Data for the Truth about Radiation

Manga Nasubi no Gimon

—Nasubi asks Questions—

Food Edition

Nasubi

● Profile

TV personality and actor
from Fukushima Prefecture

Environmental Regeneration Plaza

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Ver.2, May 2020

Question 1 : Rice

What kinds of steps have been taken against radioactive substances in food from Fukushima?

Initially after the nuclear accident, radioactive cesium remained in a relatively shallow depth, as it bonded to the dirt near the surface of the field.

Inversion tillage and deep tillage

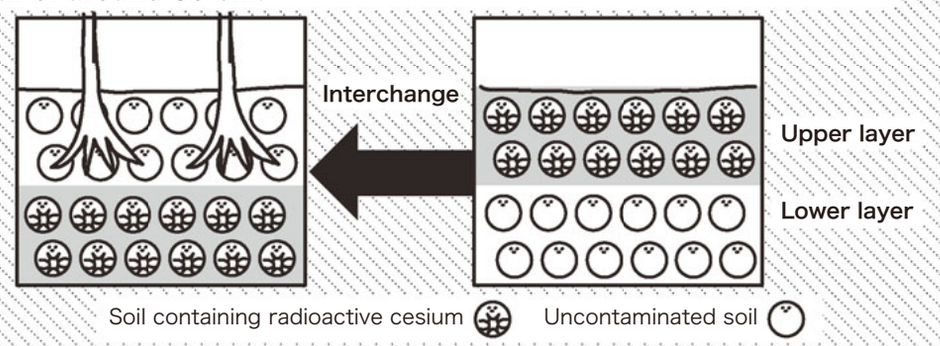
So that the rice plants do not absorb this cesium, we performed “deep tillage” (plowing deeper than normal) and “inversion tillage.”

For details, see P25 – 26.

Is that so?

First then, tell me what you do before harvesting.

Inversion tillage is a method of turning over and replacing the surface soil containing radioactive cesium with uncontaminated soil from a depth of around 30 cm.



This reduces the concentration of radioactive cesium in the soil where the rice plants have their roots.

Really!? But in fact there is still radioactive cesium in the soil, right?

In my fields, for the first planting I also scattered zeolite into the soil. Zeolite absorbs radioactive cesium.

OK then, what else?

You have a beautiful field of rice.

How is the yield this year?

Nice, isn't it?

What measures do you take against radioactive substances when producing your rice?

A great harvest!

It is thanks to good weather and little impact from typhoons.

There are special measures before farming the rice and when the rice is shipped.

What measures do you take when the rice is shipped?

Uh-huh

Warehouse for harvested brown rice

Wow!

We are inspecting all bags of rice grown in Fukushima Prefecture.

RICE

Not only the rice that is sent to the market but also the rice for our own consumption is inspected.

At present the standard limit for the amount of radioactive cesium in rice (*) is 100 becquerel per kg.

100 becquerel per kg

So what are the results?

For details, see P32.

Wow!

So it is 100% inspected!

* 100 becquerel (Bq) is the standard limit for general foods prescribed in the Food Sanitation Act.

Potassium is a fertilizer that is necessary for plants to grow, and is found in the soil in nature.

You use fertilizer?

As a way to reduce the absorption of radioactive cesium by the rice plants, I also use potash fertilizer.

K

Potassium

Potash fertilizer

For details, see P29 – 30.

When there is sufficient potassium, the plants are less likely to absorb radioactive cesium having similar characteristics. The same is true of rice plants, soybeans, buckwheat, and other crops.

rice plants

稲

STOP

ⓚ ··· Potassium

☆ ··· Radioactive cesium

100% inspection of rice

To tell the truth, at first we farmers were also skeptical since radioactive cesium is invisible.

However the results of the 100% inspections at the time of shipping clearly show that the rice plants absorb almost no radioactive cesium!

For details, see P31.

So there is still radioactive cesium in the soil. I guess I am still worried...

Ummm...

Those tremendous efforts, however, are part of what drives our confidence.

The farmers had a very hard time after the accident.

Some farmers had to spread potash fertilizer over every inch of their fields by hand, without any machinery.

You can enjoy eating it more when you know that it has been properly inspected.

As the years pass after the accident, the amount of rice which exceeds the standard limit has shrunk.

Beginning from 2015, all of the harvested rice has been at or below the standard limit!

Is that so?

Total samples for inspections of rice produced in 2018:
9,208,457

Samples that exceeded the standard limit:
0

Samples below the measurable limit:
99.996%

* The measurable limit is 25 becquerels/kg as of March 31, 2019

For details, see P31 – 32.

That is something I look forward to.

I recently had a son. When he is old enough to eat rice, I want him to eat the rice that I grew myself.

PaPa...

Even if the value should exceed the standard limit, the rice would not reach the market.

To the market!

Rice
100% inspected and found to be at or below the standard limit

The result for all the rice from my fields was “no detection” (*).

* “No detection” means a value less than the minimum detection limit of 25 Bq/kg.

Wonderful

munch

munch

End of Question 1

Excuse me...

May I have one more?

Of course, help yourself.

Looks good!

mmm

bite!

delicious ♡

This is why I am certain that people can feel safe in eating rice in school lunches and at home!

Here, have some rice balls made with fresh rice from my fields.

Yay

Question 2 : Fruits

What kinds of steps have been taken against radioactive substances in food from Fukushima?

Let's find out!

What measures are taken against radioactive substances in fruits?

Zooom.

Speaking of Fukushima, fruits come to my mind!

That is the subject of this question!

RICE

Are the same measures as for rice also taken for vegetables and other foods?

Of course we take measures against radioactive substances in fruits as well.

Hello!

Kazuhiro Abe
Senior researcher
Fruit Tree Research Centre
Fukushima Agricultural Technology Centre

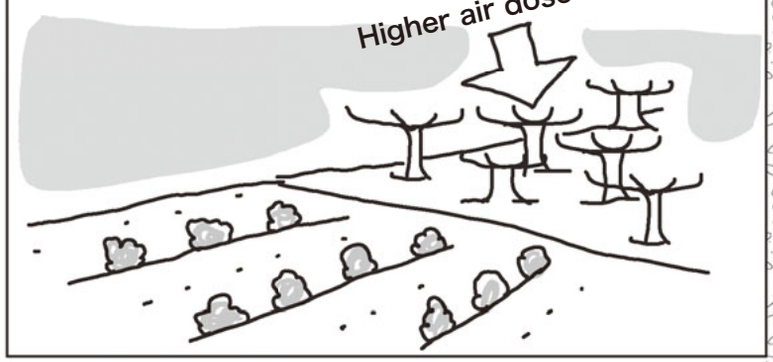
This is the Fruit Tree Research Centre of Fukushima Prefecture.

Hello. I have some questions for you.

No, the measures are slightly different.

Let me explain from the beginning.

Right.
When the air dose rates were measured in agricultural areas shortly after the accident, those areas with trees tended to be higher than those without.



So it is not just the soil.

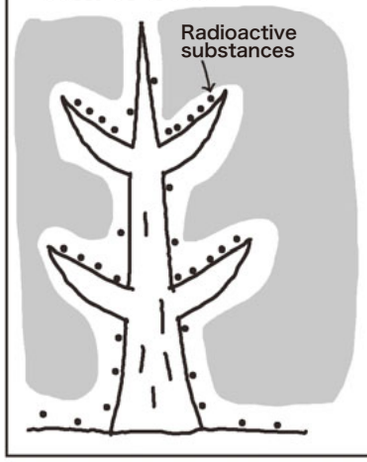
and conducted an investigation of tree bark.

Hmm!

Is that right?
So what did you find out?

We thought that this was due to radioactive substances adhering to the trees,

but also adhered to the bark of trees.

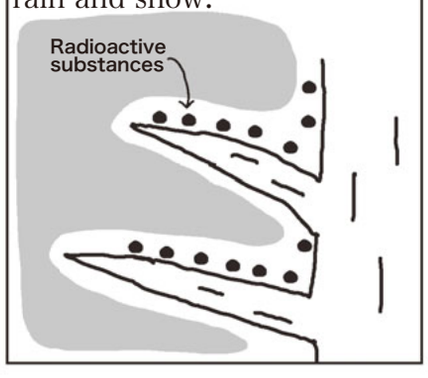


Immediately after the accident, radioactive substances not only fell to the ground together with rain and snow,

Really?
From the surface of the trees?

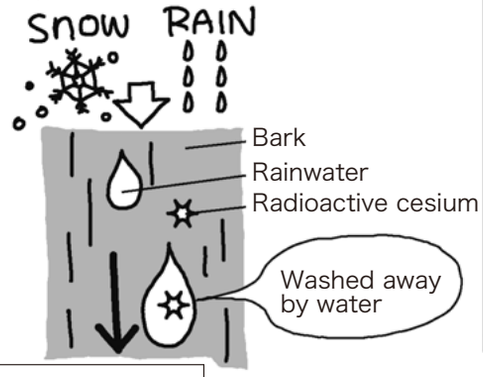
We found that a portion of these radioactive substances was absorbed into the trees through the bark or buds, and were then transferred to the fruit.

Higher radiation levels were observed at the parts of the tree that frequently contacted rain and snow.



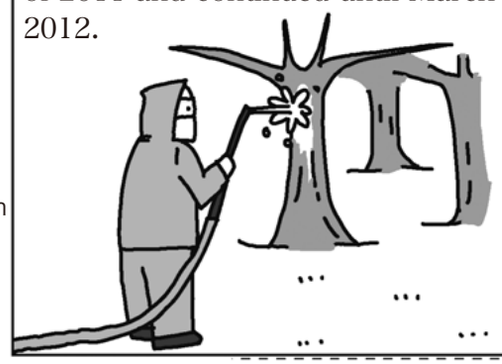
* The affiliation and position of the persons appearing in this manga are those from 2014.

