 | 5.5 | 650 | 618 |
| Tohoku | 380 | 21.9 | 377 | 1,434 |
| Hokuriku | - | - | - | - |
| Kanto/Tozan | 208 | 12.0 | 567 | 1,176 |
| Tokai | 308 | 17.7 | 861 | 2,653 |
| Kinki/Chugoku/Shikoku | 244 | 14.0 | 840 | 2,050 |
| Kyushu | 502 | 28.9 | 916 | 4,598 |
| Japan | 1,737 (3,020) | 100.0 | 666 (20,100) | 20,500 (67,000) |



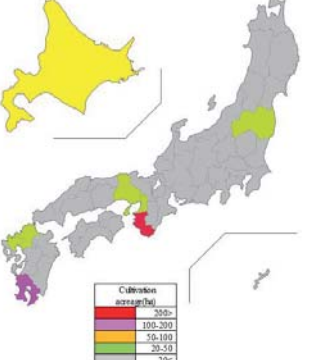
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Production of Green pea

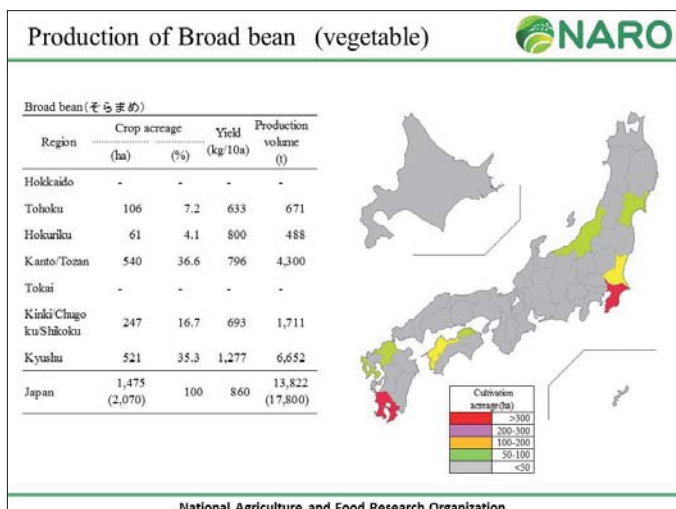


| Region | Crop acreage (ha) | (%) | Yield (kg/10a) | Production volume (t) |
|-----------------------|-------------------|-------|----------------|-----------------------|
| Hokkaido | 51 | 8.7 | 532 | 272 |
| Tohoku | 36 | 6.1 | 414 | 149 |
| Hokuriku | - | - | - | - |
| Kanto/Tozan | - | - | - | - |
| Tokai | - | - | - | - |
| Kinki/Chugoku/Shikoku | 315 | 53.6 | 960 | 3,025 |
| Kyushu | 186 | 31.6 | 905 | 1,683 |
| Japan | 588 (859) | 100.0 | 780 (6,700) | 5,129 (67,000) |

