

Agricultural Measures for Reducing Radionuclide Contamination of Agricultural Products

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Ministry of Agriculture, Forestry and Fisheries

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1 Agricultural Measures for Radionuclide

Nuclear Emergency Response Headquarters
Restrict food shipments / Set and remove intake limits

Instructions

Related municipalities

- Develop and implement inspection plans for food
- Implementation of shipment and intake restrictions for foodstuffs

Claims/
Support
←
→
Reports

Ministry of Health, Labor, and Welfare

Set reference values for radioactive substances in food

- Disclose test results

Support

Cooperation

Inquiries ↓ Findings ↑

Ministry of Agriculture, Forestry, and Fisheries

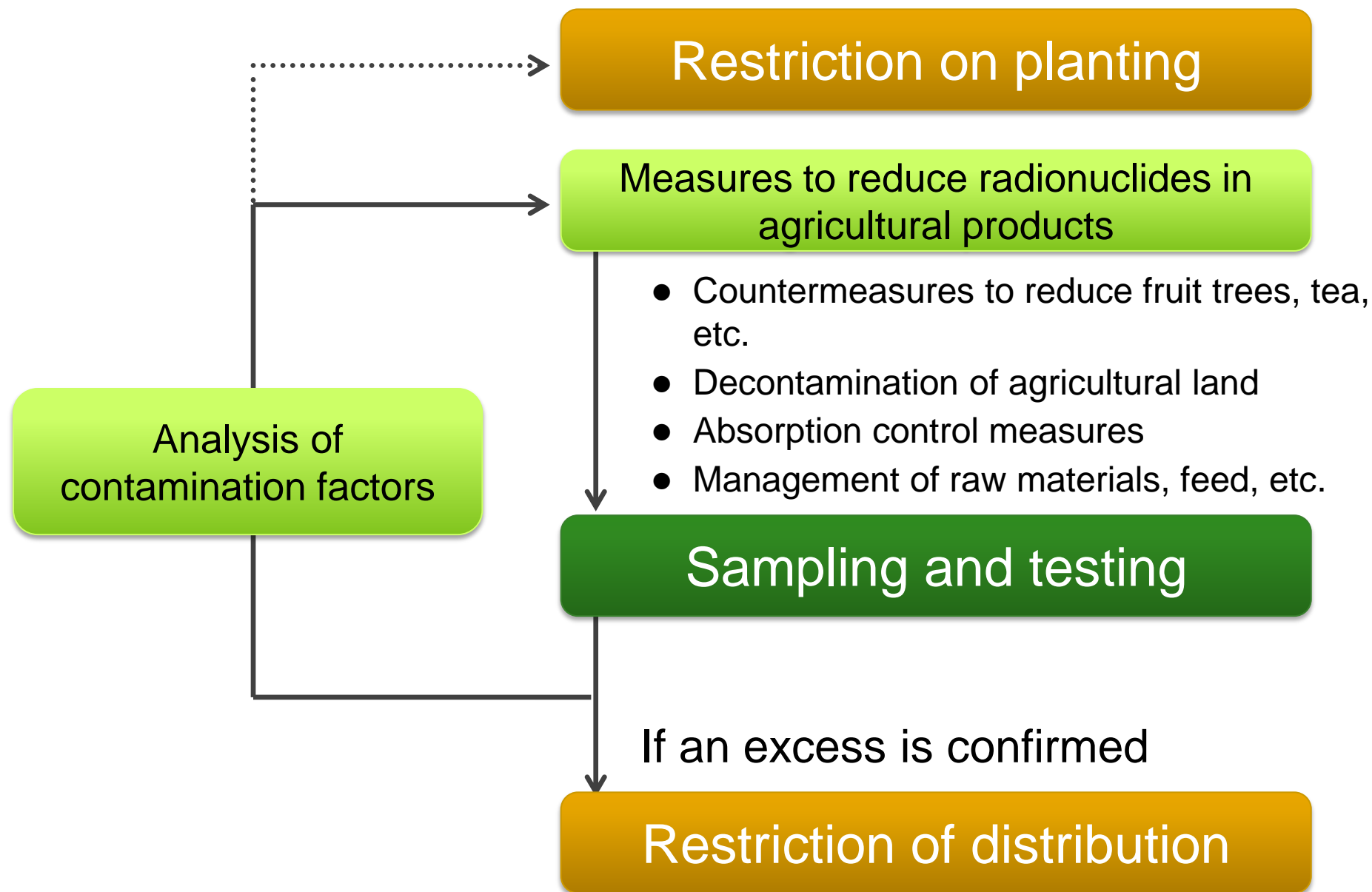
- Support inspection plans and advise in technical inspections
- Advise in technical provisions for reduction of radioactive substances at productions sites, and set temporarily tolerated measurements in raw materials