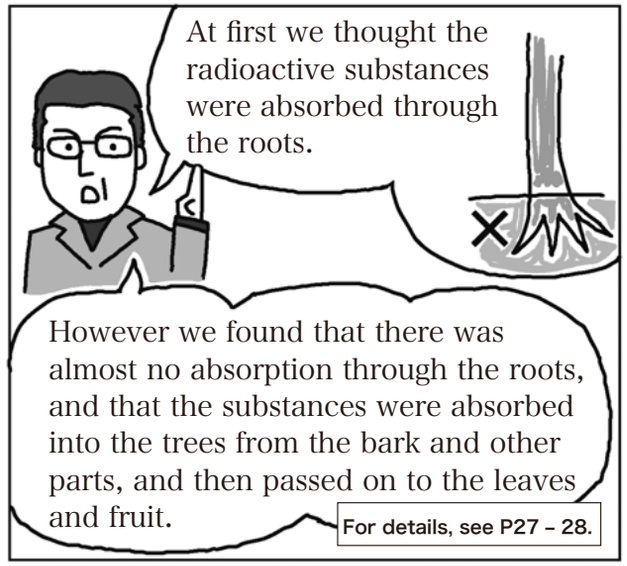
In addition, the amount of radioactive cesium naturally decreases over time, and it is also washed off of the tree bark by rain and other forces.

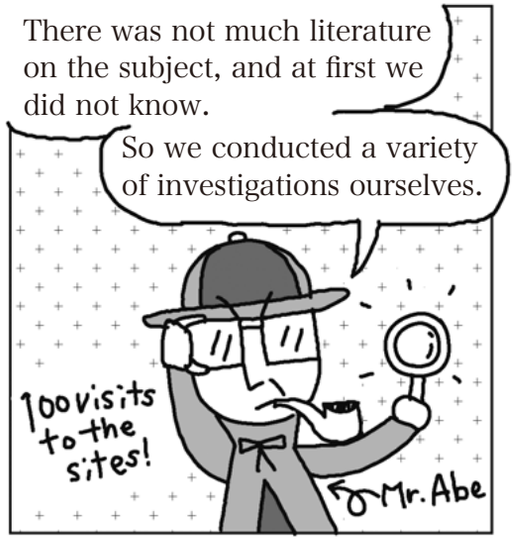


For details, see P27 – 28.

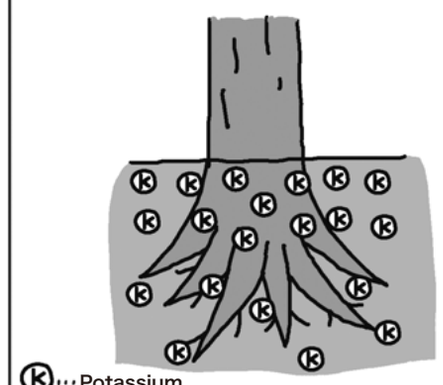
In areas such as Nakadori, where there are many fruit orchards, we started decontaminating the trees from the end of 2011 and continued until March 2012.



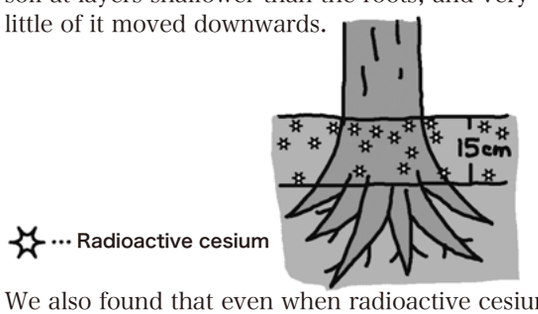




The soil where fruit trees grow contains large amounts of potassium. As a result, there is almost no absorption of radioactive substances from the roots.

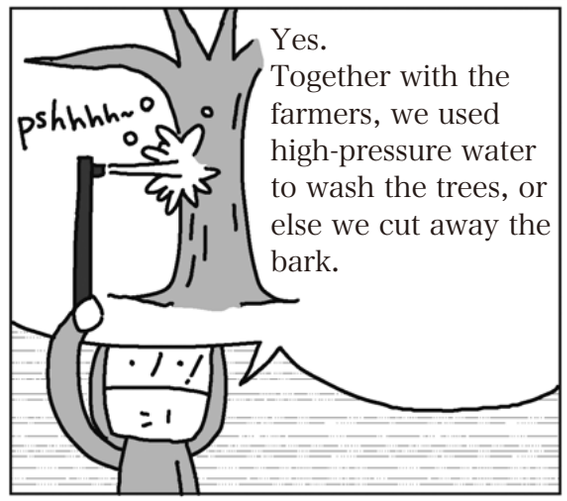


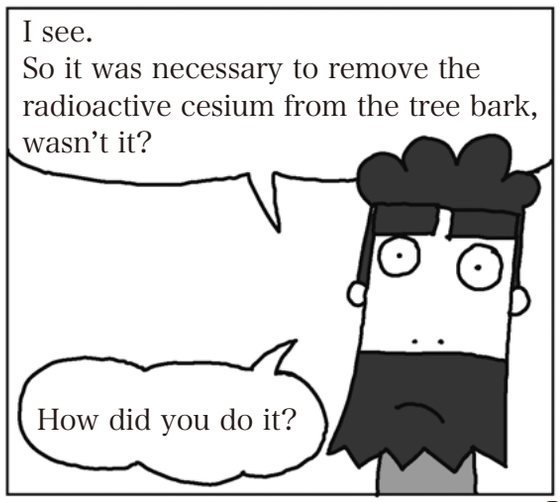
Most of the roots of a fruit tree extend more than 15 cm below the surface.
An investigation showed that nearly all of the radioactive cesium was bonded strongly to the soil at layers shallower than the roots, and very little of it moved downwards.



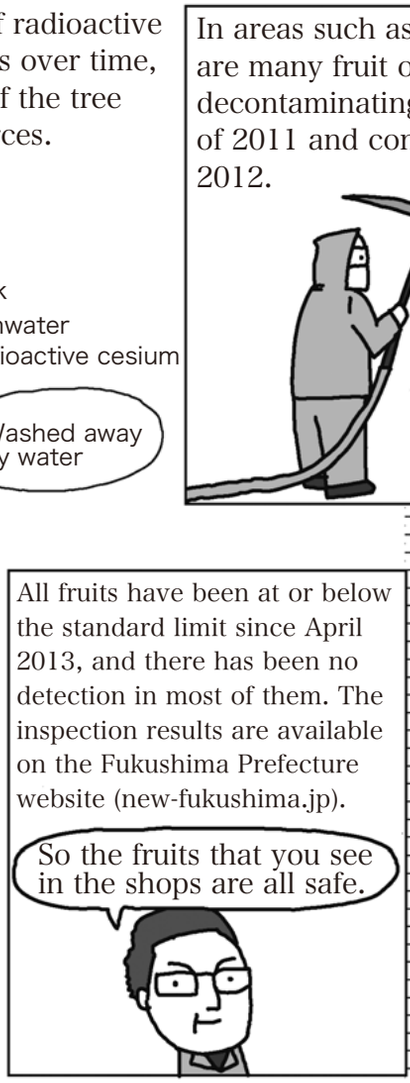
We also found that even when radioactive cesium was present, it was bonded strongly to the soil and was not easily absorbed into the roots.

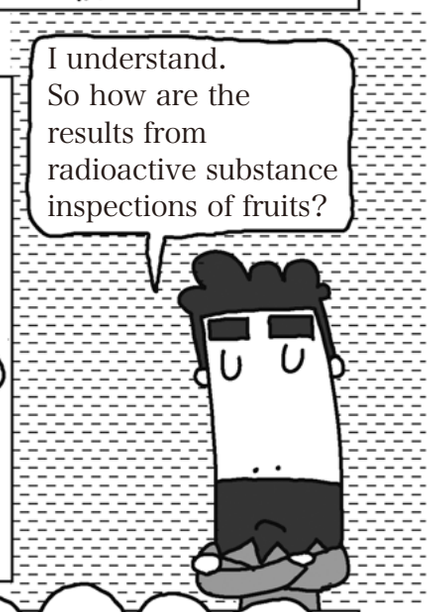
For details, see P23.





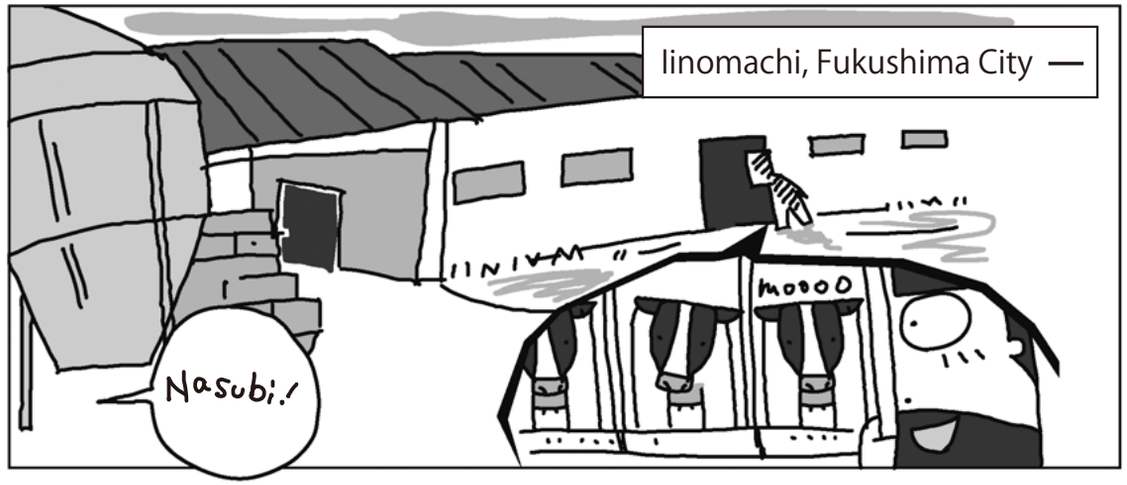
All fruits have been at or below the standard limit since April 2013, and there has been no detection in most of them. The inspection results are available on the Fukushima Prefecture website (new-fukushima.jp).



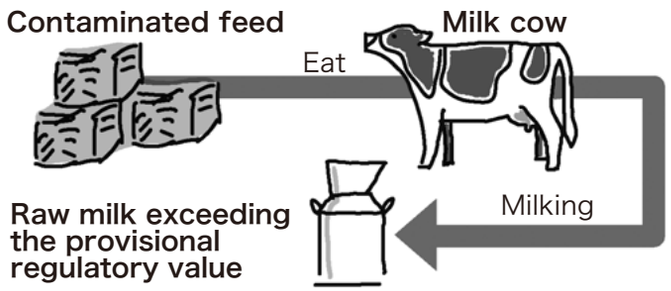


Question 3 : Milk

What kinds of steps have been taken against radioactive substances in food from Fukushima?