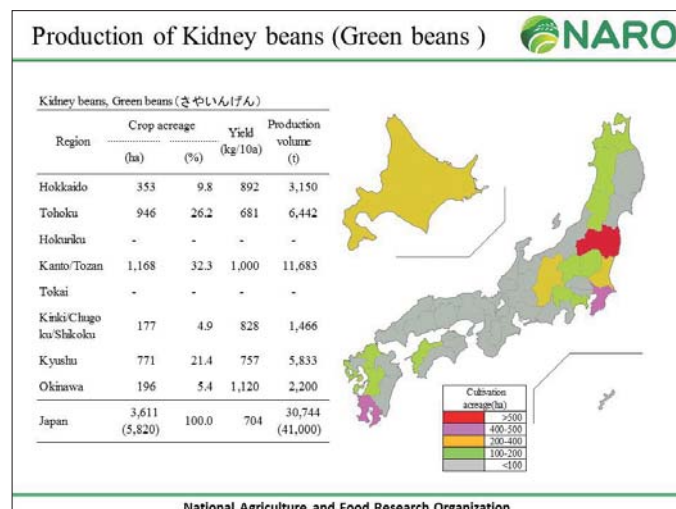


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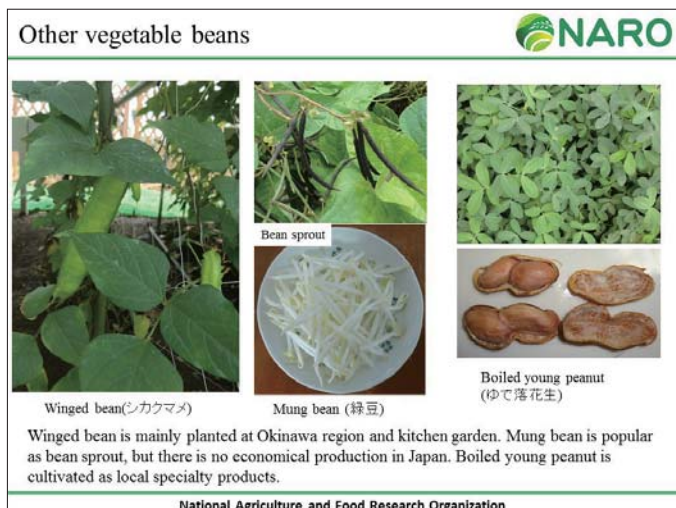
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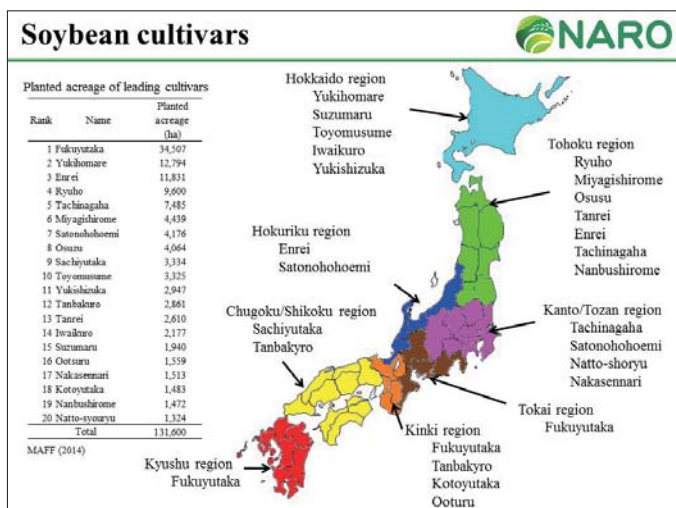
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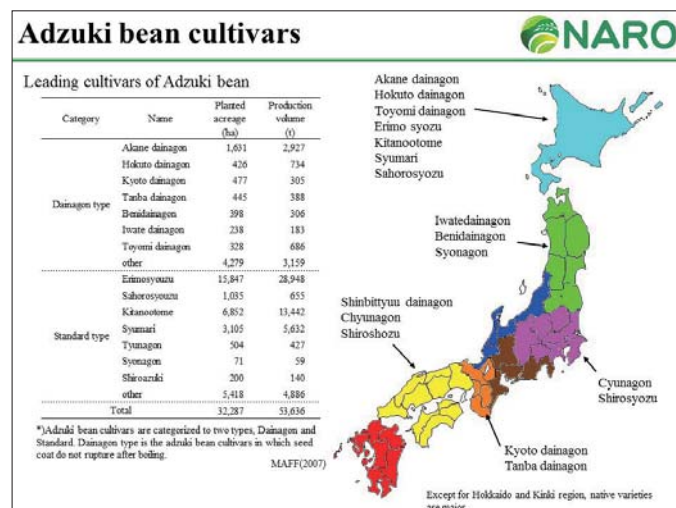
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Common bean cultivars



