

Status and Priorities of Soil Management in Japan

*GSP Technical Workshop “Managing Living Soils”
5-7 December 2012, FAO Headquarters, Rome, Italy*



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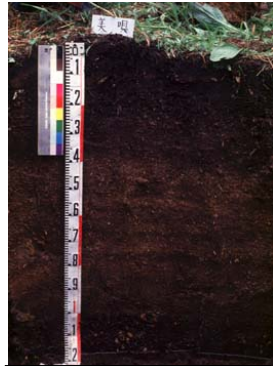


Japan: Geography and Climate

- Japan has a total of 6,852 islands extending along the Pacific coast of East Asia, lies between latitudes 24° - 46° N.
- The climate of Japan is predominantly temperate, but varies greatly from north to south. Pacific summer monsoon brings warm and humid, while Siberian winter monsoon brings cold weather. The average winter temperature in Japan is 5.1°C and the average summer temperature is 25.2°C .
- About 66% of Japan's land is covered with forests, and 12% with agricultural lands.



Japan: Distribution of Major Soils



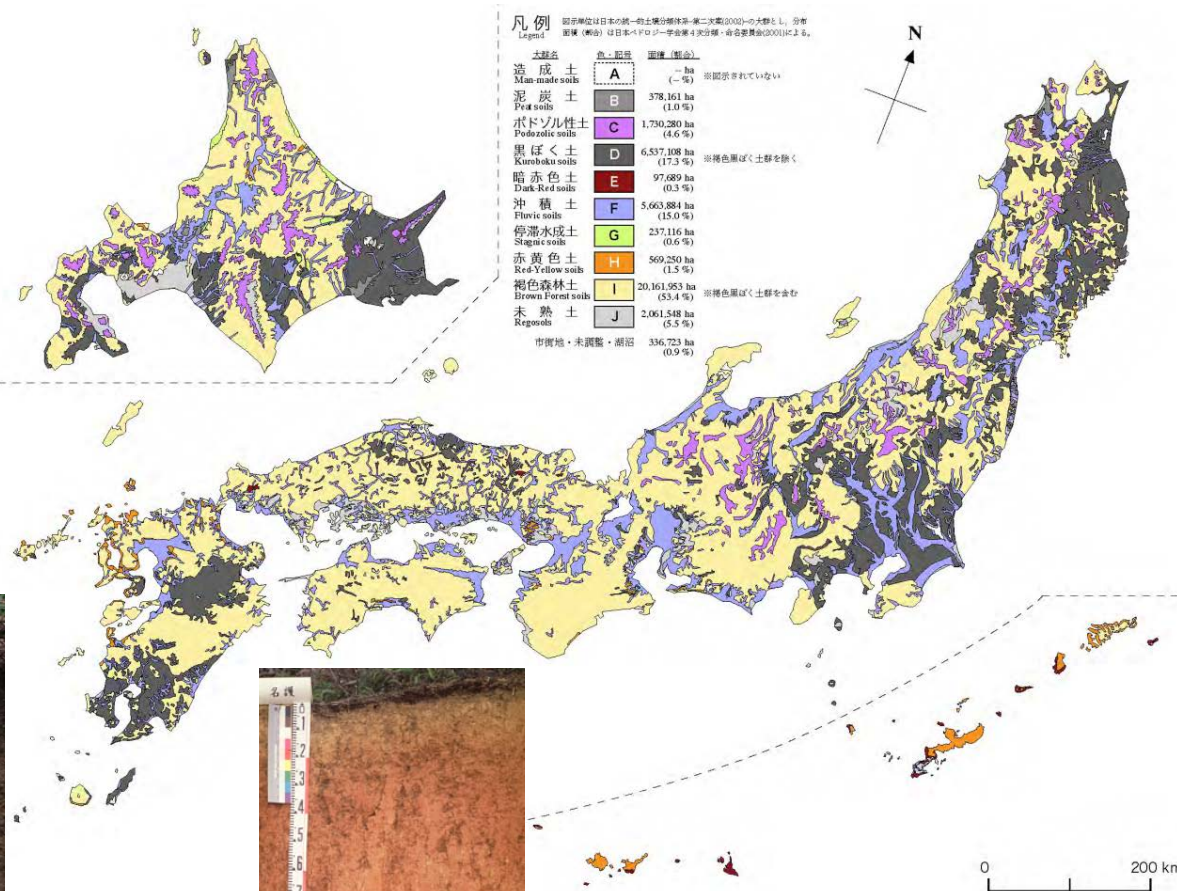
B. Peat soil



I. Brown forest soil



H. Red-yellow soil

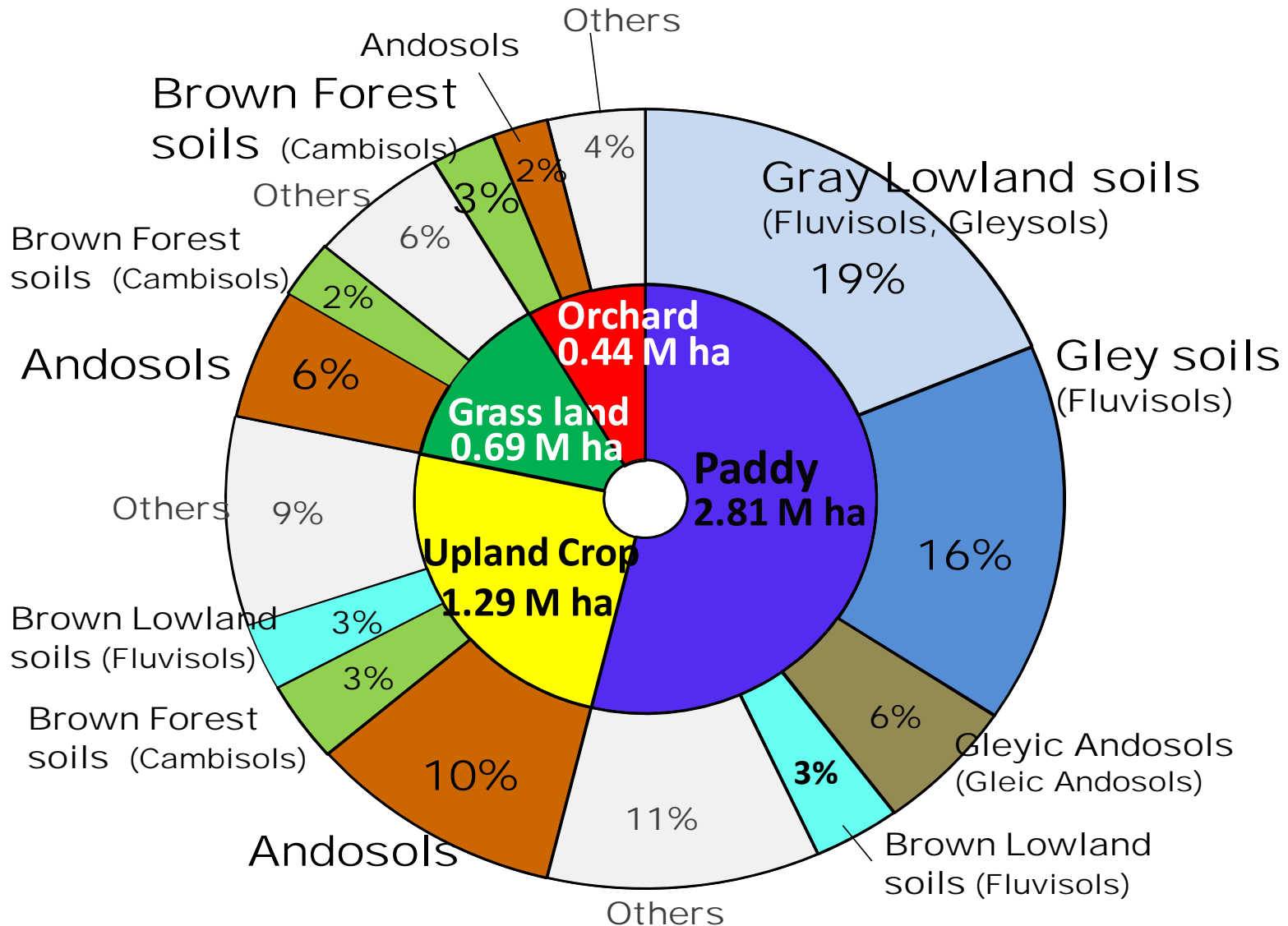


D. Andosol



F. Fluvic soil

Japan: Distributions of Soil Types in Crop Lands



Japan: Priorities of Soil Management

- Soil fertility management
 - Sustainability of soil fertility
 - Soil management for quality and quantity of products
- Environmental assessment
 - Soil management for eco-farming