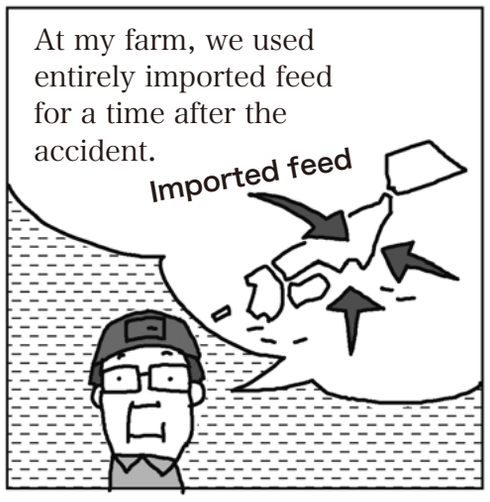
In the immediate aftermath of the accident, raw milk which exceeded the provisional regulatory value was found at inspections.



However because the feed was changed entirely to import feed, no milk exceeding the standard limit has been found since April 2011. The ban on shipments was lifted in June 2011 (*).

For details, see P31.

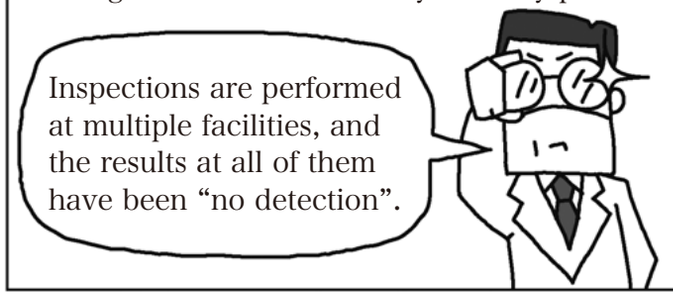
* Excepting the Evacuation Areas at that time

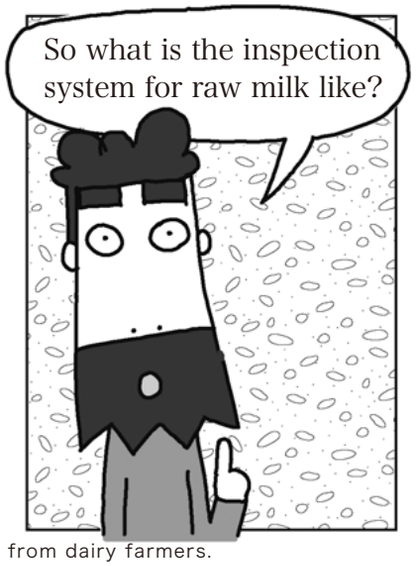


At dairy farms, feed is very important for keeping the livestock healthy and producing safe, delicious milk.

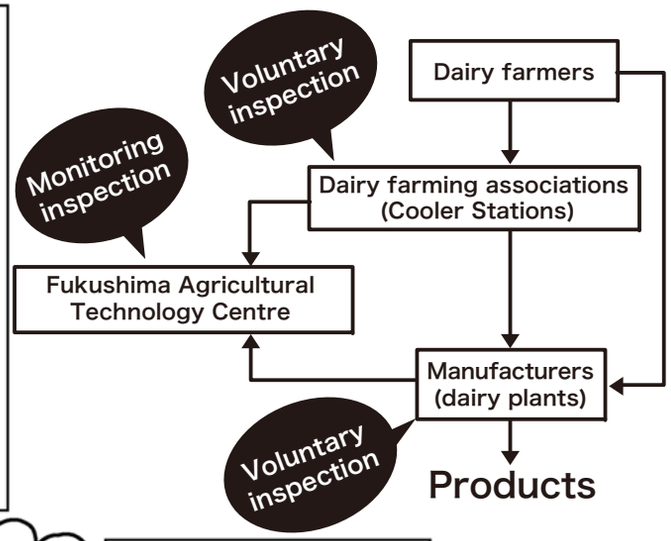
If radioactive substances in the feed are controlled, then no radioactive substances will be detected in the raw milk.

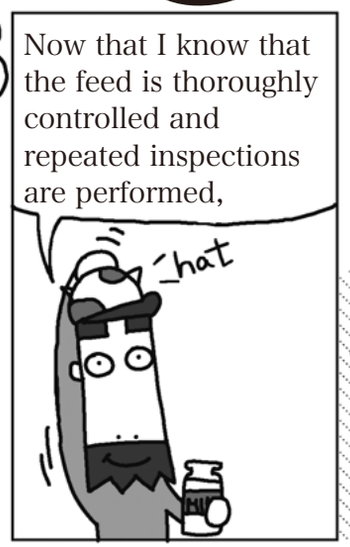
Raw milk is collected in Cooler Stations (*3) or at dairy plants, and monitoring inspections are performed at the Fukushima Agricultural Technology Centre.
Voluntary inspections are also performed by dairy farming associations and dairy industry plants.

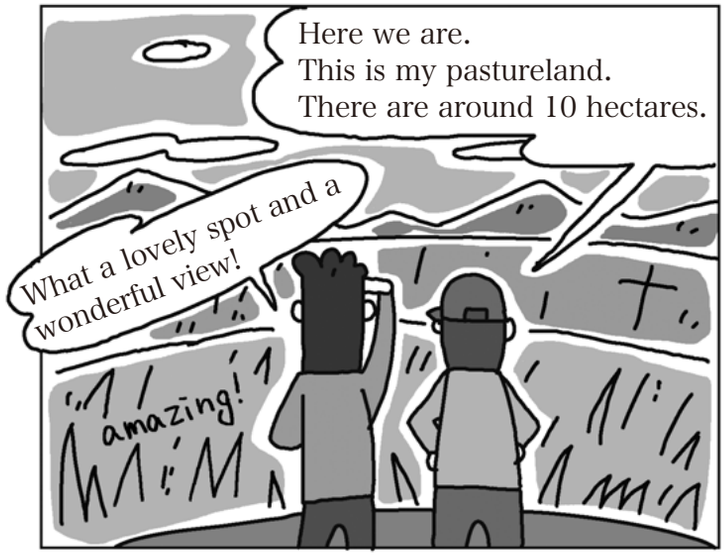




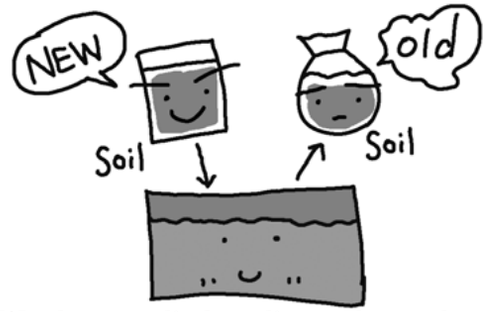
*3: These facilities temporarily store and cool the raw milk collected from dairy farmers.





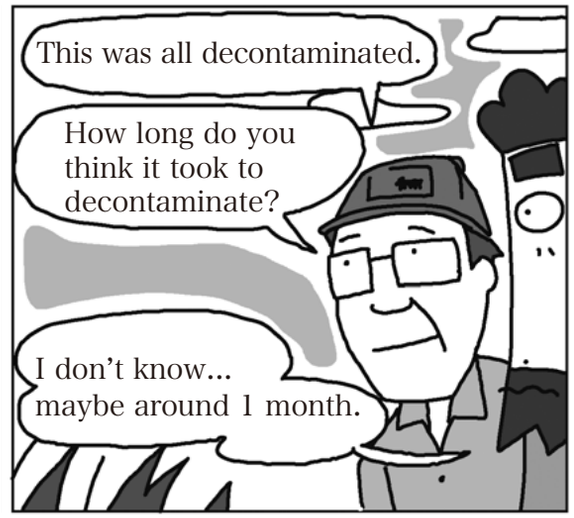


6 months
On my land, we scraped away the topsoil and replaced it with new soil.

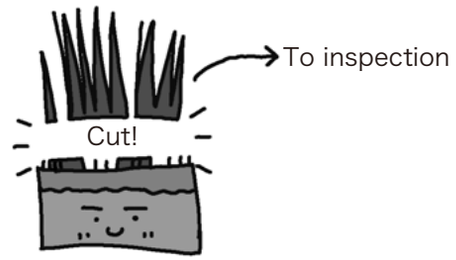


We then applied zeolite and potash fertilizer before planting the grass seeds.

* Inversion tillage was used in some cases.



The grass is cut and inspected, and if the result is at or below the standard limit (*1), it can be used as feed.

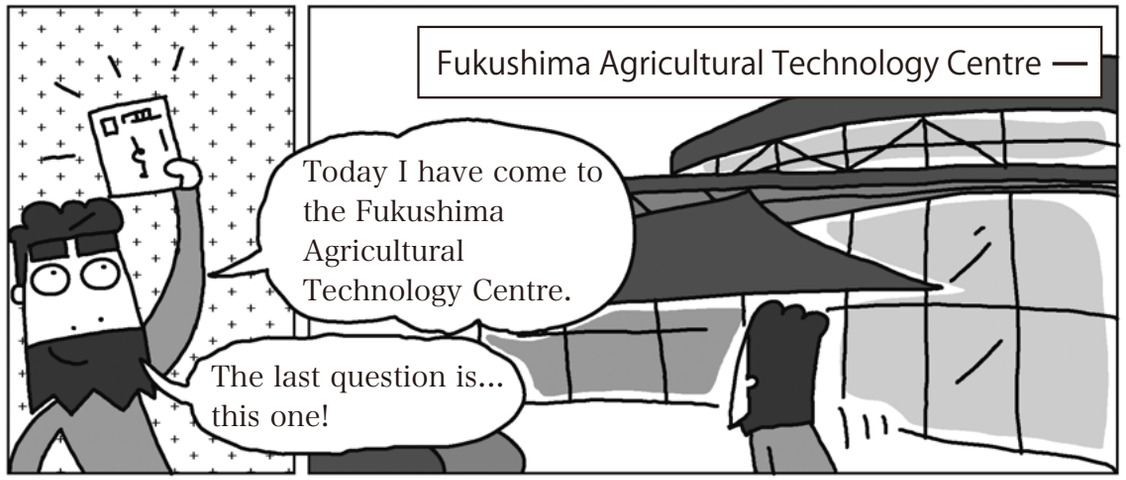


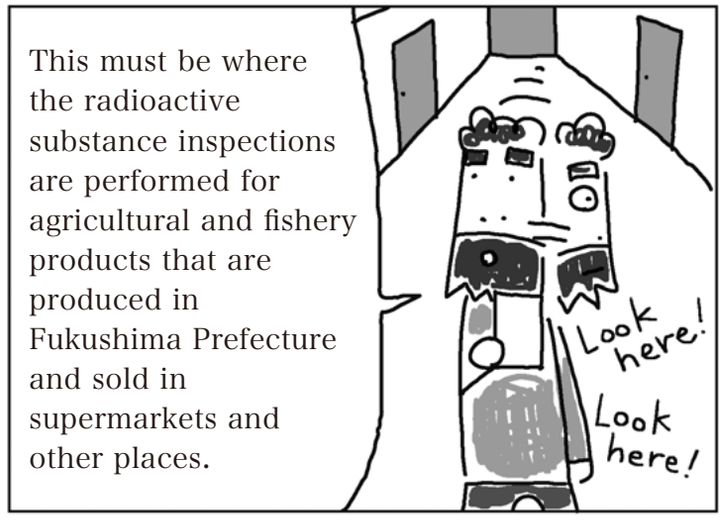
Because no radioactive substances had been detected in the grass that grew after decontamination, we began using it as feed from the spring of 2015 (*2).