Leading cultivars of common bean

| Category | Name | Planted acreage (ha) | Production volume (t) |
|-----------------------------------|------------------|----------------------|-----------------------|
| Tebo type | Hime tebou | 993 | 2,530 |
| | Yuki tebou | 2,136 | 5,771 |
| | other | 21 | 59 |
| Kinoki type | Taiyo kinoki | 4,175 | 9,655 |
| | Fukujō kinoki | 446 | 1,155 |
| | Hokkai kinoki | 403 | 956 |
| | Fukumasari | 3,492 | 8,895 |
| | other | 64 | 159 |
| Usura type | Fukuyuchunaga | 150 | 337 |
| | Fuku usura | 299 | 692 |
| | other | 7 | 11 |
| Oofuku type | Oofuku | 111 | 276 |
| | Toyaoofuku | 186 | 385 |
| | Kairyotoramame | 95 | 220 |
| Toramame type | Fukutoramame | 123 | 262 |
| | Ooshirohana | 415 | 983 |
| | Marasakihanamame | 59 | 153 |
| Runner bean (Phaseolus coccineus) | Hanamame | 1 | 1 |
| | Beshibana ingen | 71 | 63 |
| | other | 72 | 141 |
| | Kuwanshimame | 2 | 6 |
| | other | 761 | 834 |
| Total | | 14,082 | 33,505 |

MAFF(2007)

Common bean





Photo by Dr. Sato (HRO)

Taiho kinoki Yuki tebo Fukura kinoki Fuku usura
Fuku toramame Toyaoofuku Beshibori Panda mame
Kurimame Kaigaramame Shirobanamame Marasakihanamame

Blue character shows Runner bean

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Adzuki bean and Common bean in Hokkaido



Leading cultivars of Adzuki bean

| Category | Name | Planted acreage (ha) |
|---------------|-----------------|----------------------|
| Dainagon type | Akane dainagon | 369 |
| | Hokuto dainagon | 7 |
| | Homare dainagon | 296 |
| Standard type | Toyomi dainagon | 1,946 |
| | other | 4 |
| | Erimosyouzu | 9,470 |
| Standard type | Sahorosyouzu | 266 |
| | Kitanootome | 5,025 |
| | Syumari | 1,120 |
| | Kitaroman | 6,853 |
| | Kitahotaru | 29 |
| Standard type | Kitasutaka | 344 |
| | other | 473 |
| | Total | 26,200 |

Leading cultivars of common bean

| Category | Name | Planted acreage (ha) |
|-----------------------------------|------------------|----------------------|
| Tebo type | Hime tebou | 145 |
| | Yuki tebou | 1,685 |
| | other | 251 |
| Kinoki type | Taiyo kinoki | 2,534 |
| | Fukujō kinoki | 110 |
| | Hokkai kinoki | 154 |
| | Fukumasari | 1,929 |
| | Fukuyō kinoki | 180 |
| Kinoki type | Fukura kinoki | 643 |
| | other | 19 |
| | Fukuyuchunaga | 21 |
| Usura type | Fuku usura | 148 |
| | other | 18 |
| Oofuku type | Oofuku | 48 |
| | Toyaoofuku | 88 |
| Toramame type | Kairyotoramame | 17 |
| | Fukutoramame | 112 |
| Runner bean (Phaseolus coccineus) | Ooshirohana | 117 |
| | Marasakihanamame | 116 |
| | other | 3 |
| Total | | 8,380 |


MAFF(2014)

* Adzuki bean cultivars are categorized to two types, Dainagon and Standard. Dainagon type is the adzuki bean cultivars in which seed coat do not rupture after boiling.

雑豆に関する資料(2014)

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Legume Major Cultivars in Japan




