



Challenge in Remediation of Agricultural soil Contaminated by Radiocaesium in Fukushima

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ABSTRACT

Most of radioactive cesium released from Fukushima Daiichi nuclear power plant has been accumulated in the topsoil within 5 cm. For decontamination of the top soil, Japanese government (Ministry of Agriculture, Forestry and Fisheries) has authorized three methods: topsoil stripping method, puddling method, and plowing method to replace surface soil with subsoil. Among three methods, the topsoil stripping method is being carried out and a lot of flexible container bags containing contaminated topsoil are piled up in the paddy field. However, we have not yet found the final disposal site of the contaminated soil. For agricultural regeneration and early return village, it is important to find a feasible decontamination method that farmers can conduct by themselves. Therefore, we are challenging some field tests that buries the contaminated soil under the ground or flushes out muddy water into a moat in the paddy. We named this method 'Madei-method' that means we treat contaminated soil very carefully. Currently, we are monitoring the radiation dose from the buried contaminated soil by using a newly developed soil radiation sensor. At the moment, leakage of radioactive cesium has not been confirmed from the buried contaminated soil despite rapid changes in ground water due to rainfall and irrigation to the paddy. This can be explained in terms of the filtering effect of the clay particles even if water penetrates the contaminated soil and colloidal clay particles move downward.

Keywords: radiocaesium, decontamination, Fukushima, clay, monitoring

For more information
Scan →

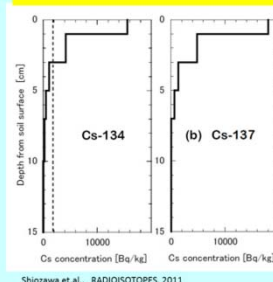


Decontamination:
Challenge of the
Villagers(NHK-WORLD,
TOMORROW)

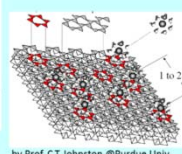


Decontaminating
Fukushima: Cleaning up
Farms(NHK WORLD)

Status of radiocaesium in soil



Shiozawa et al., RADIOISOTOPES, 2011



by Prof. C.T Johnston @Purdue Univ.



Egg pack model (Mizoguchi, 2014)

Radiocaesium is replaced with K
and fixed to the clay particles

Tips for decontamination

- Regard as a complex of cesium and clay particles
- Note the movement of the clay
- Think the removal of the clay



Stripping topsoil method



Soil puddling method



Deep plowing method

Official decontamination methods by Government

MAFF

Ministry of Agriculture, Forestry and Fisheries

From August, 2012

Pile of flexible container bags and Farmland devastated in Iitate, Fukushima, Japan



A pile of flexible container bags (Sugaya, 2013.9.21)



Paddy disturbed by wild boar (Sasu, 2012.4.21)



Summer grass (Sasu, 2013.8.3)



Wild boars in paddy fields (Sasu, 2012.10.6)



Monkeys walking on the road (Sasu, 2013.6.16)

Feasible decontamination method that farmers can conduct by themselves

'Madei-method'

Madei-construction method

Madei means "carefully" or "heartly" in the dialect of Iitate, Fukushima



In Sasu (2012.12.1)

[Madei-1] Strip and bury the contaminated topsoil under the

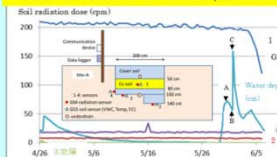


In Komiya (2013.5.18)

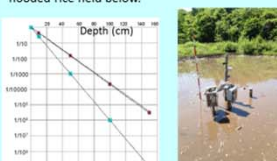
[Madei-2] flush out muddy water into a moat in the paddy

Contaminated soil should be buried in the bare hole!

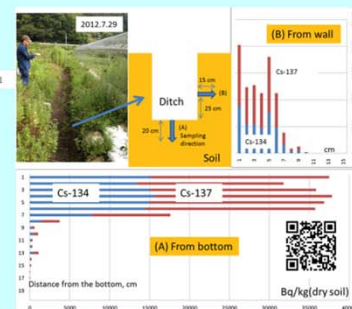
Cesium is not moved even if water penetrates!



Soil radiation dose (cpm) vs. water level in a well in flooded rice field below.



Radiation dose is 1/100 to 1/1000 if the contaminated soil is buried in 50cm deep!



As a result of the measurement of radioactivity at each depth after pouring contaminated muddy water into the ditch, we reveals cesium does NOT penetrate in the soil by the filtration function of soil!