Measures for Reduction of Radionuclide Contamination of Agricultural Produce

September 2022

Ministry of Agriculture, Forestry and Fisheries

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Nuclear Emergency Response Headquarters

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Ministry of Agriculture, Forestry, and Fisheries

- Regulate materials used for production of food and feed
- Support inspection plans and advise in technical inspection
- Advise in technical provisions for reduction of radionuclide contamination at production sites

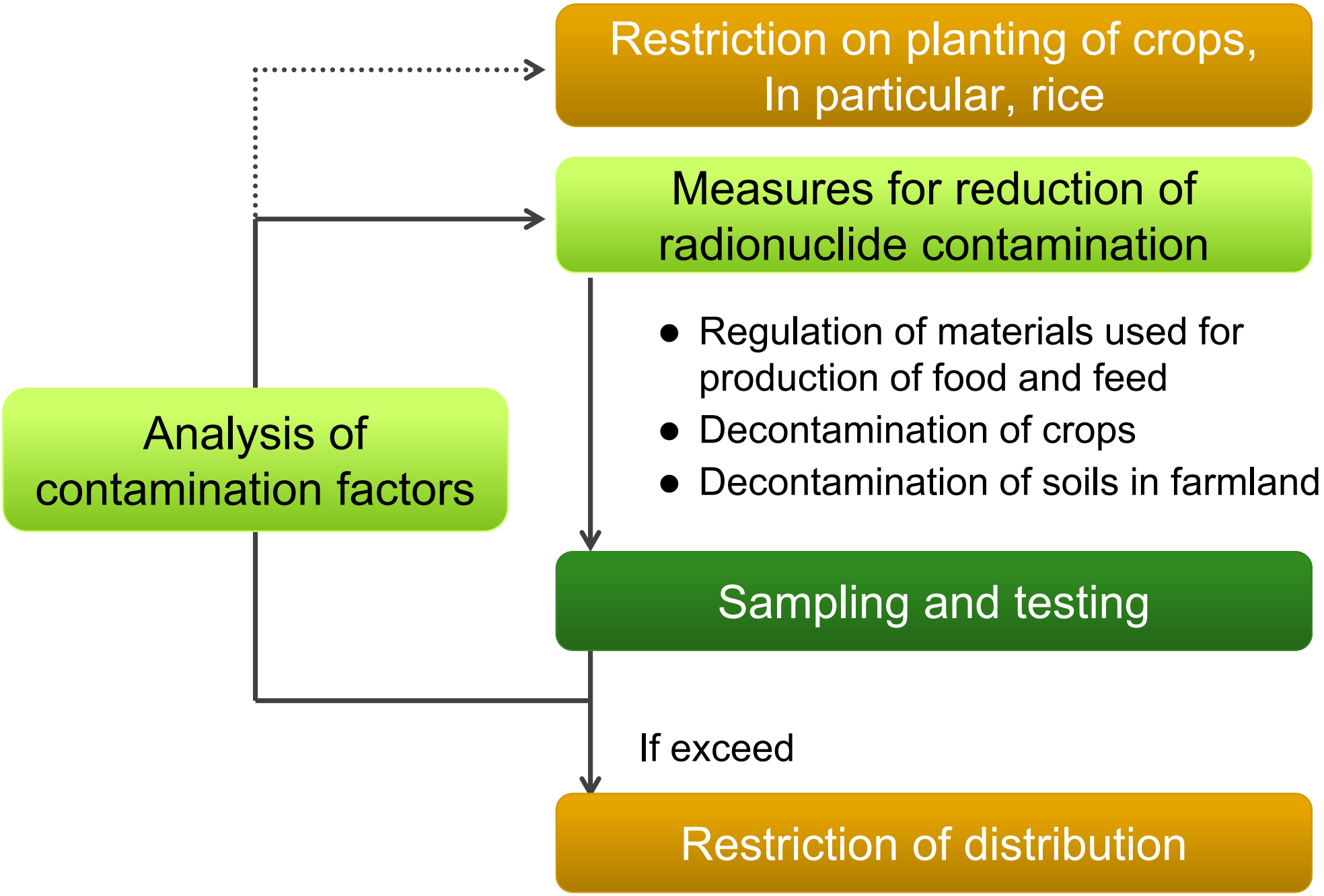
Food Safety Commission

- Evaluate health impact from radioactive materials in food

Nuclear Regulation Authority

- Radiation Council

1 Control of radionuclides in food



1 Control of radionuclides in food

(Reference) Maximum levels for radioactive Cs in food

- The maximum levels have been set in accordance with the table below

Food groups	Maximum level (Bq/kg)
Drinking water	10
Milk	50
General foods	100
Infant foods	50