| Item | Japanese name | NO. of registered cultivars** | Example of cultivars |
|-------------|---------------------|-------------------------------|--------------------------------------------------------------------------------------------------------------------------------|
| Soybean | 大豆、枝豆 | 217 | Fukuyutaka, Enrei, Yukihomare, Tachinagaha, (Tanbakuro)*, Ryubo, Hiden, Okuharawase, Sapporomidori, Sayamazume (Tanbadainagon) |
| Adzuki bean | 小豆 | 23 | Akanedainagon, Erimosyouzu, Kitanoootome, Syumari, (Tanbadainagon) |
| Common bean | インゲンマメ、さやインゲン | 54 | Taiyokinoki, Fukumasari, Yuki-tebou, Oofuku |
| Runner bean | ベニバナインゲン | 3 | Marasakimame, Ooshirohana, Hifae-hiooguro |
| Peanut | 落花生 | 9 | Chabandachi, Nakateyutaka, Kairyohandachi, Oomasaki |
| Pea | エンドウ、さやエンドウ、グリーンピース | 77 | Toyomidori, (Kinusaya endou), (Snap endou) |
| Broad bean | ソラマメ | 23 | Ryousaijin, Kawachijin, Nintokinjin, Ainosora |
| Winged bean | シカクマメ | 6 | Uritan, Chikushimidori, Wakosama |

* Name in the parenthesis is general name including some cultivars.
** The number of the registered cultivars were counted at MAFF HP. There are many conventional cultivars and patent broken cultivars.

We have not enough cultivars data except for Soybean and adzuki bean. So, number of registered cultivars and cultivar names are pick up from MAFF HP
(page: <http://www.hansyu.maff.go.jp/vps/CMD4.asp?CMD=110.aspx?058-1>).

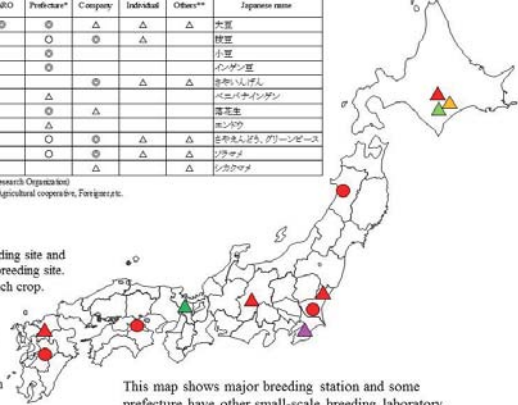
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Legume Breeding Organization



| Item | Type | NARO | Prefectures* | Company | Individual | Other** | Japanese name |
|-------------|-----------|------|--------------|---------|------------|---------|-----------------|
| Soybean | seed | ● | ● | △ | △ | △ | 大豆 |
| | vegetable | | ○ | ○ | △ | | 枝豆 |
| Adzuki bean | seed | | ○ | | | | 小豆 |
| Common bean | seed | | ○ | | | | インゲン豆 |
| Common bean | vegetable | | | ○ | △ | △ | さやインゲン |
| Runner bean | seed | | △ | | | | ベニバナインゲン |
| Peanut | seed | | ○ | △ | | | 落花生 |
| Pea | seed | | △ | | | | エンドウ |
| Pea | vegetable | | ○ | ○ | △ | △ | さやエンドウ, グリーンピース |
| Broad bean | vegetable | | ○ | ○ | △ | △ | ソラマメ |
| Winged bean | vegetable | | | △ | | | シカクマメ |

* Prefecture* contains HRO (Hokkaido Research Organization)
** Others* contains University, IBCAS, Agricultural cooperative, Fairpartner.
● Main breeding organization
○ Small breeding organization
△ Not organized



Circles show NARO's breeding site and triangles show prefectural breeding site. The colors correspond to each crop.

● ▲ Soybean
● ▲ Adzuki bean
● ▲ Peanut
● ▲ Common bean

This map shows major breeding station and some prefecture have other small-scale breeding laboratory.

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Chair Tobita

Good morning. Welcome to Session 1. My name is Satoshi Tobita, Program Director of JIRCAS, in charge of the Environment and Natural Resource Management Program.

This session is titled 'Legumes in agriculture: Sustainability, environment, and development.' It covers a range of research from agronomy to development. In this session, we will have three presentations. The first presentation is about the situation of legumes cultivation in Japan. Second, we will see the legumes in cropping systems in sub-Saharan Africa in some projects. And third lecture is about agriculture development projects and their impacts in Central America.