 - Contamination of pollutants (heavy metal, organic pollutants, radionuclides, etc.)
 - Soil C sequestration and GHG emissions
- Soil information for food security
- Capacity building and education

Japan: Research-Policy-Land Users Network

Research

Policy

Academic
Societies
JSSSPN, etc.

National Institutes
for Agriculture &
Forestry
NIAES, NARO,
FFPRI, others

National

Ministry of
Agriculture, Forestry
and Fisheries
(MAFF)

Cabinet
Office &
Other
Ministries

Universities

Prefectural
Institutes &
Experimental
Stations

Regional

Prefectural
Governments

Associations
of Producers

Extension Stations

Land Users

History of National Soil Survey Programs in Japanese Agricultural Land (1953-1978)

- Soil Survey for Improving Fertilizer application (1953-1961)

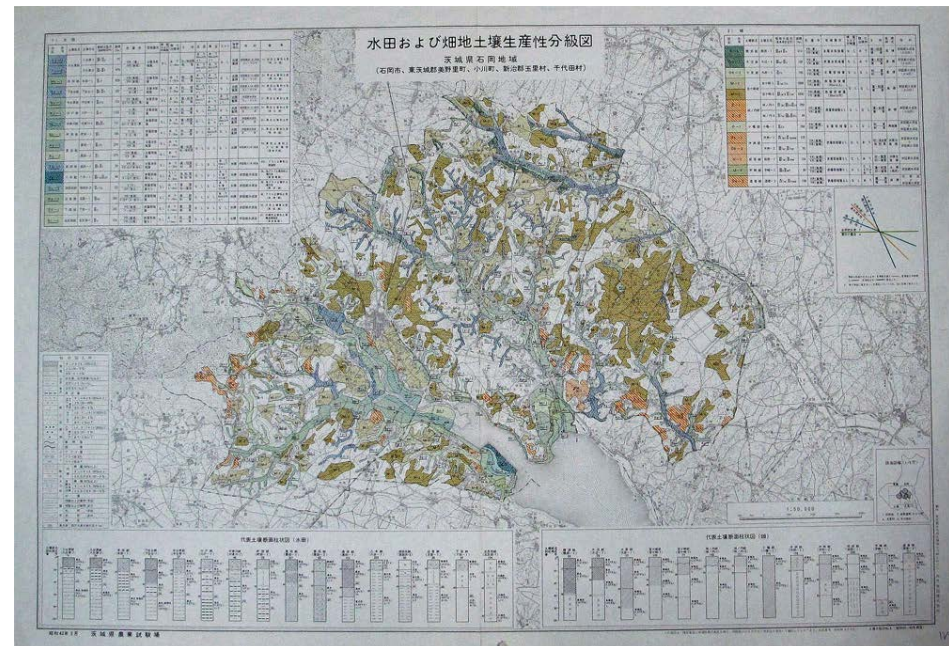
Mainly in paddy field, about 200,000 pedons were surveyed.

- Fundamental Soil Survey for Soil Fertility Conservation (1959-1978)

Mainly in upland field, the survey density was 500m.

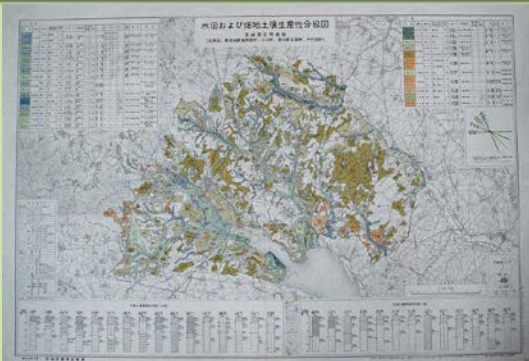


Summaries of Pedon dataset
(47 prefectures)



Cultivated soil maps (1:50,000)

Digitalized and updated cultivated soil maps (1: 50,000)



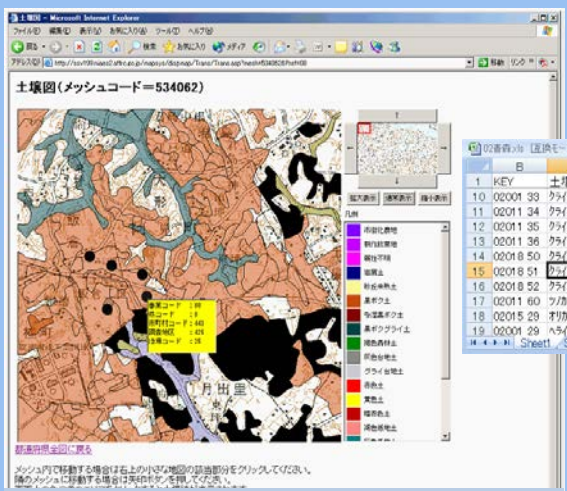
Cultivated soil maps (1:50,000)