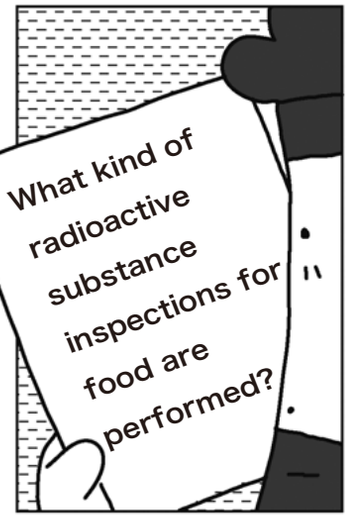
*1: ・Provisional regulatory value for radioactive cesium in feed for cows = 100 Bq/kg
・The dairy farming associations in Fukushima Prefecture adopted a voluntary standard limit of 30 Bq/kg to ensure safety.
*2: It was confirmed that the inspection results were below the detectable limit (no detection) and the grass has been used as feed since spring 2015.

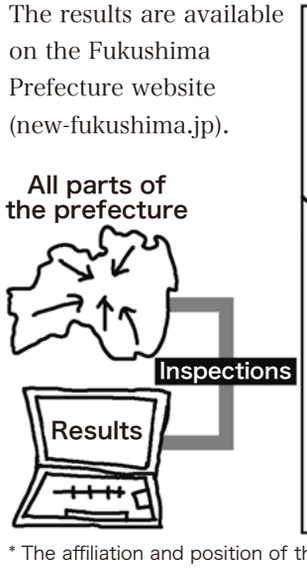
Question 4 : Inspections

What kinds of steps have been taken against radioactive substances in food from Fukushima?





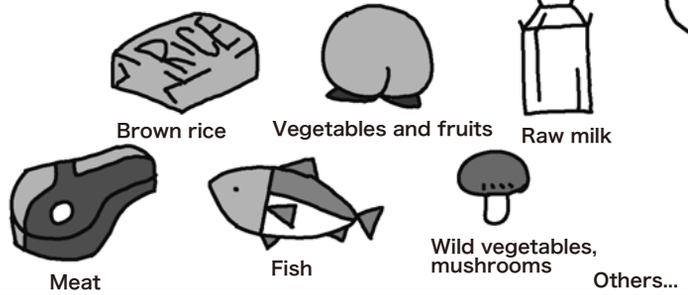




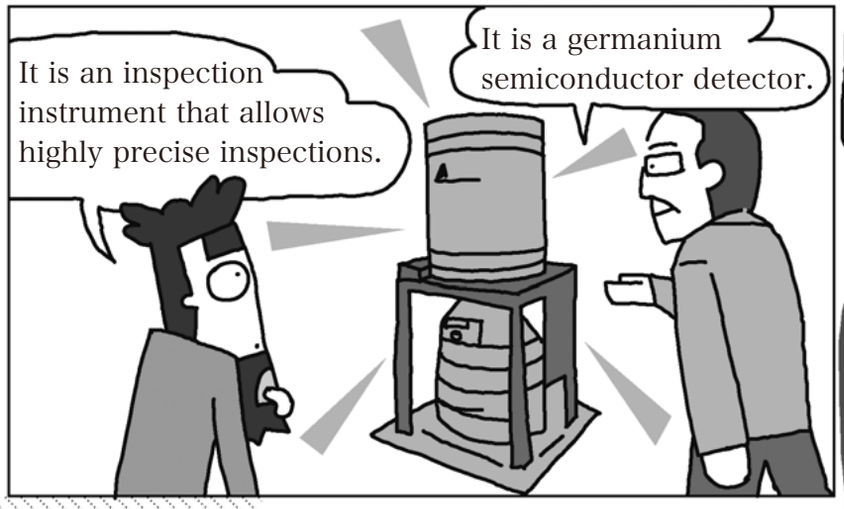
The results are available on the Fukushima Prefecture website (new-fukushima.jp).

* The affiliation and position of the persons appearing in this manga are those from 2014.

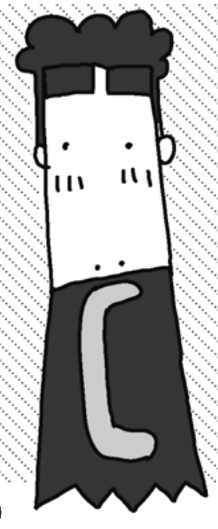
First, inspections are performed for all groups of Fukushima Prefecture agricultural and fishery food products that are sold.



[What about inspections of processed foods?]
Processed foods such as *anpo-gaki* (dried persimmons) and *shimi-dofu* (dried tofu) are inspected at the Fukushima Technology Centre and other facilities.



So, 220,000 items...



Produce from home gardens cannot be inspected here,

If I grow vegetables at home, can I have them inspected?

Complete measures are taken to ensure that no foods which exceed the standard limit reach the market until their safety has been confirmed.

Shipping restrictions

We are still only midway along the road to recovery in Fukushima.
We will continue to inform people in Fukushima and other prefectures, and in fact around the world, that the safety of Fukushima products on the market has been confirmed by data.

ofcourse

Will the inspections continue?

however inspection institutes have been set up for your city or town.
Please have them inspected there.

Municipal inspection institutes

I understand that the foods on the market have been thoroughly inspected and are safe!

You got it!

End of Question 4

The results of the inspections here are posted the following day on the Fukushima Prefecture website (new-fukushima.jp). The results are also posted in English for communication to the wider world.
Nasubi, help us promote Fukushima products!

For details, see P31 – 32.

Nearly all the results are at or below the standard limit.

PC

You can see them on the website, where they are updated daily.

What were the results?

For details, see P31 – 32.

Among foods such as wild vegetables, mushrooms, and particular types of fish, there are still types which exceed the standard limit.

The inspection results are also published in newspapers and elsewhere.

At or below the standard limit

Above all, there have been no vegetables, raw milk, meat, or eggs that exceeded the standard limit.

Pc

because we have conducted such a large number of inspections and they have continued for this long, we know the types and the areas where detection is likely. (*)

Types

Areas

Right.
Although we do not inspect every item for vegetables and others the way that they do with rice and beef,

You don't measure every item like they do with rice. Is that OK?

RICE

100% inspection

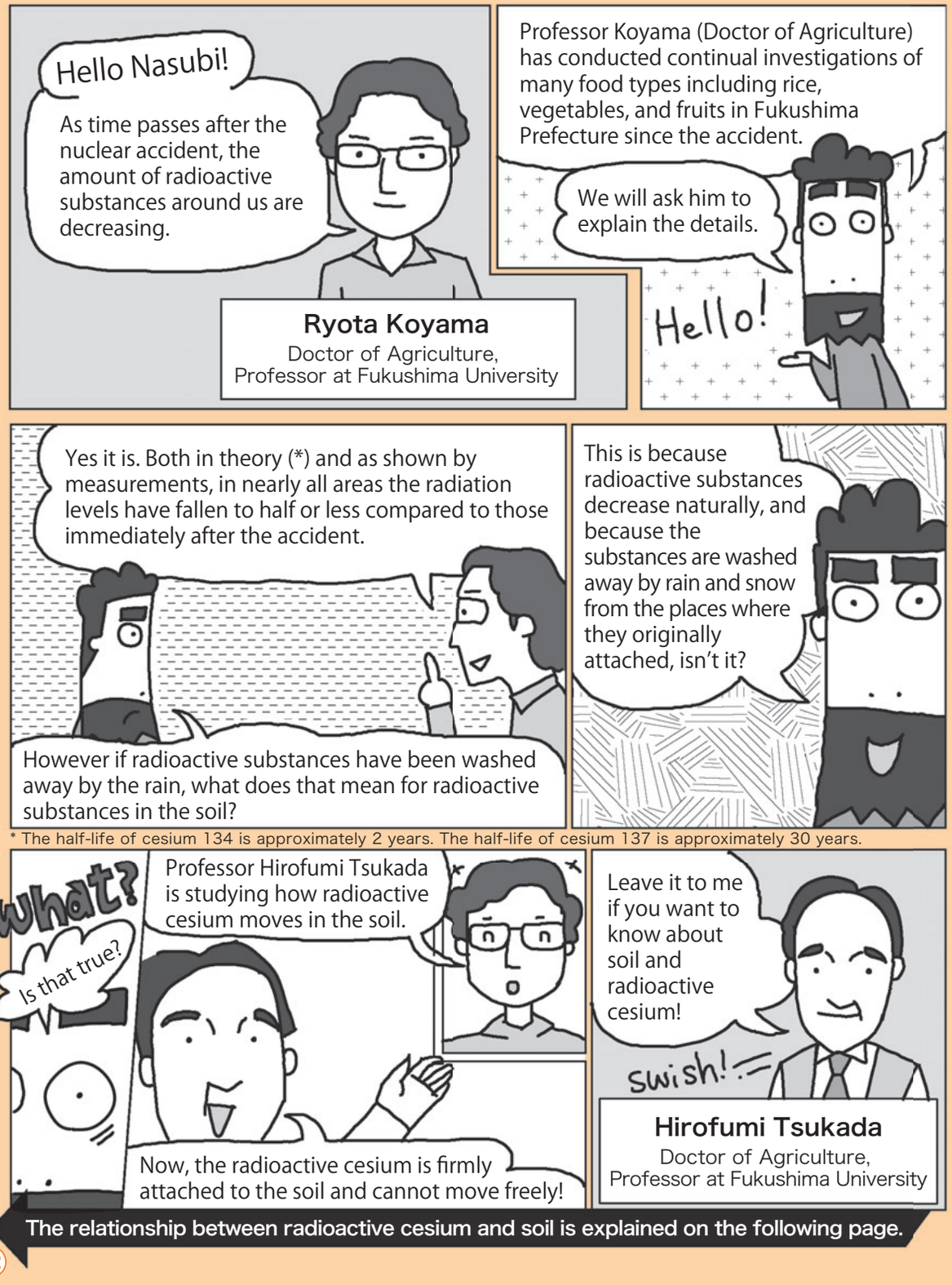
type I
type II

Pc

* There is also a system for inspections conducted in the producing areas by JA (Japan Agricultural Cooperatives) and other agencies. For details, please see the "Fukushima Association for Securing Safety of Agricultural Products" website.