I cordially ask all speakers to finish your presentation within 15 minutes. Now, I will call Dr. Makita Hajika as the first presenter. Dr. Hajika is Director of Field Crop Research Division of the Institute of Crop Science, NARO. His expertise is soybean breeding, but today, he may speak also about other legumes in several aspects. I know him as technical advisor to new activities for promoting soybean in Africa. Okay, Dr. Hajika, the floor is yours.

Dr. Makita Hajika

Thank you Chairman. I am Hajika. I am a soybean breeder, but today, I have to talk about not only soybean but also the other legumes. So, some part of other legumes, I have some mistake or so, please allow me. These are today's contents. There are two types of legume usage. One is grain usage and second is vegetable usage. So, I will talk two types of legumes. First, I want to introduce to you the present situation of Japan's legumes. This chart shows gross agricultural production value. We can see legumes at beans and vegetable categories. Though total legume production value is only 4% of Japanese agricultural production value, but the presence of the legumes is not so small in Japanese food life. For example, soybean is very important food material like miso or tofu and adzuki bean is very popular in Japanese sweets. In addition to that, podded pea and green beans are popular at green salad.

Total production value of legumes is more than 200 billion yen. Grain bean is 76 billion yen and vegetable one is two times or so. But in addition to that, the economical value of the factory products is larger. For example, production value of tofu and fried tofu is more than 280 billion yen. So, grain bean is important for processing legumes.

This is the legume position in the field crops. Compared to the rice, the legume production area is not so big, but compared to the other field crops, bean production area is not so little.

This table shows the self-sufficiency ratio of dry beans. Except for adzuki beans, self-sufficiency ratio is not so high, especially pea, broad bean and cowpea are low. In addition to that, probably about lentil, pigeonpea and chickpea, there is no economical production.

From this slide, I talk about the dry legume production, grain legumes. Soybean has correct data, so I can make easily such slide. This table is cultivation acreage of soybean. Major soybean production area is Hokkaido, Tohoku, and Kyushu, but you can see there is not so small production acreage at the other areas. Because Japanese agriculture has one big problem, overproduction of rice. So, instead of rice, Japanese government encourage to produce the soybean at the paddy field. And you can see this small chart. This one is the production chart. Red line is the planted area and blue line is the production volume and green one is unit yield. In these 10 to 20 years, production area is flat, not changing, but the production volume is very unstable. So, it's a very big problem of Japanese soybean production.

This slide shows traditional style of Japanese soybean cultivation. In ancient, you could see the soybean near the ridge of the paddy field or soybean with other crops in the small sizes. In such cases, many farmers seeding and harvested by hand and like that system many man hand labor is needed. But nowadays, in such small production is not so much, very rare. Modern production style is like this. Soybean production scale began larger, not only Hokkaido area but also the other areas, machine seeding and harvesting is standard style.

This is a chart of the production scale. Total number of soybean cultivation of farmers decreasing year by year, but the farmers percentage with more than 1 hectare is increasing rapidly. This is the average of the planted acreage, not only Hokkaido but also the other regions increasing, especially at the Tokai areas, the scale of the soybean production is bigger and bigger year by year. Several slides before, I said soybean production is unstable. There are some causes. One cause is weather disaster or pest damage, but there are other problems.

One big problem is rough management, for example rough seeding, rough harvesting or failure of weed control and humidity control. Accumulation of the small labor misses are big causes of the raw yield or after yield.

Adzuki bean production is mainly conducted at Hokkaido areas. Except for Hokkaido areas, there is not so many economical productions. In Hokkaido, adzuki bean cultivation is similar to soybean. The scale is very big and machine seeding and harvesting is popular. But the other areas like this photo, adzuki bean cultivation is very small size and sometimes farmers only produce for self-consumption like this. This one is a small field and you can see adzuki bean with soybeans. Adzuki bean harvesting in such cases, farmers seeding by hand and harvested by hand and threshed by hand. In small scale adzuki bean production is all hand made. So, it's only for their self-consumption. In Hokkaido, combine harvesting is becoming standard style. Before style is bean cutter, harvesting, and natural seeding style.