Benchmarked soil dataset (about 20,000sites)

- Soil Survey for Improving Fertilizer application
- Fundamental Soil Survey for Soil Fertility Conservation

Digitalized soil inventory

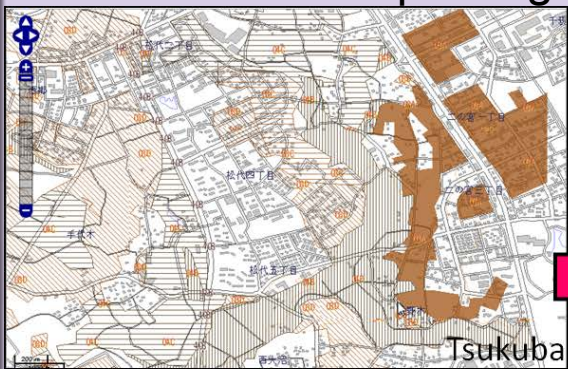


Digital soil map

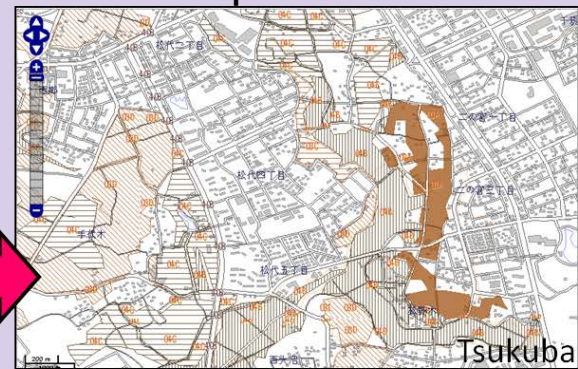
KEY	土壌区分	土壌群名	第II等級	表土土性	次表土性	地目	第1月	第2月	PH _{H2O} 1	PH _{H2O} 1	PH _{H2O} 1
10	02001 39	クサシ-2	黒ボク土	DXFNE	L	SL	40	80	5.75	4.9	6.5
11	02011 34	クサシ-1	黒ボク土	XFNE	L	SL	40	80	5.75	4.9	6.5
12	02011 35	クサシ-2	黒ボク土	DXFNE	L	SL	40	80	5.75	4.9	6.5
13	02011 36	クサシ-3	黒ボク土	XFNE	L	SL	40	80	5.75	4.9	6.5
14	02018 50	クサシ-1	黒ボク土	XFNE	L	SL	40	80	5.75	4.9	6.5
15	02018 51	クサシ-2	黒ボク土	DXFNE	L	SL	40	80	5.75	4.9	6.5
16	02018 52	クサシ-3	黒ボク土	XFNE	L	SL	40	80	5.75	4.9	6.5
17	02011 60	クサシ-1	黒ボク土	DXFNE	L	SL	40	80	5.75	4.9	6.5
18	02015 29	クサシ-1	黒ボク土	DXFNE	L	SL	40	80	5.75	4.9	6.5
19	02001 29	クサシ-2	黒ボク土	DXFNE	L	SL	40	80	5.75	4.9	6.5

Benchmarked soil pedon database

Updating soil-land map



1992 version



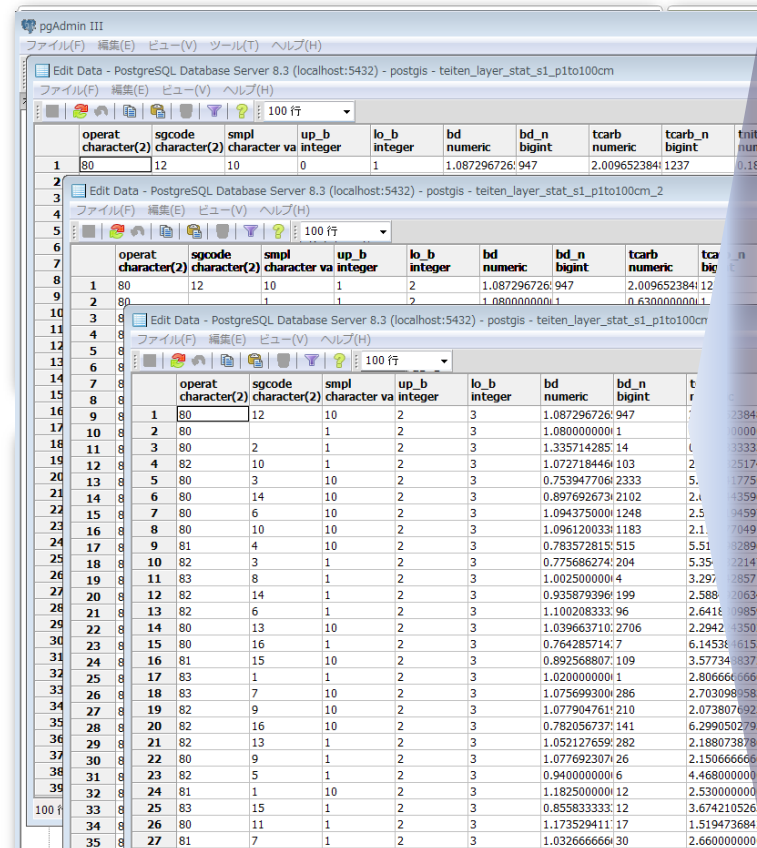
2001 version

Urban sprawl impacts on fertile soils

History of National Soil Survey Programs in Japanese Agricultural Land (1979-1999)