Know this first!

Current conditions of radioactive cesium



* The half-life of cesium 134 is approximately 2 years. The half-life of cesium 137 is approximately 30 years.

The relationship between radioactive cesium and soil is explained on the following page.

Data for the Truth

Explanation in Detail!

On the following pages, expert will use data and charts to explain the information from the manga in more detail. Because the amount of information released on the internet is enormous, you can examine as much data as you need to until you are convinced.

Here we explain the measures that are taken against radioactive cesium.

For details, see P25-28

Measure 1 Decontamination [Farmlands / Fruit trees]

I will explain the specific decontamination methods and their effects.

Professor Koyama

For details, see P29-30

Measure 2 Measures to prevent absorption of radioactive cesium

I will explain the measures for preventing radioactive cesium from entering agricultural products.

Professor Tsukada

For details, see P31-32

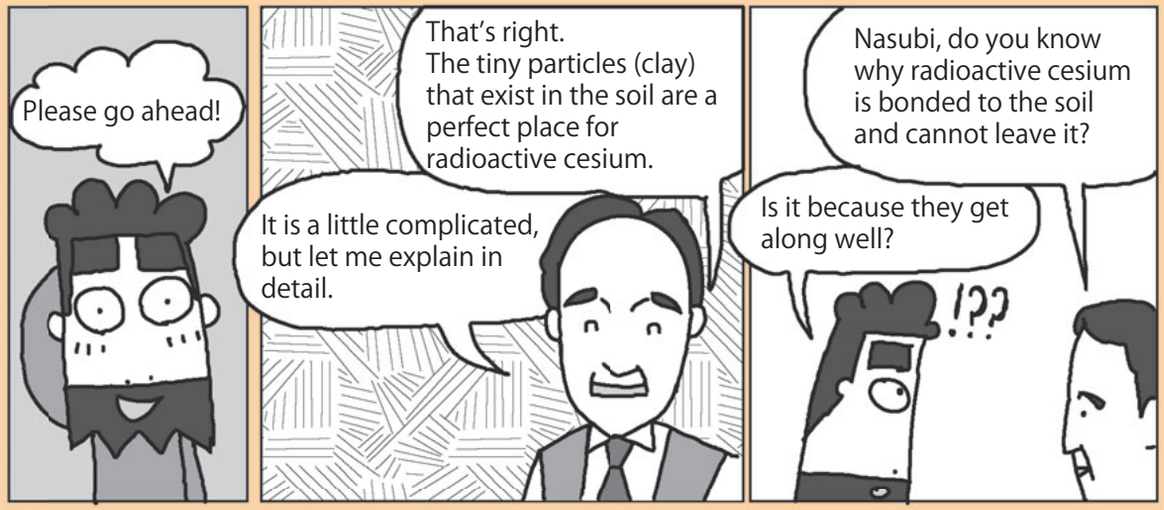
Measure 3 Results of food inspections

I will explain the inspection results for Fukushima agricultural and fishery products.

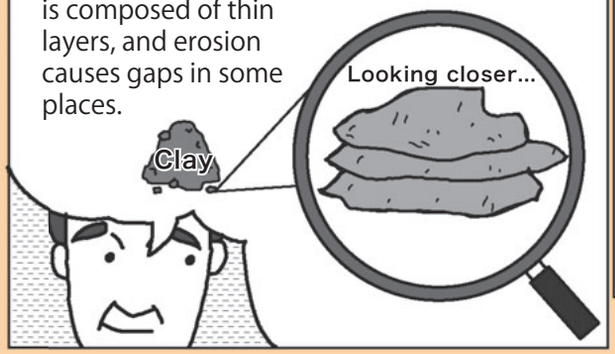
Professor Koyama

Tell me more!

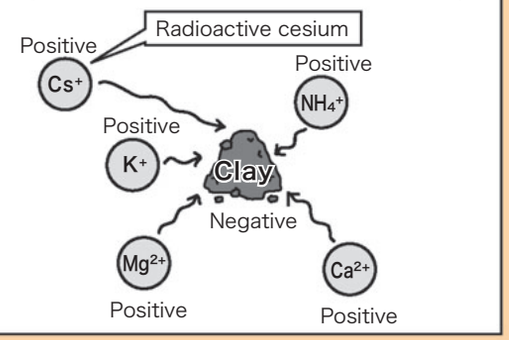
Relationship between radioactive cesium and soil



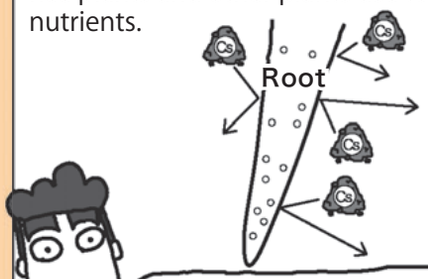
With just the bond between the positive and negative charges, the two can still be easily separated. However when we look closer as shown in the figure, we see that clay is composed of thin layers, and erosion causes gaps in some places.



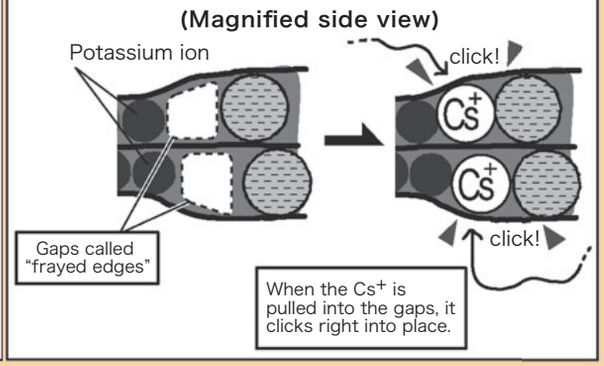
Clay has a negative electrical charge. Radioactive cesium has a positive electrical charge. Therefore it is attracted to the clay.



Because of the size of the clay that the radioactive cesium is attached to, it cannot pass through the tiny holes that the roots of rice plants and other plants use to absorb nutrients.

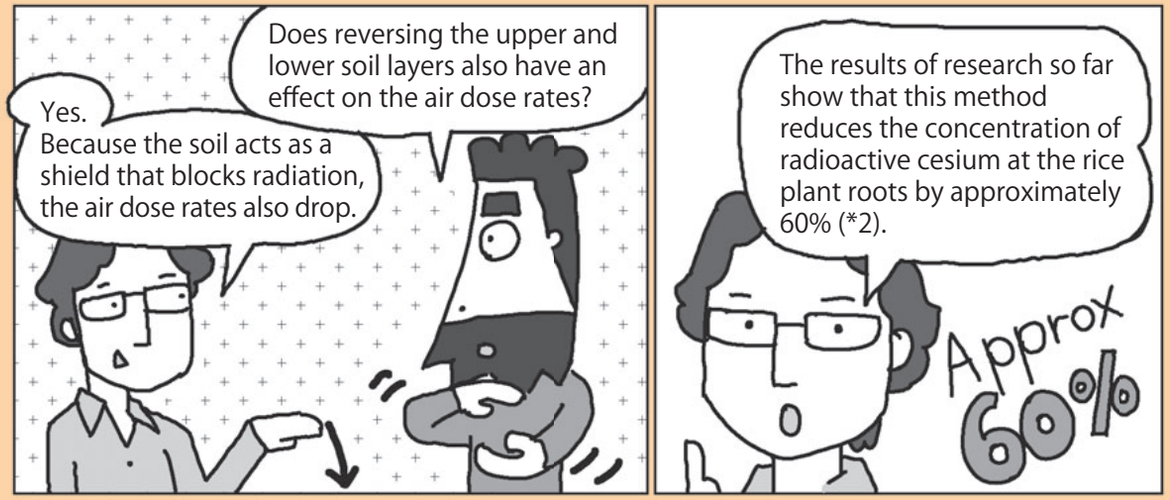


These gaps are exactly the right size for radioactive cesium to fit into.
When radioactive cesium fits into these gaps, it gets stuck and cannot get out!
Once it is stuck, it will not dissolve in water.