Common bean production situation is similar to adzuki beans. Most of the common bean are produced at Hokkaido areas. Except for Hokkaido areas, cultivation scale of common bean is very small and it is the same as the situation of adzuki bean. There are two types of common bean. One type is non-climbing type. This is a dwarf type that we can easily use the machine for harvesting, but climbing type or running type common bean, we need bean pole and it is difficult to machinization. Compared to the adzuki bean, common bean has a larger seed, so injured bean by combine harvesting is becoming problem.

Now, the peanut production. We can see peanut at the south Kanto areas, especially at Chiba Prefecture. Most of the peanut production is at Chiba Prefecture.

In the works of peanut cultivation, many man hand labors still remain. For example, mulching is machine, but seeding is by hand and harvesting is by hand. Of course, some harvester was developing but it's not popular. Natural seeding process like this one is very important process for good quality, especially for good taste. So, this process cannot move to the machine harvesting. It's one big problem for the production of peanut cultivation.

About the other beans, there is not so many data for other bean production. This is 10 years ago data. But the situation is not different probably. Compared to soybean or adzuki bean, the production area is very small. In addition to that, cowpea seed shape is a similar to adzuki bean, so some farmers cultivate cowpea as adzuki bean. For example, cultivar such as Tenko adzuki or Kuroadzuki are cowpea.

From this slide, I will talk about vegetable legumes in Japan. Vegetable legumes, there is not so much official data. Sorry, I have not so much time, so I have to talk in a few words. Edamame production area is near big cities like Osaka or Tokyo, but recently, highway network is elongating to the north Tohoku areas and the other production areas are increasing. Edamame harvesting in ancient, man hand harvesting was major, but recently, many harvesters introduced to the cultivation field. In addition to that, Edamame sorting machine is very important for keeping the quality.

For snap peas, podded pea, the production of the podded pea spreads from north to south. Such spreading production area is very convenient to provide all season.

Green pea has very small planting areas. We have about 7000 tonnes production, but we imported two times of this production as frozen green peas. This is broad bean production. Grain broad bean is very rare in Japan, but for vegetable, young broad bean is very popular in Japan at spring season.

That's green beans. Green beans production is similar to the green pea. For the other vegetable beans, mung bean is used for the bean sprout in Japan, but the production of the mung bean is not so much. Most of the mung bean imported from China, Myanmar and Thailand. Winged bean is mainly planted at Okinawa region and small size kitchen garden or so. Boiled young peanut is cultivated as local specialty products.

Lastly, I want to talk about the cultivars. Soybean cultivars have correct data. This chart shows a major cultivar and its planted areas. Most of these cultivars are bred by the public breeding station, but conventional cultivars such as Miyagishirome or Tanbakuro still remain as the local cultivars.

For adzuki bean cultivars, I have no new data. So, this is the old data, but you can see in Hokkaido areas, new cultivars planted. For the other areas, conventional cultivars, local cultivars still remain.

Common bean cultivars' situation is the same. This table includes the runner beans. Runner beans taste is similar to the common bean, so sometimes they are confused.

This is the newest data, but I can get only Hokkaido data. This one is the new one. Adzuki bean cultivar is two types, Dainagon type is adzuki bean cultivar in which seed coat does not rupture after boiling. Standard type adzuki bean is mainly produced. About the other legume cultivar, I cannot get correct data, so I picked up the number of listed cultivars from the MAFF home page. Of course, two or three times of these number of cultivars exist, but which cultivar is major I don't know surely. This example of cultivar name I picked up from the old data, books, website, the other private data or so.

This slide is the last slide. I introduce Legume Breeding Organization in Japan. This table is breeding site of legumes. You can see most of the grain beans are bred at the public breeding organization and vegetable legumes are bred as private company or individuals, and this map shows major breeding stations. Of course, in addition to this breeding organization, some prefectures have other small scale breeding laboratory and private companies have their own breeding stations. Thank you.

Chair Tobita

Thank you very much Dr. Hajika for reviewing the legumes cultivation in Japan. Because of time, we can have only very, very quick question, one question from the audience. No? Okay. Thank you very much Dr. Hajika. Please give him a big hand. Thank you very much.