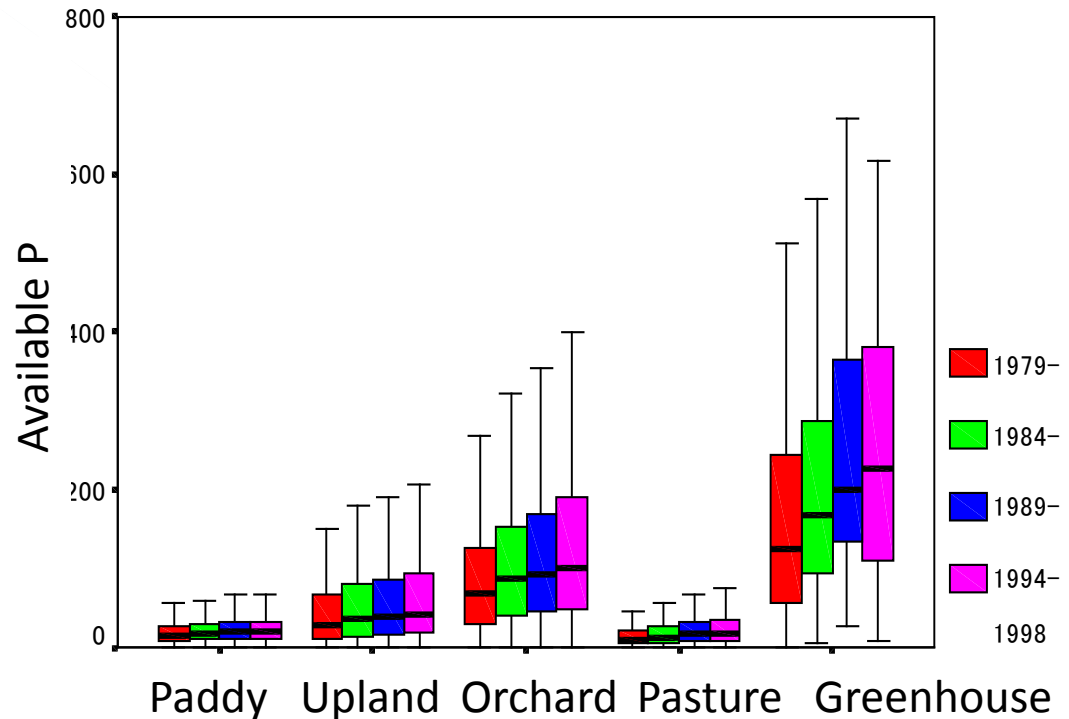
Basic Soil - Environment Monitoring

About 20,000 monitoring sites.
5-year-interval (Since 1979)



The screenshot shows the pgAdmin III interface with a table named 'teiten_layer_stat_s1_p1to100cm'. The table contains columns for various soil parameters and their units. The data is organized into rows, with some rows highlighted in blue. The table structure is as follows:

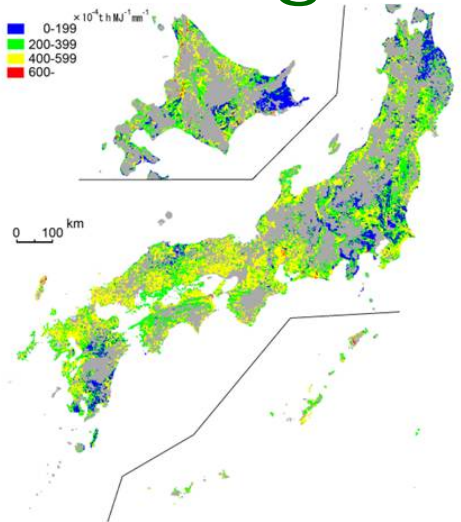
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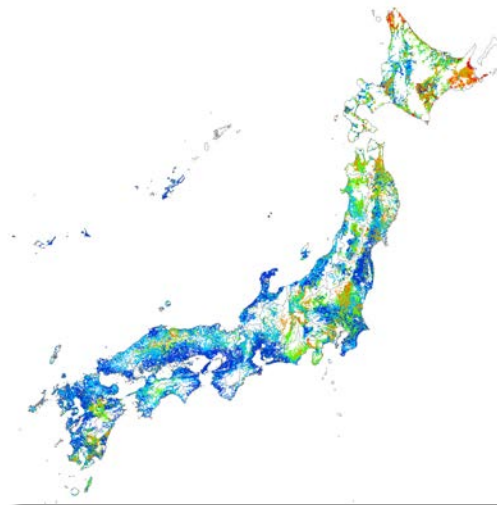
This soil database has been used for creating various agro-environmental indicators

Application of soil inventory in Japanese agricultural land 1

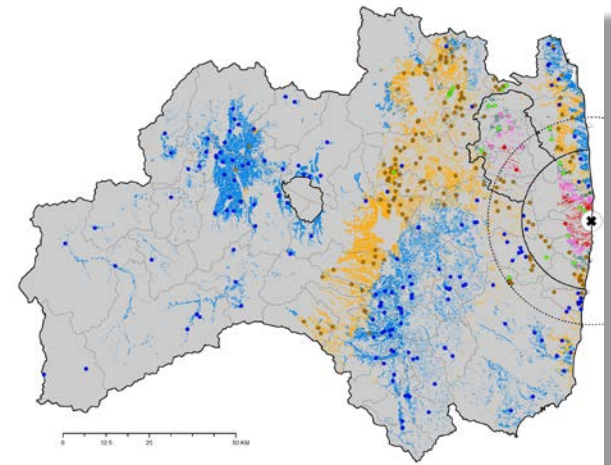
Agro-environmental indicators



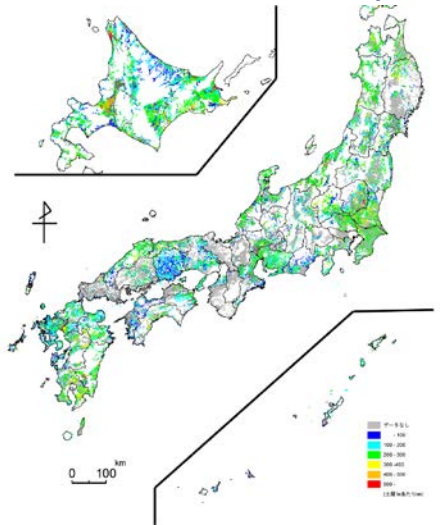
Soil Erodibility
(K) factor Map



Soil Carbon
Stock Map



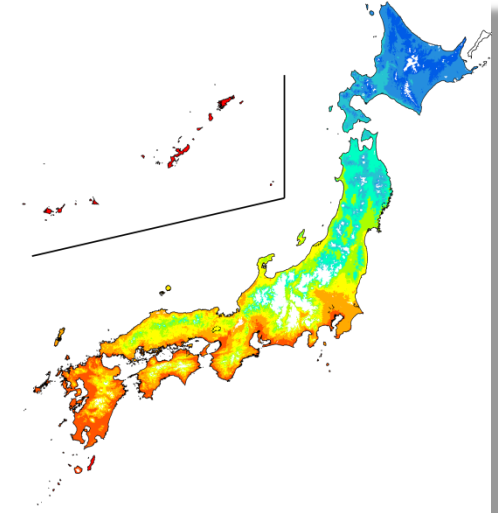
Radioactive Cs
Concentration map
(Aug. 2011)