Food Safety Commission

Evaluate health impact from radioactive substances in food

Nuclear Regulatory Commission
Radiation Council

1 Agricultural Measures for Radionuclide



1 Agricultural Measures for Radionuclide

(Reference) Standard limits for radiocesium concentration in foods

- The limits have been set in accordance with the table below.

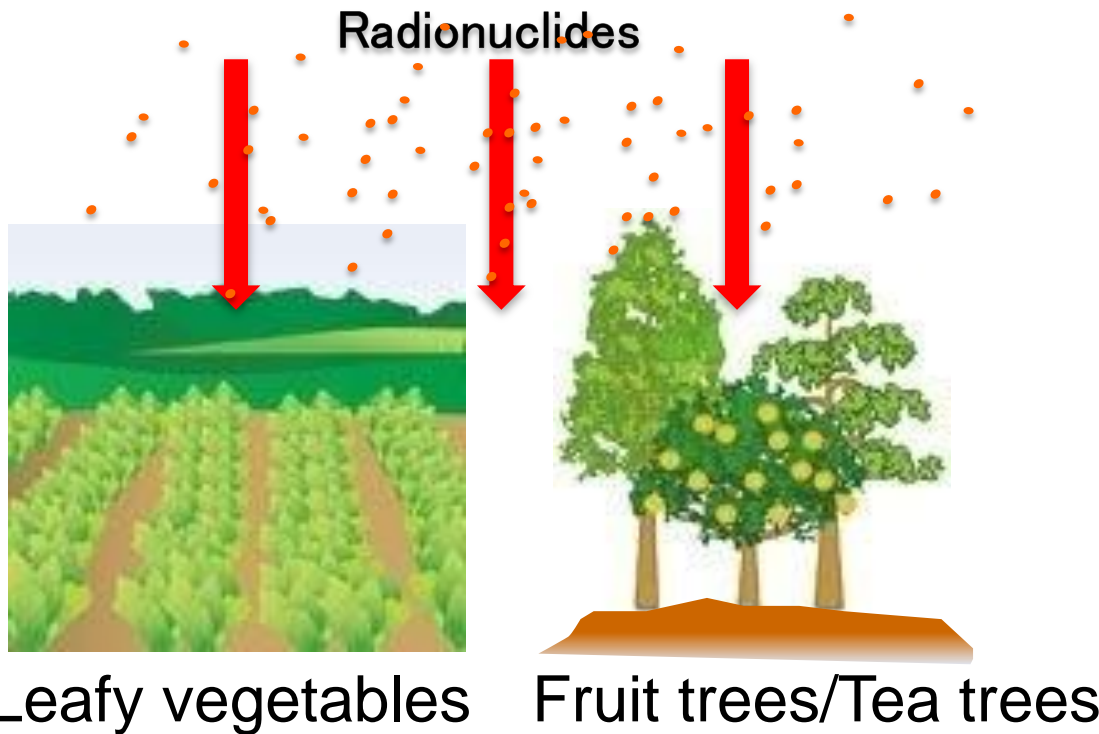
| Food groups | Standard (Bq/kg) |
|----------------|------------------|
| Drinking water | 10 |
| Milk | 50 |
| General foods | 100 |
| Infant foods | 50 |

- ※ Assuming that half of the foodstuffs in circulation contain radioactive substances at the upper limit of the reference value, the annual dose is set to fit 1mSv/year.