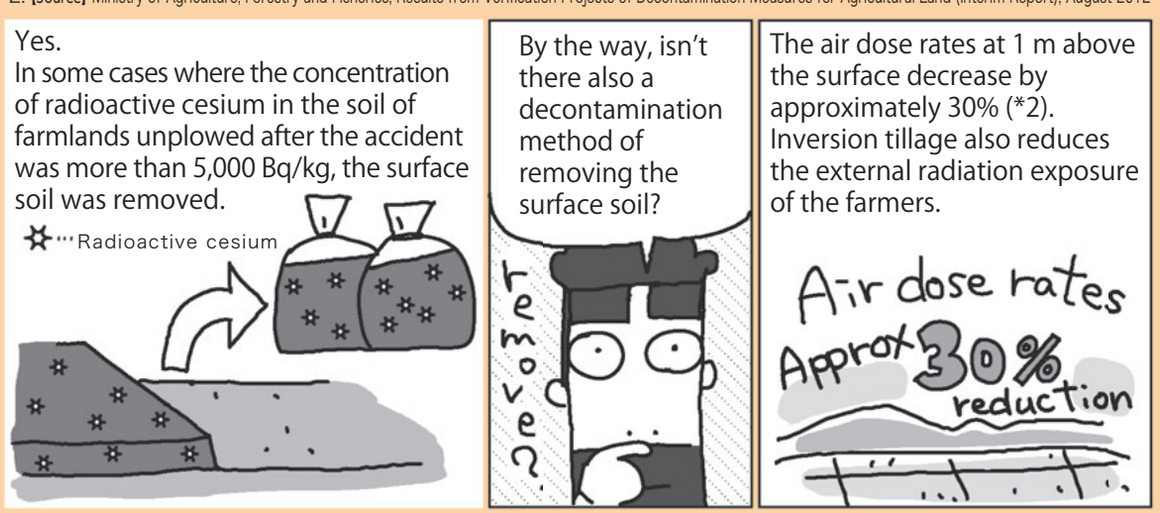


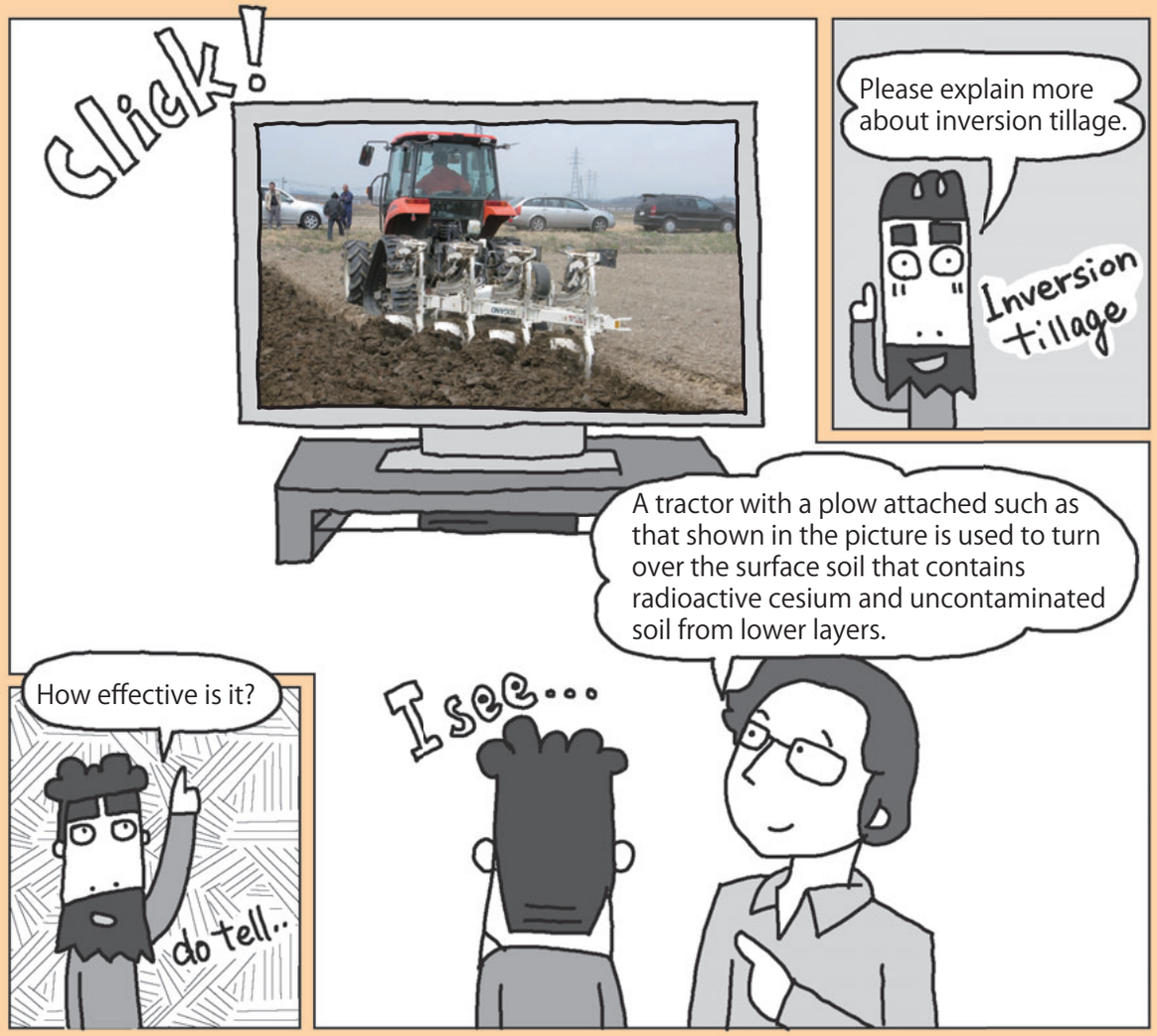
◆ For more details, please see "Information About the Nuclear Accident and Tsunami (Japanese)" from the Japanese Society of Soil Science and Plant Nutrition. ◆

Decontamination [Farmlands]



*2: [Source] Ministry of Agriculture, Forestry and Fisheries, Results from Verification Projects of Decontamination Measures for Agricultural Land (Interim Report), August 2012






Producer Kiyoto Matsumoto


Happy to be planting rice for the first time in 4 years. From left: Kiyoto Matsumoto of the Namie Town Sakata Agriculture Recovery Association, Yoshio Suzuki, Yoshihiro Hangai

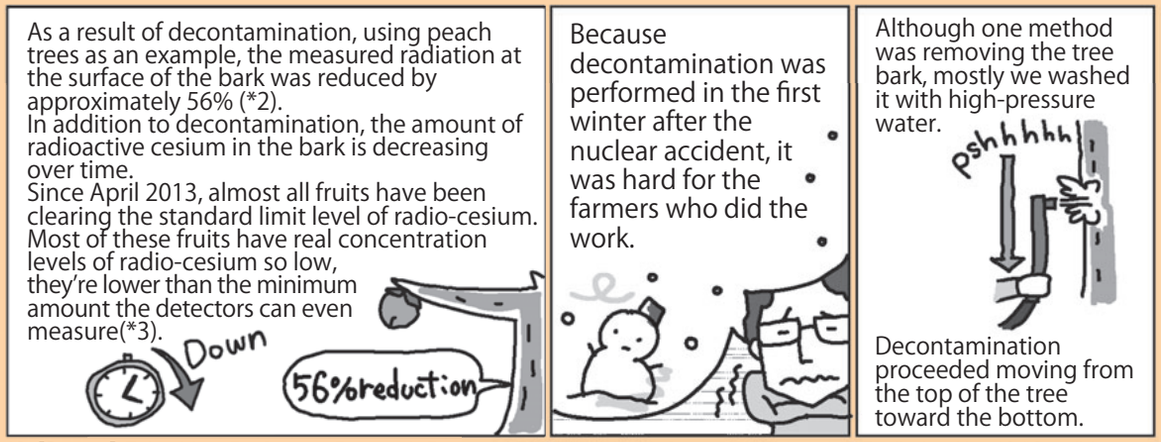
Report

Test with rice planting in Namie Town

In May 2014, rice planting took place for the first time in 4 years after the Great East Japan Earthquake in Sakata District of Namie Town in Fukushima Prefecture – an area that had been designated as a Habitation Restricted Area(*1).
Decontamination of farmlands in Namie Town was done by removing the surface soil.
In early October, the long-awaited harvest took place and a total of approximately 6,800 kg of rice was harvested. The results of 100% inspection showed that the level of radioactive cesium in the rice was far below the standard limit (100 Bq/kg) prescribed in the Food Sanitation Act, confirming that the rice was safe.
Kiyoto Matsumoto, a producer who cooperated with the rice-planting test, was greatly relieved by the results. "We had good weather, and both the flavor and the harvest quantity appear to be beyond my expectations." He showed signs of confidence that he will be able to resume commercial farming.

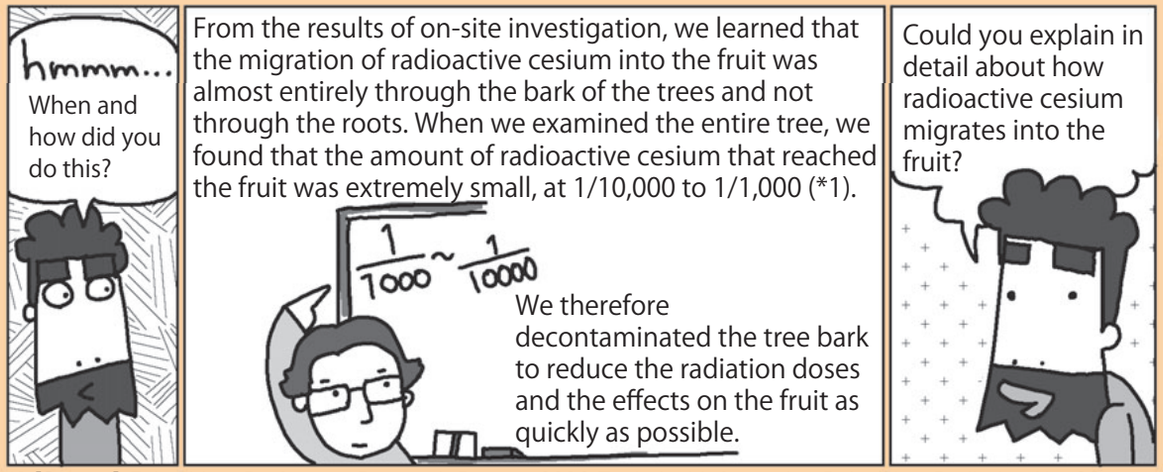
*1: Evacuation order for the Habitation Restricted Area in Namie Town was lifted on March 31st, 2017.

Decontamination [Fruit trees]



*2: 【Source】 Fukushima Prefecture Research Report, 2011 Technical Information Related to Radiation No. 40 "Conditions of Radioactive Substance Contamination on Peach Tree Bark and Decontamination Effects from Tree Washing (Japanese)"

*3: For more detailed inspection results, see the Fukushima Prefecture website (new-fukushima.jp).



*1:【Source】 Fukushima Prefecture Research Report, 2012 Technical Information Related to Radiation No. 33 "Explanation of Amounts of Radioactive Cesium Migration from Bark and Soil to Leaves and Fruit (Japanese)"

What is the status of Fukushima peaches?

Here are the scenes of bark decontamination and the bark surface and fruit data.