Available Water
Content



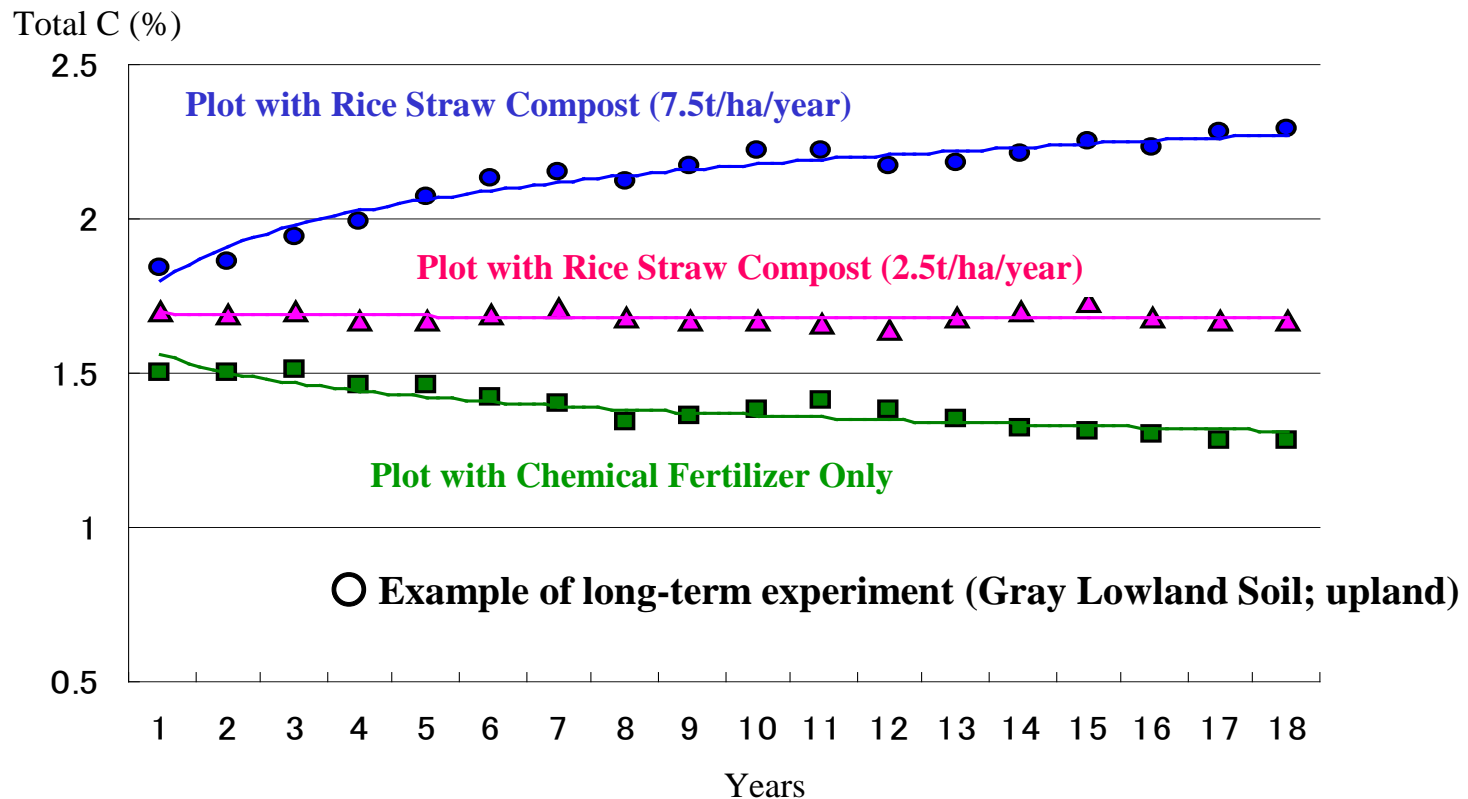
Soil Nitrogen
Stock Map



Soil Temperature
Map

Long-Term Experiments in Japan

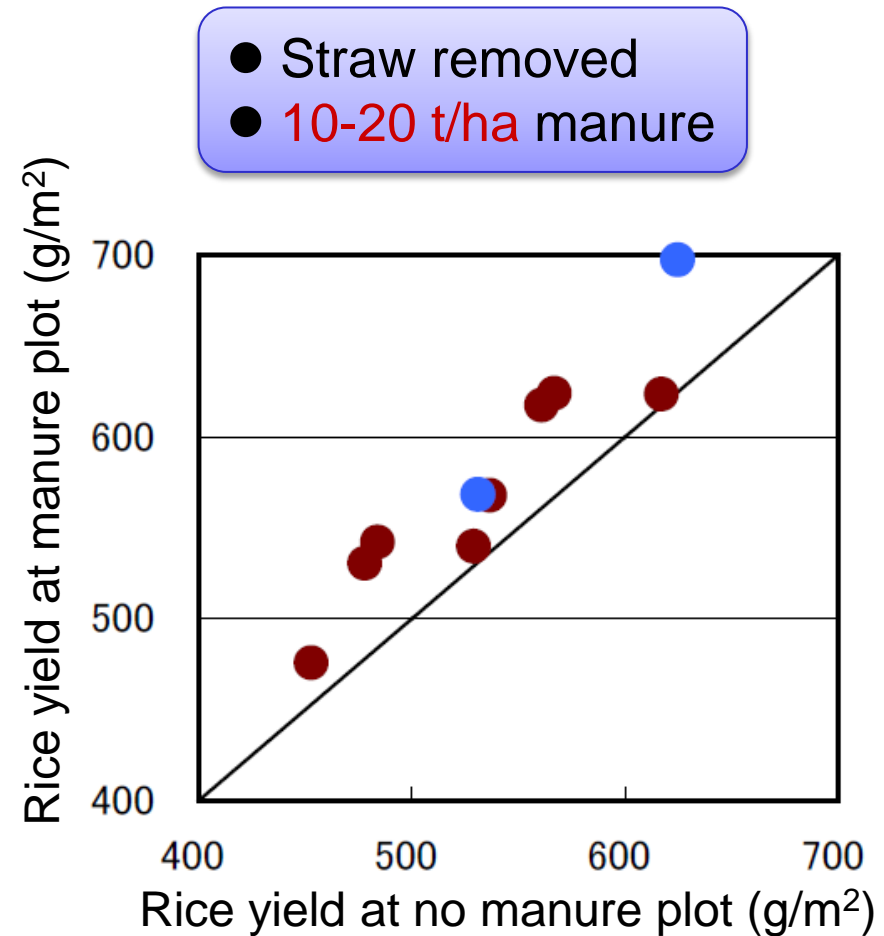
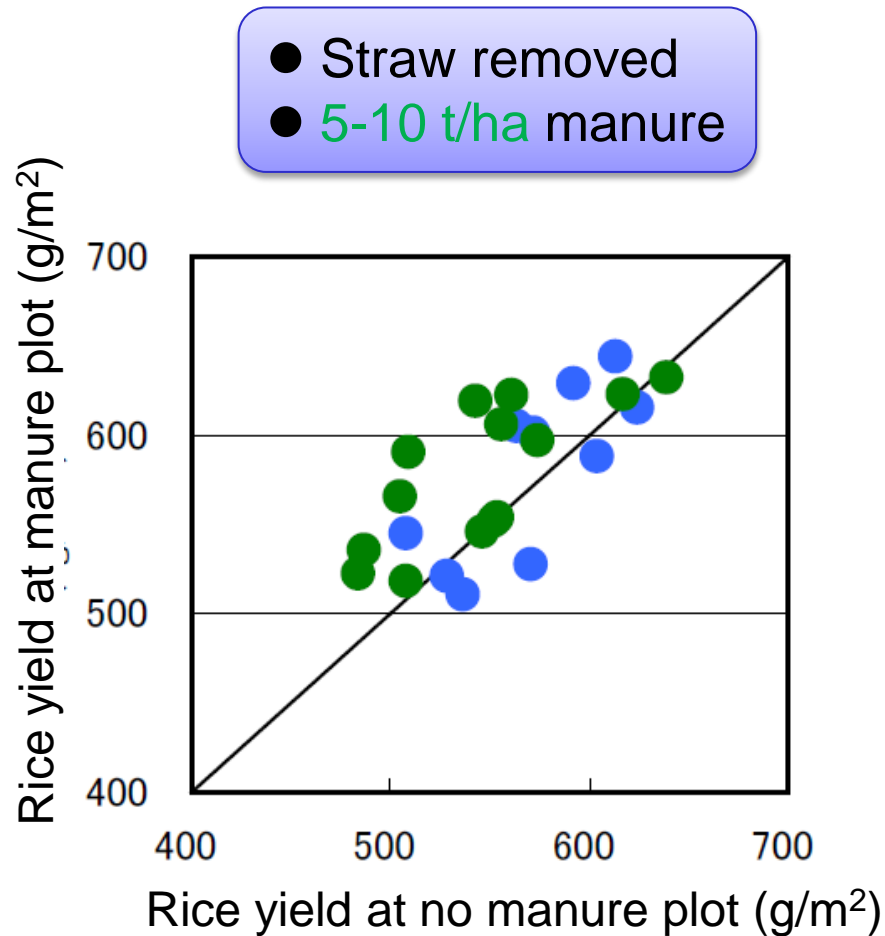
- Since 1975, the MAFF has conducted long-term experiments with continuous organic matter application under typical soil type and cropping system of each prefecture (over 150 sites in total), which demonstrated that soil carbon stock increased through organic matter application such as compost.



Data: "Basic Survey of Soil Environment (Benchmark Survey)" Yamaguchi Pref. Agricultural Research Institute. Figure for a year is the three-year average including the previous and the next year to that year.

Long-Term Experiments in Japan

Change of Rice Production




How the “Soil Information Web Viewer” is to be used by prefecture office

Fertilizer prescription program of Mie Prefecture

三重県土壌診断・堆肥流通支援システム

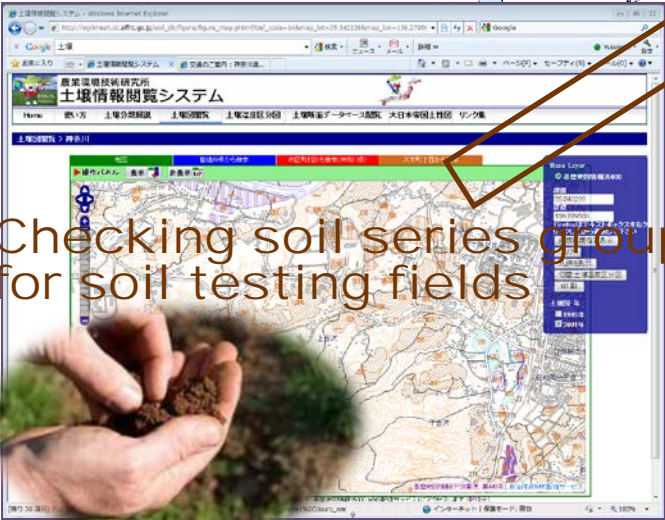
土壌の診断と、栽培する品目・堆肥にあわせた施用量の確認ができます。

ご覧になりたい地区上にカーソルを合わせ、クリックしてください。



<http://www.taihi.pref.mie.lg.jp/>