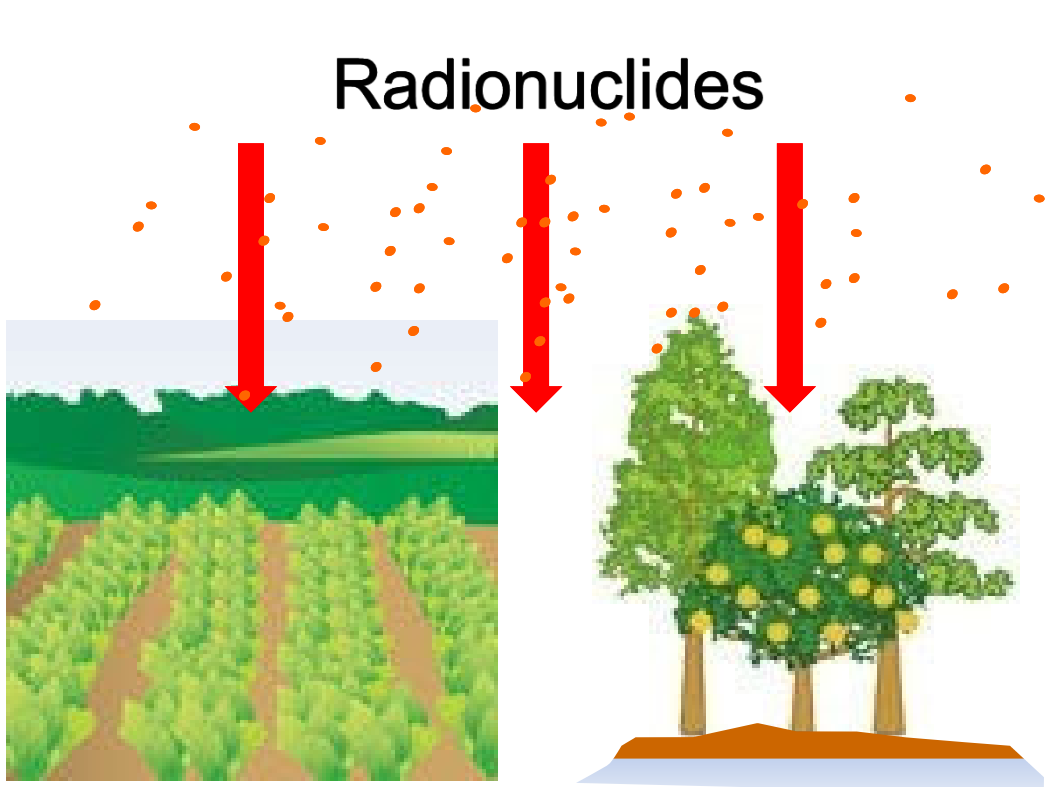
※ Assuming that the intervention exemption level of 1 mSv/year, the same value as for Codex guideline levels.