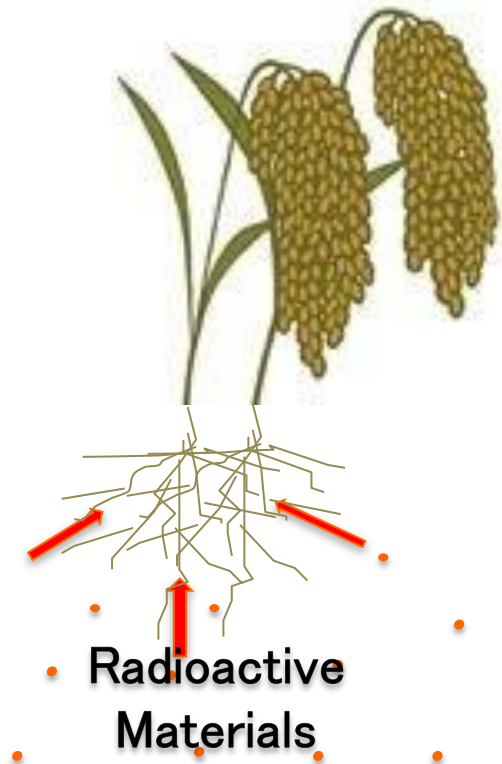
2 Measures to reduce radionuclides migration