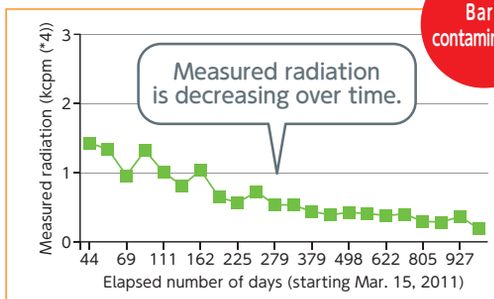
Cesium 137 concentration

Changes in fruit

【Source】 Overview of results, Fruit Tree Research Centre, Fukushima Agricultural Technology Centre

Measured radiation at the bark surface

Bark contamination



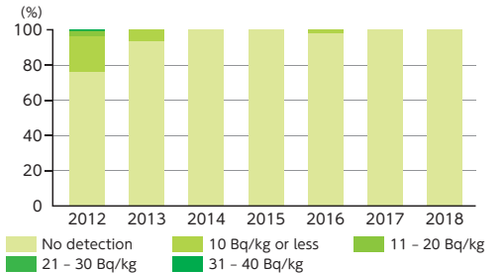
【Source】 Fukushima Prefecture Research Information 2013, Technical Information Related to Radiation No. 9 "Changes in contamination of tree bark in orchards (Japanese)"

*4: cpm (count per minute) is the amount of radiation measured in 1 minute, and is a unit of surface contamination.

Peaches on the trees

Peaches line up in a shop

Results of peach monitoring inspections



【Source】 Fukushima prefecture agriculture, forestry and fisheries products processed food monitoring information (new-fukushima.jp).

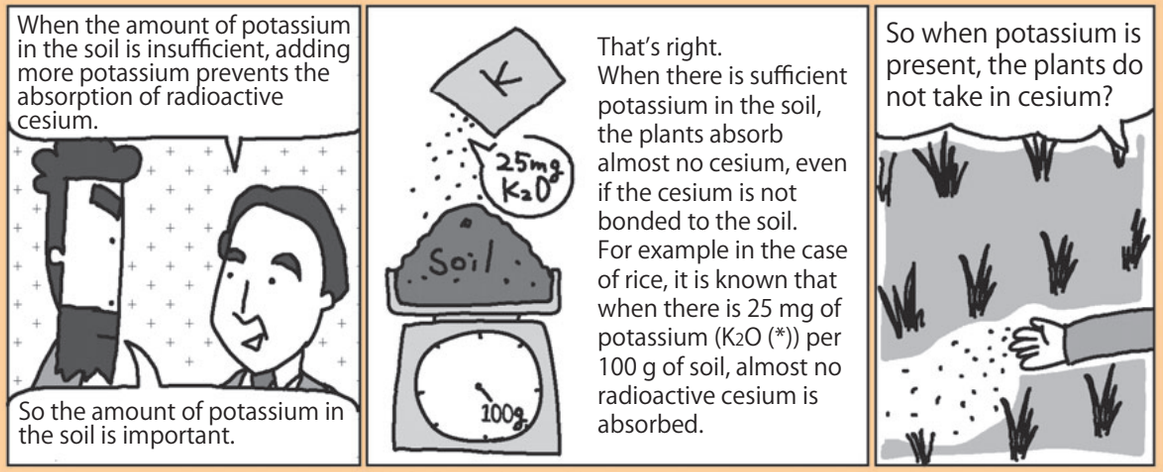
Scenes of decontamination

Location: Fruit Tree Research Centre, Fukushima Agricultural Technology Centre

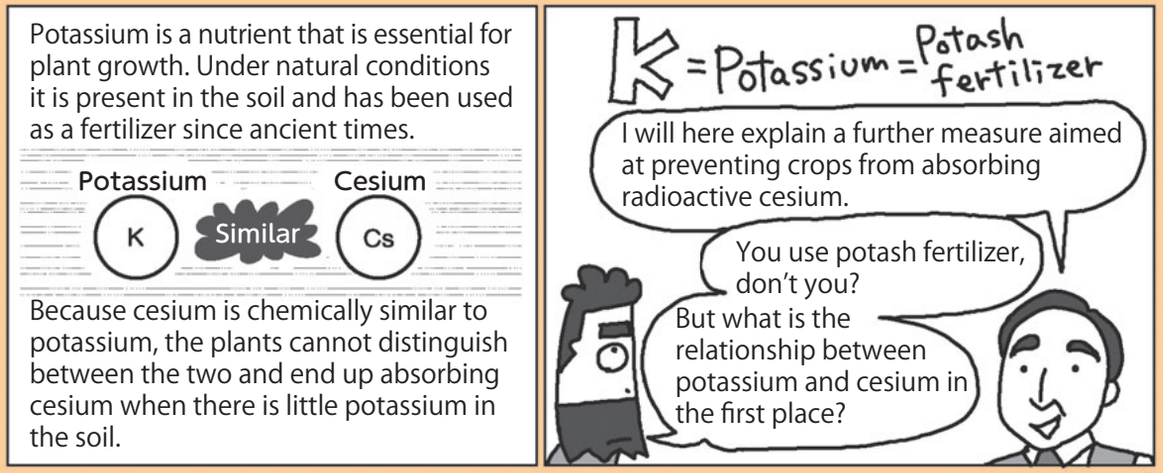
Location: Fruit Tree Research Centre, Fukushima Agricultural Technology Centre

Measure 2

Measures to prevent absorption of radioactive cesium



* K_2O: Potassium oxide

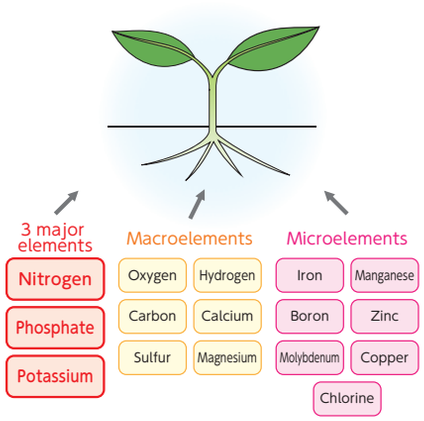


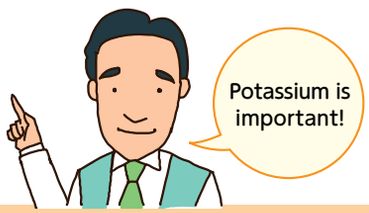
Why is the absorption of radioactive cesium prevented?

A bit more information

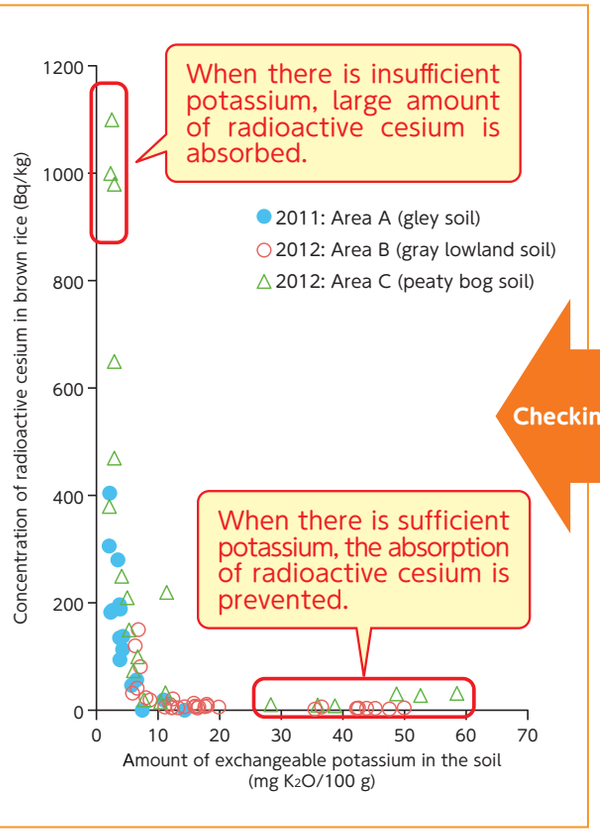
Nutrients essential for plant growth

Nitrogen, phosphate, and potassium are the 3 major elements essential for plant growth, and potash fertilizer has been used since ancient times.
Including these 3, there are 16 elements that are essential to plants.



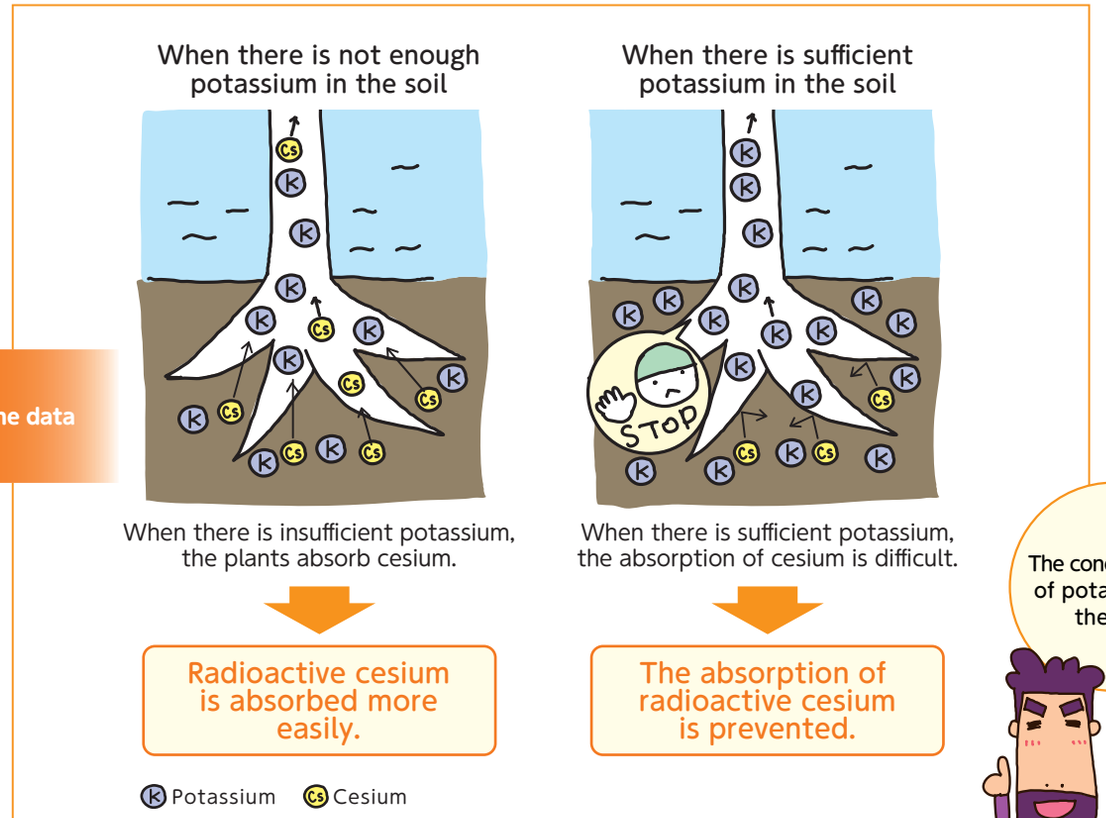


Effects of potassium in preventing the absorption of radioactive cesium



【Source】"Measures to Prevent Radioactive Cesium Absorption in Paddy Rice (Japanese)," Fukushima Agricultural Technology Centre