2 Measures to reduce radionuclides migration

Pathways of radionuclide contamination of crops

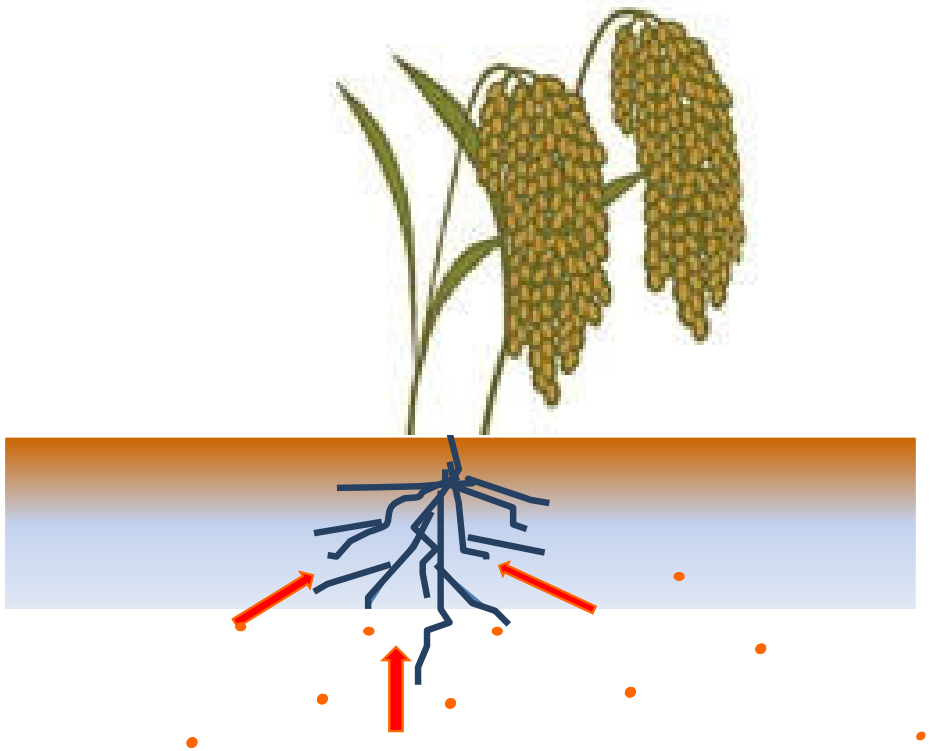
Direct contamination by radionuclide fallout

Uptake of radionuclide from soil



Leafy vegetables

Fruit trees/Tea trees



Radionuclides attached to trees are transferred to fruits or shoot

2 Measures to reduce radionuclides migration

Measures for feed (Provisional tolerance values for radioactive Cs)

Feed for:	Set on 14 Apr. 2011	Revised on 1 Aug. 2011	Revised on 1 Apr. 2012
Cattle	300 Bq/kg*1	300 Bq/kg*2	100 Bq/kg*2
Pigs	-	300 Bq/kg*1	80 Bq/kg*2
Chickens	-	300 Bq/kg*1	160 Bq/kg*2
Cultured fish	-	100 Bq/kg*3	40 Bq/kg*3

* Provisional tolerance values for feed set on a basis of feed consumption and provisional transfer coefficients by:

*1 Referring the IAEA documents.

*2 Using the results of the transfer studies on dairy cattle, pigs and hens conducted by MAFF in Japan after the accident.

*3 Using the result of the cultured fish transfer study conducted by MAFF in Japan after the accident and previous studies.

2 Measures to reduce radionuclides migration

Feed management in accordance with tolerance values

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

2 Decontamination by deep plowing and others can lead to pasture production under provisionally tolerated level.

2 Measures to reduce radionuclides migration

Measures for materials used for the cultivation of edible fungi (Reference values for radioactive Cs)

Material	Set on 6 Oct. 2011	Revised on 1 Apr. 2012
Wood logs (for Shiitake)	150 Bq/kg	50 Bq/kg
Cultivation media	150 Bq/kg	200 Bq/kg

2 Measures to reduce radionuclides migration

Measures for the cultivation of edible fungi

- Introduction of safe production materials, and reduction of pollution due to radionuclides
- Information related to collection of wild edible fungi and wild edible plants

Efforts

1. Securing safe wood logs (wood logs procurement support and supply-demand matching for wood logs)
2. Support for decontamination of wood logs and introduction of pollution control facilities including simple greenhouses
3. Establishment and dissemination of wood log fungi cultivation management guidelines for radionuclides reduction
4. Dissemination of cultivation technology that reduces pollution from radionuclides
5. Transmission of information via websites and pamphlets, on-site traveling guidance

2 Measures to reduce radionuclides migration

Measures for materials used as fertilizers, soil conditioners, and nursery soils (for radioactive Cs)

Material	Value	Note
Sludge for manure	200 Bq/kg	Standard value set on 24 Jun. 2011
Fertilizers (including those from leaves), soil conditioners, nursery soils, etc.	400 Bq/kg	Provisional tolerance value set on 1 Aug. 2011