Pathways of radionuclide contamination of crops

Direct contamination by radionuclide fallout



Uptake of radionuclide from soil

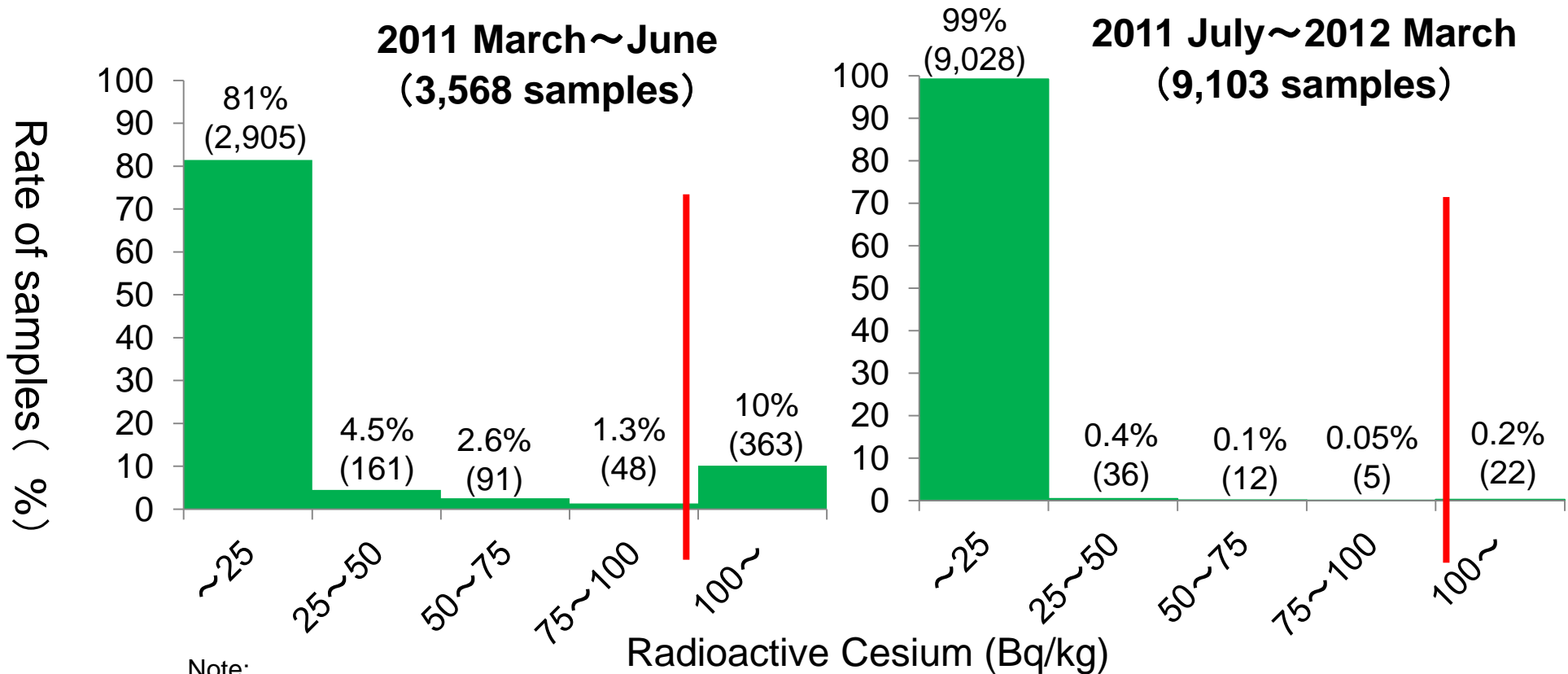


Radionuclides attached to trees are transferred to fruits or shoot

2 Measures to reduce radionuclides migration

(Reference) Effects from adhesion of radioactive materials after the accident (vegetables)

- Samples exceeding the limit were reported from some vegetables which were being cultivated at the time of the accident.
- Reference value excess ratio has decreased for the vegetables that were cultivated and raised by plowing work after the accident.



Note:

- Based on the data MHLW has published by March 31, 2013. () is the number of samples tested
- Samples with values below limits of detection fall into the category of “~ 25 Bq/kg.”

2 Measures to reduce radionuclides migration

Measures to reduce radionuclides of fruit trees

The levels of radioactive cesium deposited onto above-ground parts of fruit trees have been reduced by cleaning the surface of bark with high-pressure water.

High-pressure washing of peach trees



Decontamination of persimmon trees in winter



2 Measures to reduce radionuclides migration

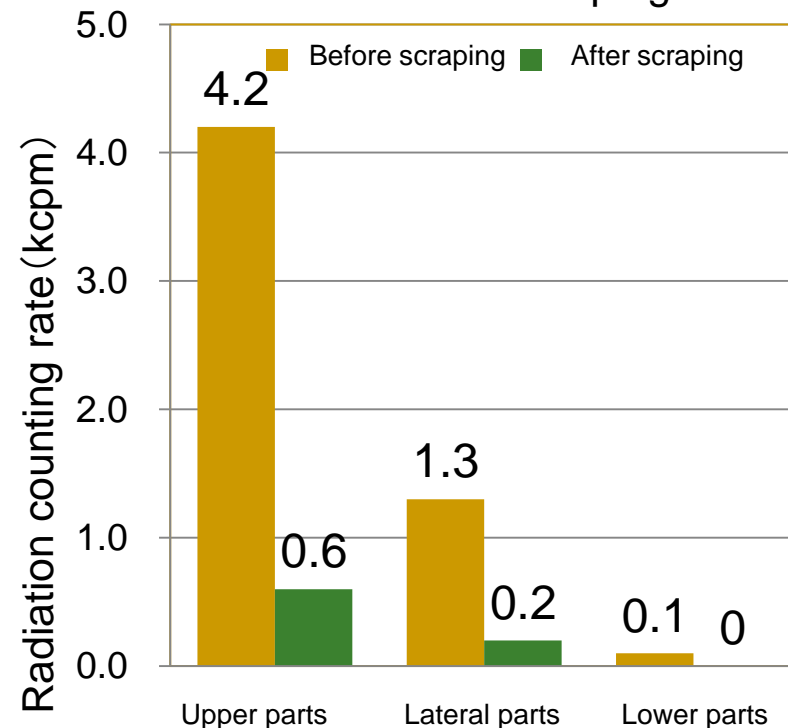
Measures to reduce radionuclides of fruit trees (cleaning the surface of bark)

- As for fruit trees whose bark can be removed with no substantial damage (e.g., grape, pear, apple and persimmon), the surface of bark was scraped away.
- Scrape obsolete bark around the top and sides of main trunk and main branch.
- The radioactive dose of pear trees can be reduced by 90% by scraping the surface of bark.