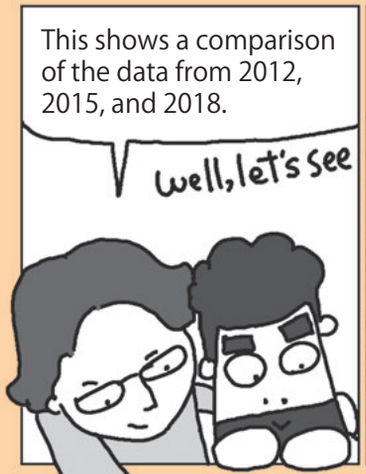
Checking the data

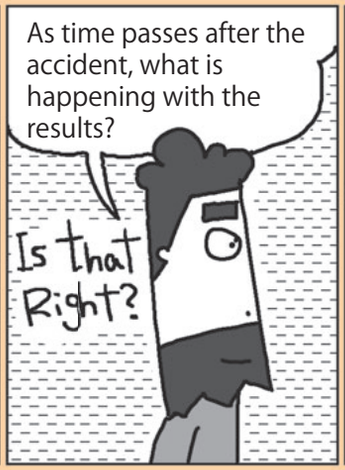


【Source】"Measures from Agricultural Production Sites (Japanese)," Feb. 2013, Ministry of Agriculture, Forestry and Fisheries

Measure ③

Results from food inspections





What are the inspection results for Fukushima agricultural and fishery products?

Results of radioactive substance monitoring inspections for Fukushima agricultural and fishery products conducted by the Fukushima Agricultural Technology Centre

Food group	2012 (Fiscal Year)			2015 (Fiscal Year)			2018 (Fiscal Year)		
	Total number of inspections	Total number exceeding standard limit	Percentage (%)	Total number of inspections	Total number exceeding standard limit	Percentage (%)	Total number of inspections	Total number exceeding standard limit	Percentage (%)
Grains (excluding brown rice)	2,179	10	0.46	2,724	2	0.07	236	0	0
Vegetables/fruits	7,271	7	0.10	4,585	0	0	2,461	0	0
Raw milk	441	0	0	413	0	0	350	0	0
Meat	6,310	0	0	3,969	0	0	3,856	0	0
Eggs	144	0	0	144	0	0	96	0	0
Pasture and feed crops	1,712	48	2.80	1,148	0	0	767	0	0
Fishery products*1	6,916	879	12.71	9,215	7	0.08	7,134	5	0.07
Wild vegetables/mushrooms*2	1,180	90	7.63	1,562	7	0.45	1,733	1	0.06

*1: The fishery products which exceeded the standard limit in 2015 were fish caught in rivers and lakes.
*2: All of the wild vegetables and mushrooms that exceeded the standard limit in 2012, 2015, and 2018 were collected in the wild.
【Source】"*Fukushima Shin-hatsubai* (Opening up Fukushima's new future)" website, Fukushima Prefecture

Results from 100% inspection of Fukushima brown rice by the Fukushima Association for Securing Safety of Agricultural Products

Food group	2012 (Fiscal Year)			2015 (Fiscal Year)			2018 (Fiscal Year)		
	Total number of inspections	Total number exceeding standard limit	Percentage (%)	Total number of inspections	Total number exceeding standard limit	Percentage (%)	Total number of inspections	Total number exceeding standard limit	Percentage (%)
Brown rice	10,346,169	71	0.0007	10,498,720	0	0	9,208,457	0	0

【Source】"Fukushima Association for Securing Safety of Agricultural Products" website * As of March 31, 2019

new-fukushima.jp Search

A bit more information

Natural radioactive substance (potassium 40)

Potassium is an element that is essential for living creatures, and is contained in all foods. 0.01% of potassium is radioactive potassium (potassium 40). This means that all foods contain radioactive potassium. Potassium 40 emits β (beta) rays and γ (gamma) rays. This means that even under natural conditions, eating food causes internal exposure to radiation. Potassium 40 also exists inside the body of all persons. (In the case of a Japanese male with body weight approx. 65 kg, the level is around 4,000 becquerel.)

Approximate amounts of potassium 40 contained in food (Bq/kg)

【Source】National Institute of Radiological Sciences, etc.

Indexes concerning radioactive substances in food (Bq/kg)

Radionuclides	Japan	Codex Alimentarius Commission	EU	US
Radioactive cesium	Drinking water ...10		Drinking water ...1,000	All food ...1,200
	Milk...50		Milk...1,000	
	Infant food ...50	Infant food ...1,000	Infant food ...400	
	General food ...100	General food ...1,000	General food ...1,250	
Upper limit value of additional dose	1mSv	1mSv	1mSv	5mSv
Estimated values of the proportion of food containing radioactive substances	50%	10%	10%	30%

It is not possible to simply compare the numerical values because the reference values (standard limits) were established by taking into account the estimated impact of the amount of food ingested, the proportion of food containing radioactive substances, etc.

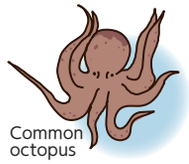
【Source】"Food and Radiation Q&A," issued by the Consumer Affairs Agency

A bit more information

Food standard limits

Immediately after the nuclear accident, a provisional regulatory value was established in the Food Sanitation Act as an emergency measure to prevent foods containing high concentrations of radioactive substances from reaching the market.
Although it was assessed that there would be no effect on health with the provisional regulation value, in order to further ensure safety and security, new standard limits for the radiation dose received from food were established in April 2012, lowering the annual dose from 5 mSv to 1 mSv.

Tell me more! Current status of fishery products


Common octopus

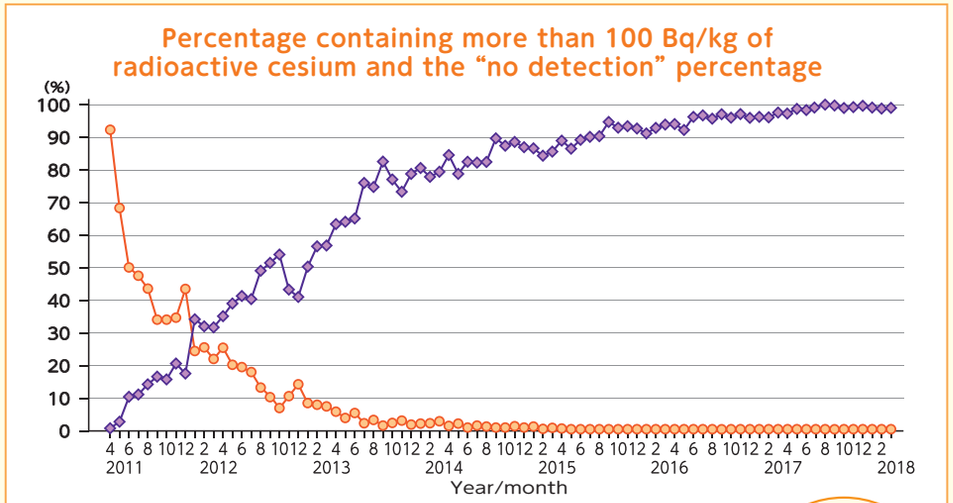

Sand eel


Sakhalin surf clam

There has been no full-scale fishing in the waters off the coast of Fukushima Prefecture since the nuclear accident. However, Fukushima Prefecture continues to acquire samples of and inspect fishery products in cooperation with the national government and the representatives of fishers in order to test for radioactive substances.
The percentage of fishery products exceeding the standard limit has been decreasing year by year. Since April 2015, almost all fishery products have been clearing the standard limit.
Fishing operations are being conducted on a trial basis and limited sales operations are conducted for all seafood types which have been confirmed safe by these inspections. At the time of shipping, a voluntary inspection by the fisheries associations is also conducted for further confirmation of safety.
In this way, efforts are continuing aimed at resumption of full-scale operations while concurrently checking for safety.

What is happening with radioactive substances contained in fishery products?

Results from inspections of radioactive substances in Fukushima Prefecture fishery products



【Source】 Monthly Radiation Monitoring Results for Fishery Products by Fukushima Prefecture (as of July 3rd, 2019)

Monitoring results of agricultural, forestry and fishery products from Fukushima Prefecture

Search

This time we asked Professor Koyama and Professor Tsukada.

Ryota Koyama

Professor, Faculty of Food and Agricultural Sciences, Fukushima University

- Has been involved in measures against radioactive contamination in agriculture since the disaster. His areas of expertise include agricultural economy, agricultural cooperative studies, and regional economics.
- Author: *Taking Back the Fukushima Agricultural, Forestry, and Fishery Industries* (Japanese), Misuzu Shobo (March 6, 2015)

Professor Koyama has been involved with agricultural issues in Fukushima following the nuclear disaster. In particular, he has worked to investigate radioactive substances in farmlands, propose safety inspection systems, and combat damage caused by unfounded rumors. He is also involved in the “Fukushima Future Foods and Agricultural Training Program,” where participants study the recovery in food and agriculture, as well as the “Recovery Marché,” which promotes Fukushima Prefecture products with the help of students.

Hirofumi Tsukada

Director, Institute of Environmental Radioactivity, Fukushima University
Division Chief, Research Division on the Movement of Radioactive Materials in the Environment, Fukushima Prefectural Centre for Environmental Creation

- Engaged in research on migration and movement of radionuclides in the environment. His area of expertise is radioecology.

The state of radioactive substances determines the migration and reactions that they undergo in the environment. As described in this booklet, most radiocaesium binds strongly with clay, and the amount which migrates to plants is small. However it will migrate to plants if it dissolves in water. He is researching to determine what factors cause the state of radioactive substances to change and affect their migration, and how they will be distributed in the future. He is also investigating measures to reduce radioactive substances in areas that are working to resume commercial farming, as well as the effects of these measures.

Institute of Environmental Radioactivity

Search