Checking soil series group for soil testing fields



Soil Information Web Viewer

キーワードを入力して検索してください。

受付番号: 氏名: 採取場所: 検索

Soil series group

あなたの土壌診断データを選択してください。

選択	受付番号	氏名	採取場所	土壌	層位	土壌採取
選択	9999999902	サンプルデータ	前の畑	厚層多腐植質黒ボク土	上 (作土)	2004年 8月
選択	2012215265	非公開	高角町	腐植質黒ボクグライ土	上 (作土)	2012年 9月
選択	2012215264	非公開	川島	細粒灰色低地土・灰色系	上 (作土)	2012年 9月
選択	2012215263	非公開	日永	細粒赤色土	上 (作土)	2012年 8月
選択	2012215185	非公開	沢西 (2012002894)	中粗粒灰色低地土・灰褐色系	上 (作土)	2012年 9月
選択	2012215184	非公開	三木東 (2012002893)	中粗粒灰色低地土・灰褐色系	上 (作土)	2012年 9月
選択	2012215183	非公開	消防東倉庫 (2012002892)	中粗粒灰色低地土・灰褐色系	上 (作土)	2012年 9月
選択	2012215182	非公開	平戸 (2012002891)	中粗粒灰色低地土・灰褐色系	上 (作土)	2012年 9月
選択	2012215178	非公開	ハウス (2012002890)	中粗粒灰色低地土・灰褐色系	上 (作土)	2012年 9月
選択	2012215177	非公開	ハウス (2012002891)	中粗粒灰色低地土・灰色系	上 (作土)	2012年 9月
選択	2012215176	非公開	ハウス (2012002890)	中粗粒灰色低地土・灰色系	上 (作土)	2012年 9月
選択	2012215042	非公開	畑 (2012002755)	細粒灰色低地土・灰色系	上 (作土)	2012年 9月
選択	2012215041	非公開	④ (2012002754)	中粗粒灰色低地土・灰色系	上 (作土)	2012年 9月
選択	2012215040	非公開	⑥ (2012002753)	中粗粒灰色低地土・灰色系	上 (作土)	2012年 9月
選択	2012215039	非公開	② (2012002752)	中粗粒灰色低地土・灰色系	上 (作土)	2012年 9月

1 2 3 4 5 6 7 8 9 10 ...