Measures to reduce radionuclides of fruit trees

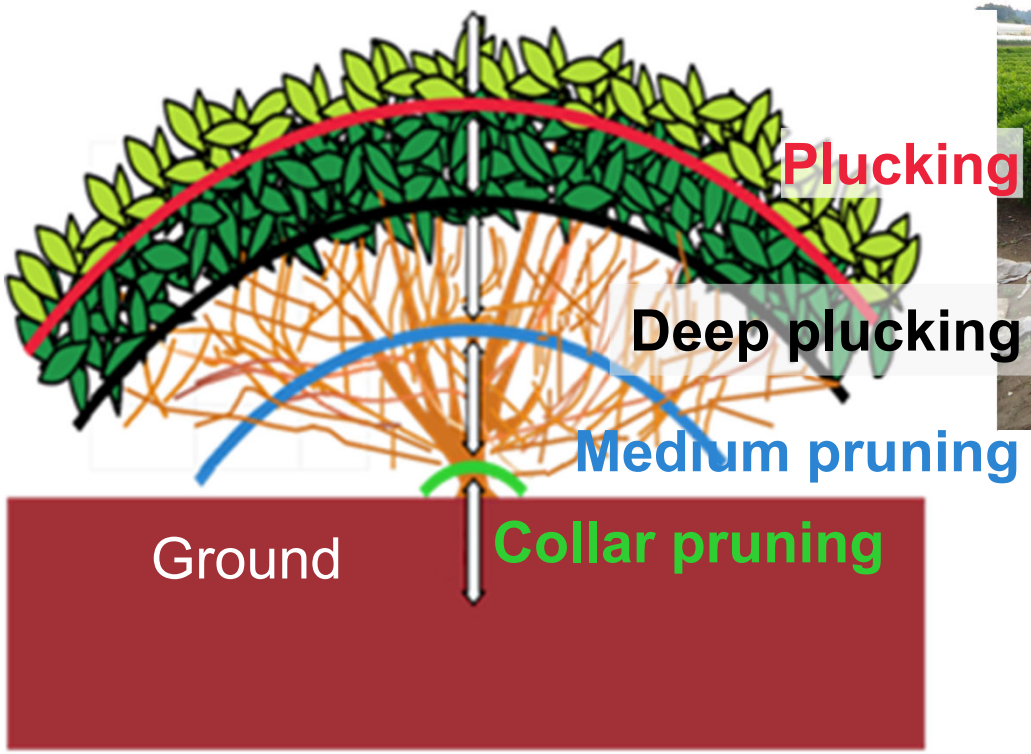
The levels of radioactive Cs deposited onto above-ground parts of fruit trees have been reduced by cleaning the surface of bark with high-pressure water.