Scraping bark for pear



Radioactive dose of pear trees before and after scraping bark

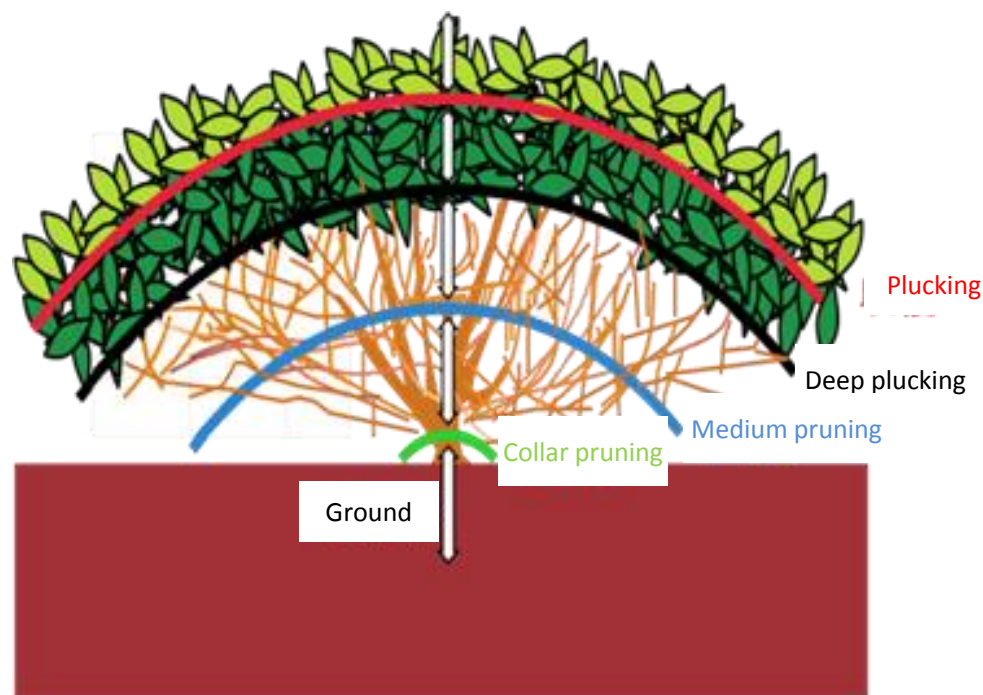


Source: Fruit Research Institute, Fukushima Prefecture Agriculture Center

2 Measures to reduce radionuclides migration

Measures to reduce radionuclides of tea trees (pruning)

To prevent the transfer of radioactive cesium from leaves and branches to new leaves, leaves and branches were plucked or pruned further than in usual practice.



2 Measures to reduce radionuclides migration

Decontamination of farmland (Removal of topsoil)

Scrape off thin farmland soil, remove the radionuclides accumulated in soil surface



Results of removal of topsoil (2011, Iitate-mura)

Removal of topsoil

Before: 10,370 Bq/kg

After: 2,599 Bq/kg **(75%Reduction)**

Ambient dose level (Surface)

Before: 7.1 μ Sv/hr

After: 3.4 μ Sv/hr **(52%Reduction)**

After harvest: 1.9 μ Sv/hr

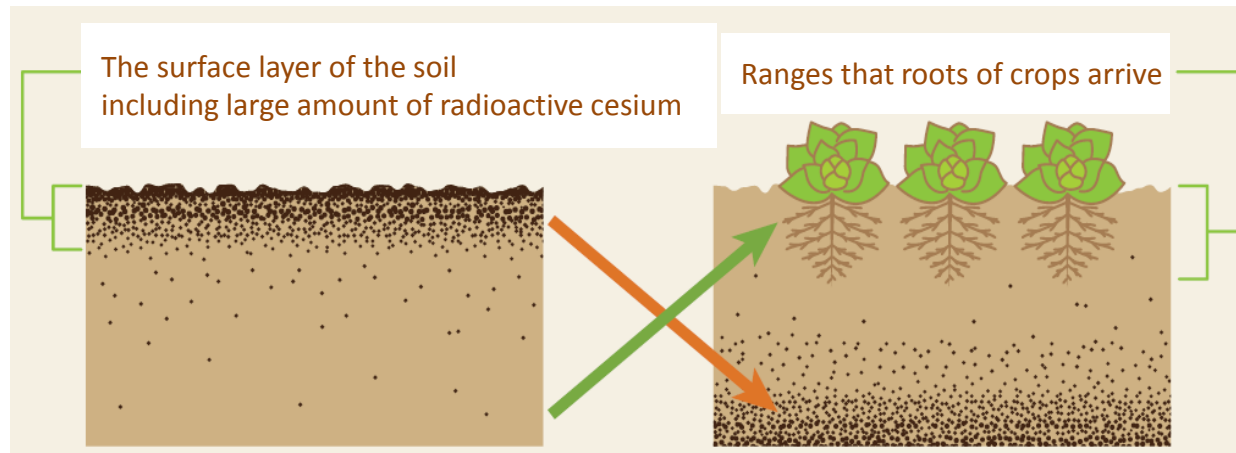
2 Measures to reduce radionuclides migration

Decontamination of farmland (Reversal tillage)

Topsoil is interchanged with subsoil to keep it out of reach of plant roots.