採取場所: 日永
地目: 畑
主要作物: 野菜 (一般葉菜類)
土壌の種類: 細粒赤色土
主要品目: キャベツ (初冬)
単位 (乾土100g当り) 印刷

土壌の説明: 細粒赤色土



山地、丘陵地、谷地の最上位、高位段丘などに分布している。表土の腐植質量は少なく、土性は細粒 (粘土質) で、土色は5YRまたはそれよりも赤色である。堆積状態はち密で、物理性、化学性はともに不良である。赤色土は1次腐植としての地在的養分すなわちCa、Mgの供給が少なく粘土腐植はギブサイト、カオリンを主体とする。赤色土の分布面積は全土壌の1.3%程度である。粘土質のものは玉城各地周辺に多く分布し、カキ園や普通畑として利用されている。

開じる

土壌診断結果

土壌化学性	単位	測定値	上限	下限
pH (HzO)		5.81	6.5	6
EC (1:5)	(mS)	0.03		
腐植	(%)	2	5	2
可給態ケイ酸	(mg)	0	30	15
交換性カルシウム (石灰)	(mg)	130	231	151
交換性マグネシウム (苦土)	(mg)	40	45	18
交換性カリウム	(mg)	91.9	35	21
CEC (陽イオン交換容量)	(me)	15		
塩基飽和度	(%)	57.3	75	45
可給態リン酸 (トルオーグ)	(mg)	114	20	15
石灰・苦土比		2.3		
苦土・カリ比		1		
硝酸態 N	(mg)	0		

レーダーチャート



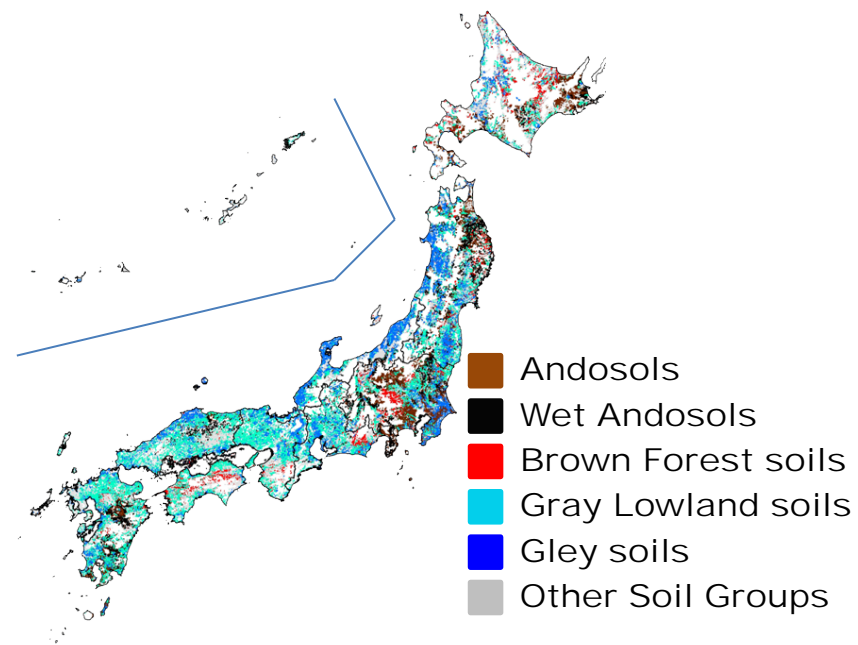
●: 測定値 ●: 上限 (外枠) ●: 下限 (内枠)

pHが低いので石灰資材を施用して下さい。施肥基準にしたがって適正量施用して下さい。カリ肥料を削減するか、

Fukushima nuclear accident

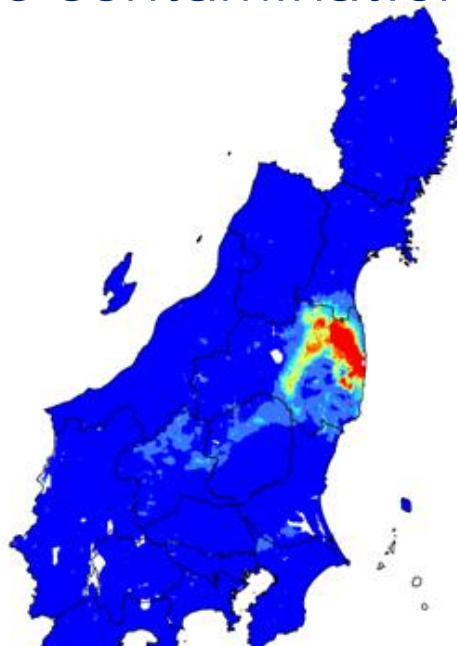
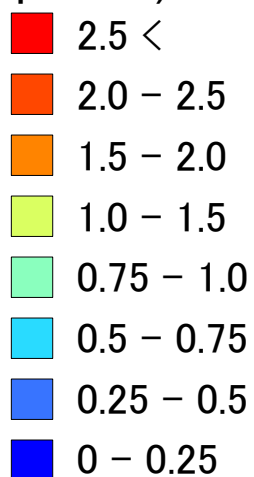


Cultivated Soil Map (1:50,000)

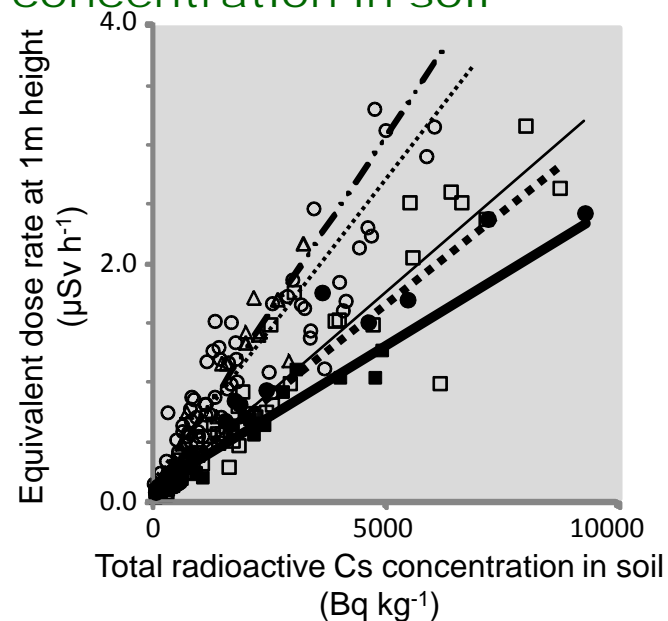


Radioactive contamination

Dose rate
($\mu\text{Sv/h}$)