High-pressure washing of peach trees

Scraping bark for pear

Measures to reduce radionuclides of tea trees

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



Before pruning

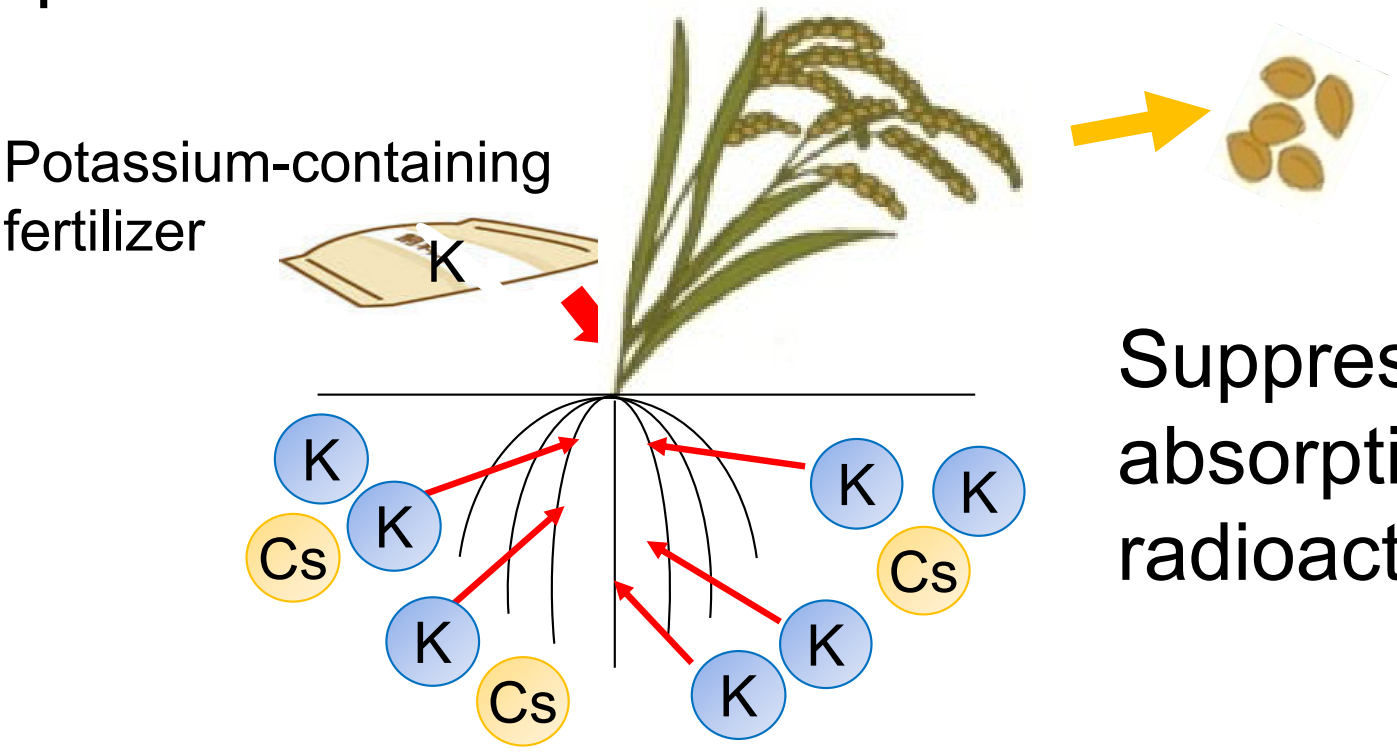
After pruning

2 Measures to reduce radionuclides migration

Absorption control through potassic fertilization to rice

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

[If potassium concentration in soil is suitable]