Reversal tillage by plow
(30cm)

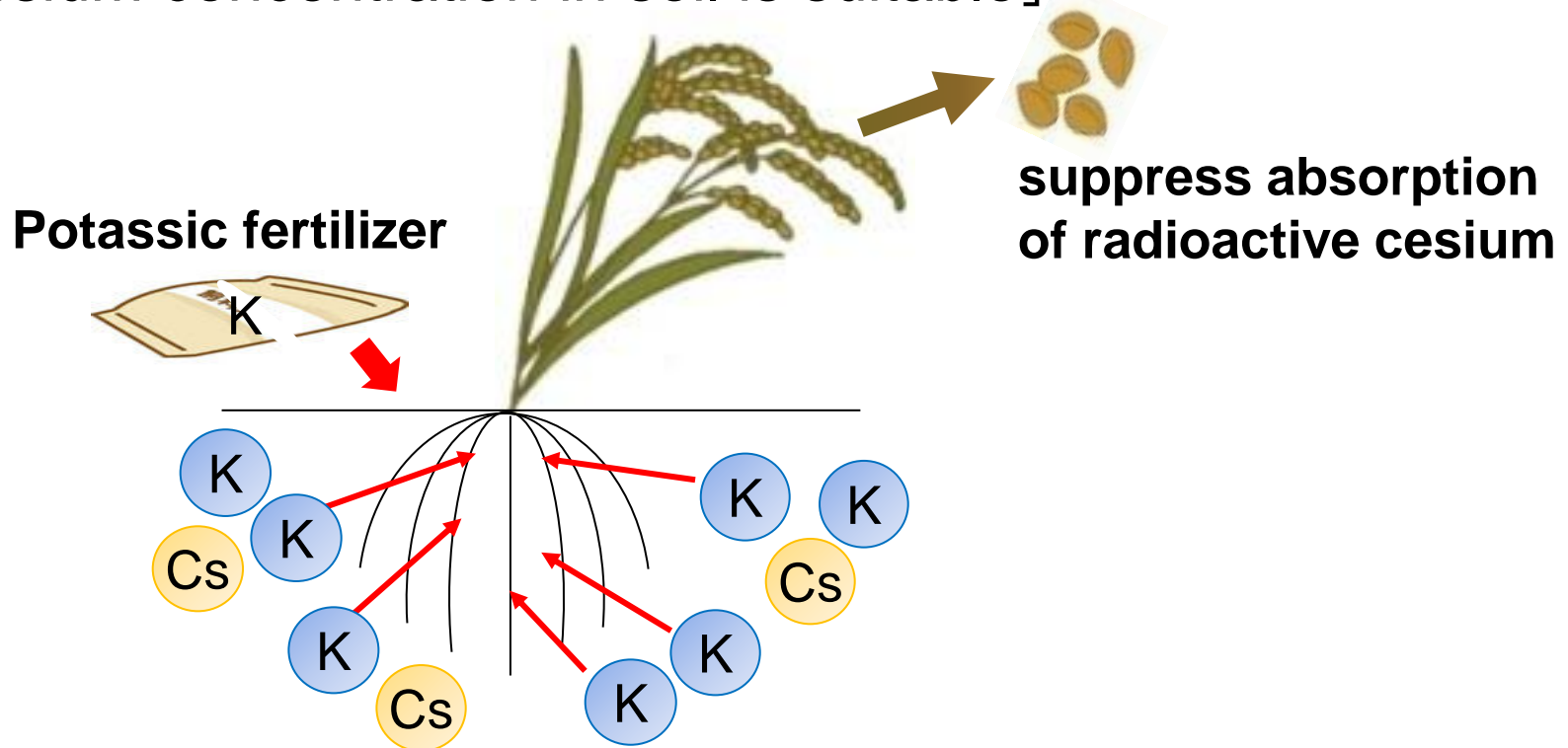


2 Measures to reduce radionuclides migration

Absorption control through potassic fertilization to rice

- Soil in paddy fields where rice with high-level radiocesium was produced tend to contain low-level potassium.
- Having similar chemical characteristics to cesium, potassium in soil can suppress absorption of cesium by root uptake.