Relationship between dose rate and Cs concentration in soil

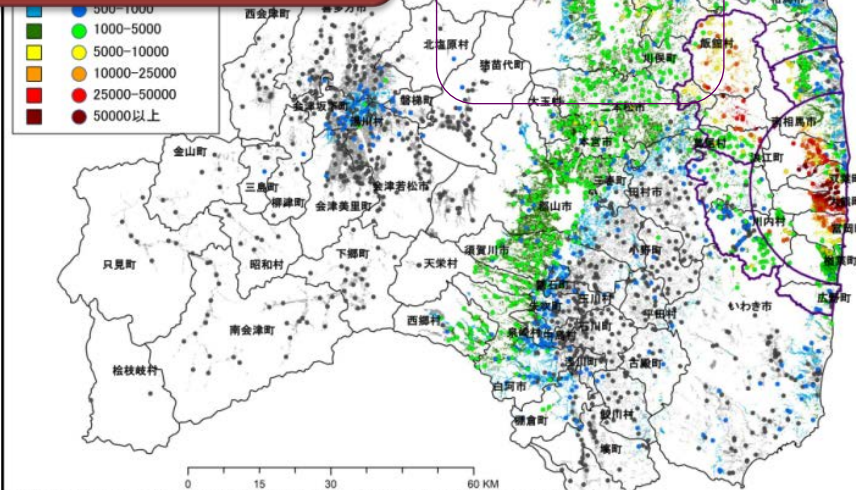
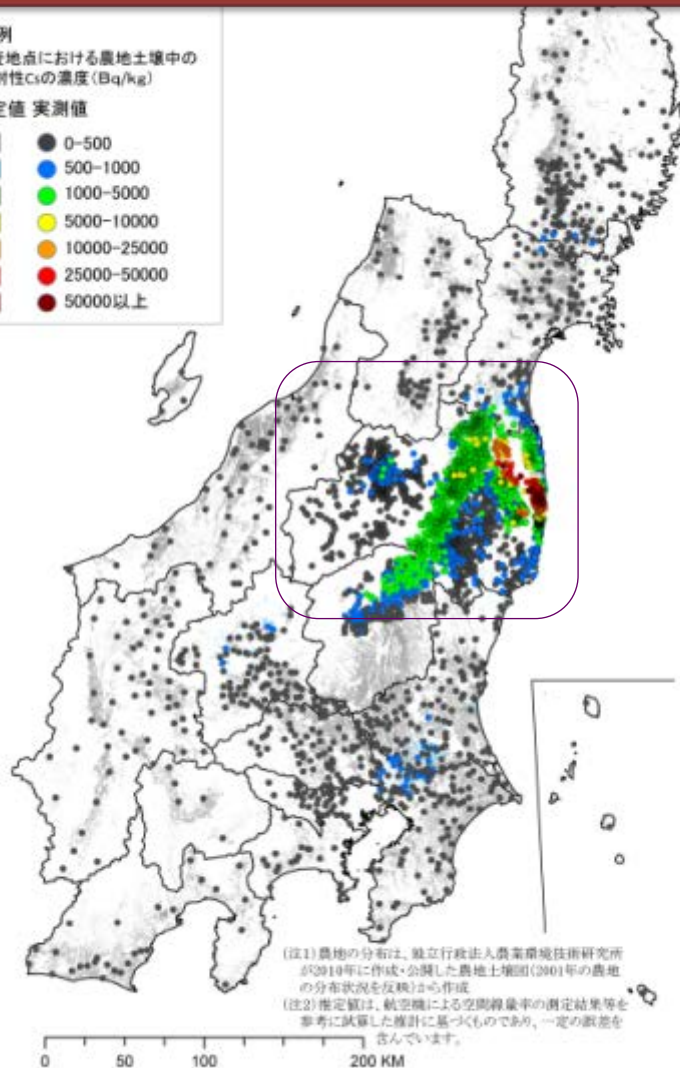
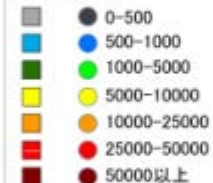


Radioactive Cs Map for Agricultural Lands

Fukushima Prefecture

凡例
調査地点における農地土壌中の
放射性Csの濃度 (Bq/kg)

推定値 実測値

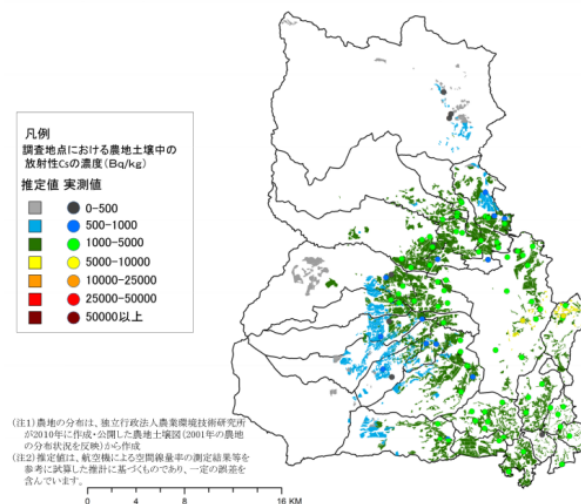
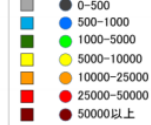


福島市 農地土壌の放射性物質濃度分布図

Fukushima City

凡例
調査地点における農地土壌中の
放射性Csの濃度 (Bq/kg)

推定値 実測値



Japan: Challenges of Soil Management

- To develop measures decreasing **environmental risks**, especially of climate change, nutrient imbalance, and contamination of radionuclides and heavy metal
- To sustain soil fertility and productivity in the systems of **environmentally-sound agricultural**
- To improve **soil information system** for public use
- To inherit soil knowledge to **the next generation**

Asia Soil Partnership (ASP)

- February 2012: A regional conference on soil information was held in Nanjing, China, and the participants signed [the Nanjing Communiqué](#) to establish the “Asian Soil Partnership” to support the vision and mission of the Global Soil Partnership.
- September 2012: An ad-hoc meeting of ASP was organized in Tsukuba, Japan, to define a road map that was consolidated through [the Tsukuba Statement](#).





風にきく 土にふれる
そしてはるかな時をおもい
環境をまもる

*Conserve the environment by listening to wind,
observing soil and thinking of our future*