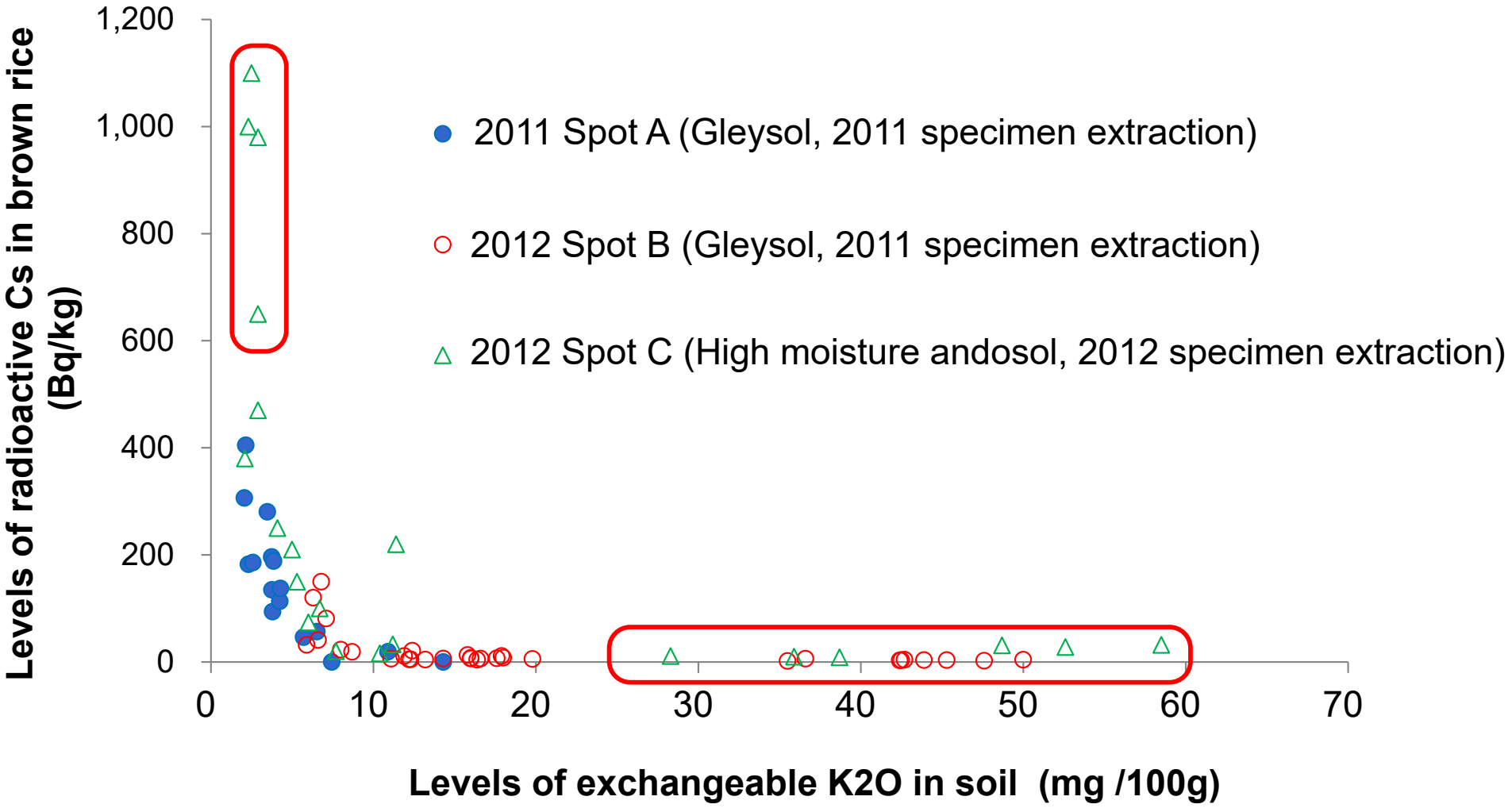


Suppress absorption of radioactive Cs

2 Measures to reduce radionuclides migration

（Reference）Application of potassium

（Test results in farmlands with over 500 Bq/kg)



2 Measures to reduce radionuclides migration

Decontamination of farmland (Removal to topsoil)

Remove the surface soil to remove the nuclides in soil surface

Results of removal of topsoil (2011,Iitatemura)

Removal of topsoil
Before: 10,370 Bq/kg
After: 2,599 Bq/kg **(75% reduction)**

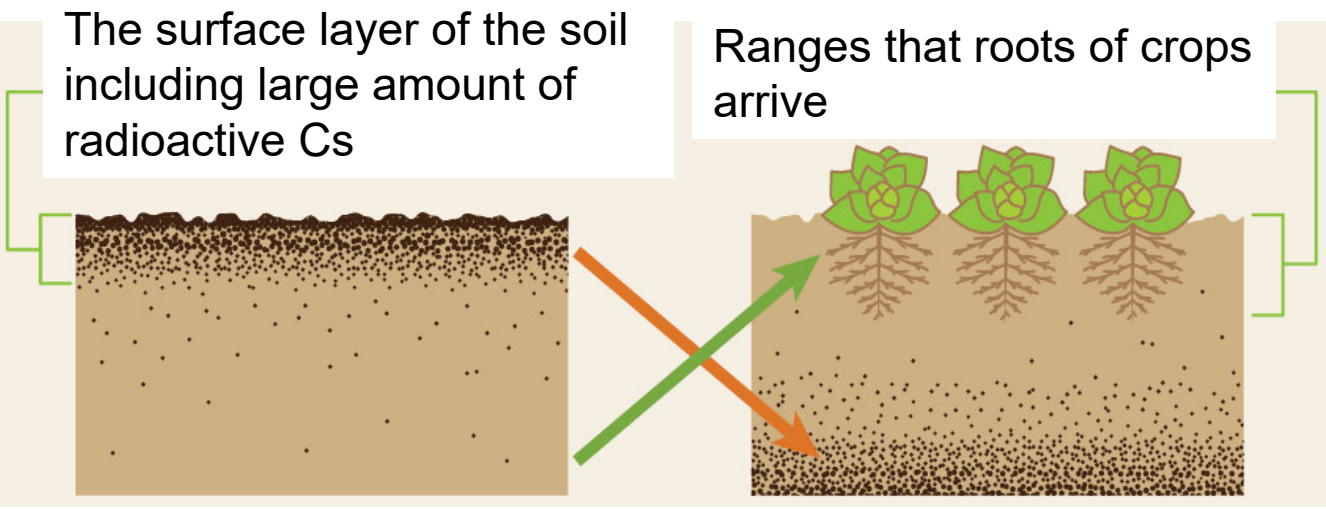
Ambient dose level (Surface)
Before: 7.1 μSv/hr
After: 3.4 μSv/hr **(52% reduction)**
After harvest: 1.9 μSv/hr

2 Measures to reduce radionuclides migration

Decontamination of farmland (Deep plowing)

Deep plowing to replace top soil with subsoil to kept the most of fallen radionuclides deeper than the range of plant root

Deep plowing (30 cm)