[If potassium concentration in soil is suitable]



2 Measures to reduce radionuclides migration

Fertilizer Management

- To prevent pollution to farmland soil, the provisional tolerance value (400Bq/kg) was set for raw materials such as fertilizer, soil enrichment products, soil, etc. (※)
- Each municipality carried out inspections, and implemented self-restraint for use regarding excess of allowable values.

※ Set the level of radioactive cesium concentrations in farmland within the same level before the nuclear accident, even with long term application of compost. That is different from food.

2 Measures to reduce radionuclides migration

Feed management

Reference values for feed have been established to ensure that livestock products are complied with the limits for food (General foods: 100 Bq/kg, Milk: 50 Bq/kg).

| | Reference values for feeds (Bq/kg) |
|----------------------|---------------------------------------|
| Cattle | 100 |
| Pigs | 80 |
| Chickens | 160 |
| Cultured fish | 40 |

2 Measures to reduce radionuclides migration

Feed Management in accordance with standard values

1. Thorough enforcement of appropriate feed management by pastures and others under the provisional tolerated values.



2. Decontamination by reversal tillage and others can lead to pasture production under provisionally tolerated level.



2 Measures to reduce radionuclides migration

Measures for cultivated mushrooms

- ❑ Introduction of safe production materials, and reduction of pollution due to radioactive materials
- ❑ Information related to collection of wild edible plants and mushrooms

Efforts

1. Ensuring safe mushroom logs (purchase support for mushroom logs & kindling wood, supply and demand matching for mushroom logs)
2. Decontamination of mushroom logs and kindling, introduction of simple greenhouses, etc.
3. Dissemination and guidance for cultivation management in accordance with guidelines
4. Dissemination of cultivation technology that reduces pollution from radioactive substances
5. Transmission of information via websites and pamphlets, patrol guidance



2 Measures to reduce radionuclides migration

(Reference) Current standard Values for mushroom logs

- The possibility of distribution of mushroom logs, mushroom beds, etc. across the country
- Set current standard values on mushroom logs or mushroom beds for safe mushrooms to be supplied

| The current standards (April 2012~) | |
|--|-----------|
| Mushroom logs & kindling | 50 Bq/kg |
| Soil for mushroom beds & mushroom beds | 200 Bq/kg |

Kindling: mushroom logs onto which mushroom spores have been planted

Mushroom bed: Soil mixed with nutritive materials, sawdust, etc. onto which mushroom spores have been planted

3 System and Results of Inspection

Implementation of inspection based on guidelines

- The Nuclear Emergency Response

Headquarters determined and published guidelines related to inspection plans made by local governments (April 4, 2011, recently amended on March 25, 2016)

- Municipality (17 prefectures)

Aomori, Iwate, Akita, Miyagi, Yamagata, Fukushima, Ibaraki, Tochigi, Gunma, Chiba, Saitama, Tokyo, Kanagawa, Niigata, Yamanashi, Nagano, Shizuoka

3 System and Results of Inspection

□ Items for inspection

Based on the guidelines about frequency or items, local governments conducted systematic inspections.

- ① Items in which radioactive cesium was detected exceeding standard in the previous year
- ② Items in which radioactive cesium was detected exceeding $\frac{1}{2}$ standard values in the previous year
- ③ Items which receive a large effect from feed management (milk, beef)
- ④ Marine products (with radioactive cesium exceeding $\frac{1}{2}$ standard values was detected)

Each local governments inspect items other than those above.

Note: With the aim of preventing distribution of items exceeding standard values, inspections are thoroughly conducted in regions and on items which are more likely to exceed the values such as items designated for shipping restrictions, regions with a high air dose, etc. Items which exceed the values are dealt with appropriately via disposal and others.