3 Test Results

Number of samples

	Year (FY)										
	2011 [2]	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021
Test samples Total [1]	93,288	212,922	248,273	233,738	260,794	249,833	245,086	240,002	229,333	44,258	34,235
Available for cultivation/feed management [3]	83,676	190,376	222,725	207,484	237,741	225,662	223,239	219,977	212,332	28,354	15,846
Difficult for cultivation/feed management [4]	6,491	20,530	23,707	24,794	21,596	22,812	20,833	19,040	16,080	15,115	17,806
Others (Processed food, etc.)	3,121	2,016	1,841	1,460	1,457	1,359	1,014	985	921	789	583

1: Prefectural product pre-shipment test samples in 17 prefectures (Aomori, Iwate, Akita, Miyagi, Yamagata, Fukushima, Ibaraki, Tochigi, Gunma, Chiba, Saitama, Tokyo, Kanagawa, Niigata, Yamanashi, Nagano, Shizuoka)

2: Including March 2011

3: Vegetables, Tubes, Fruits, Seeds, Rice, Grains, Legumes, Cereals, Meat, Eggs, Fresh Milk, Tea(ready for consumption), Edible Fungi (cultivated), Wild Plants for Food (cultivated)

4: Wild edible fungi, Wild plants for Food (wild), Game meat, Fishery Products, Honey

3 Test Results

Radioactive Cs concentration in food

(Available for cultivation/feed management)

Vegetables, Tubes, Fruits, Seeds, Rice, Grains, Legumes, Cereals, Meat, Eggs, Edible Fungi (cultivated), Wild Plants for Food (cultivated)

Radioactive Cs concentration (Bq/kg)	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021
Less than 25	79,229 (96.17%)	184,396 (98.53%)	217,785 (98.92%)	204,941 (99.79%)	235,781 (99.84%)	223,779 (99.84%)	222,109 (99.90%)	219,084 (99.90%)	211,635 (99.93%)	27,945 (99.54%)	15,465 (98.98%)
25–50	1,293 (1.57%)	1,237 (0.66%)	1,340 (0.61%)	382 (0.19%)	321 (0.14%)	332 (0.15%)	209 (0.09%)	194 (0.09%)	141 (0.07%)	116 (0.41%)	146 (0.93%)
50–100	1036 (1.26%)	1123 (0.60%)	960 (0.44%)	45 (0.02%)	46 (0.02%)	31 (0.01%)	17 (0.01%)	30 (0.01%)	16 (0.01%)	14 (0.05%)	13 (0.08%)
More than 100	825 (1.00%)	392 (0.21%)	87 (0.04%)	5 (0.002%)	5 (0.002%)	0 (0%)	2 (0.001%)	0 (0%)	2 (0.001%)	0 (0%)	0 (0%)

1: Upper row: detected samples, lower row: detected samples rate for inspected samples

2: Excluding fresh milk and tea, for which maximum levels differ from general foodstuffs.

3 Test Results

Radioactive Cs concentration in food

(Difficult for cultivation/feed management)

Wild edible fungi, Wild plants for Food (wild), Game meat, Fishery Products, Honey

Radioactive Cs concentration (Bq/kg)	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021
Less than 25	3,567 (54.95%)	14,835 (72.26%)	20,455 (86.28%)	22,506 (90.77%)	20,412 (94.52%)	21,092 (92.46%)	19,855 (95.31%)	17,696 (92.94%)	15,207 (94.57%)	14,234 (94.17%)	17,180 (96.48%)
25–50	781 (12.0%)	2,241 (10.92%)	1,336 (5.64%)	1,068 (4.31%)	573 (2.65%)	845 (3.70%)	534 (2.56%)	700 (3.68%)	541 (3.36%)	627 (4.15%)	367 (2.06%)
50–100	800 (12.3%)	1,626 (7.92%)	1,014 (4.28%)	678 (2.73%)	352 (1.63%)	425 (1.86%)	259 (1.24%)	350 (1.84%)	175 (1.09%)	151 (1.00%)	153 (0.86%)
More than 100	1,343 (20.69%)	1,828 (8.90%)	902 (3.80%)	542 (2.19%)	259 (1.20%)	450 (1.97%)	185 (0.89%)	294 (1.54%)	157 (0.98%)	103 (0.68%)	106 (0.60%)

Upper row: detected samples, lower row: detected samples rate for inspected samples