Fallow management alters plant species composition and soil carbon profile after cessation of cultivation

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Target

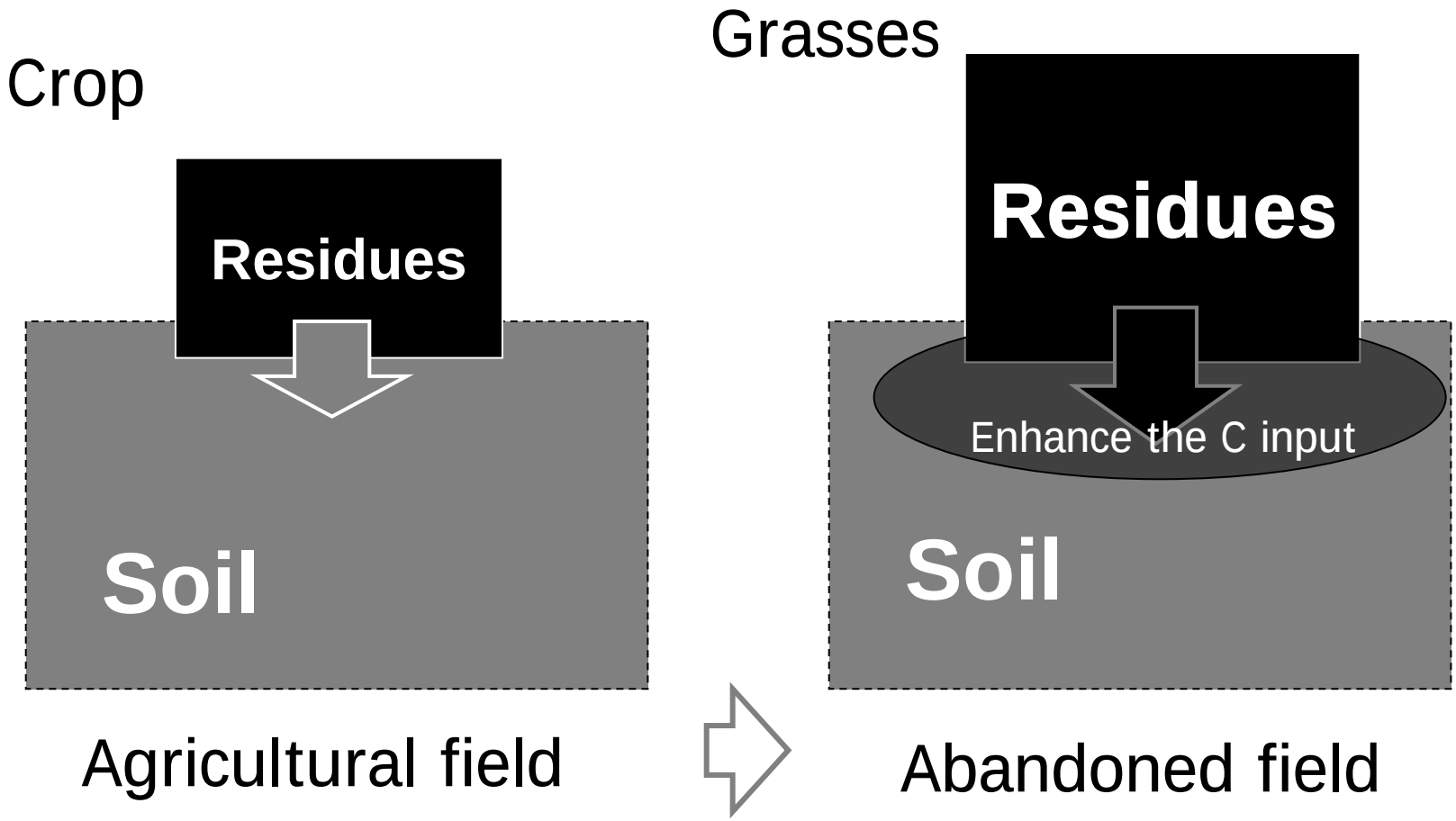
Agricultural field ⇨ Abandoned field

・Abandoned
・Fallow paddy fields
have recently increased

Some works have focused on
・Soil physical properties
・Vegetation coverage

→ Impact on soil C

Hypothesis

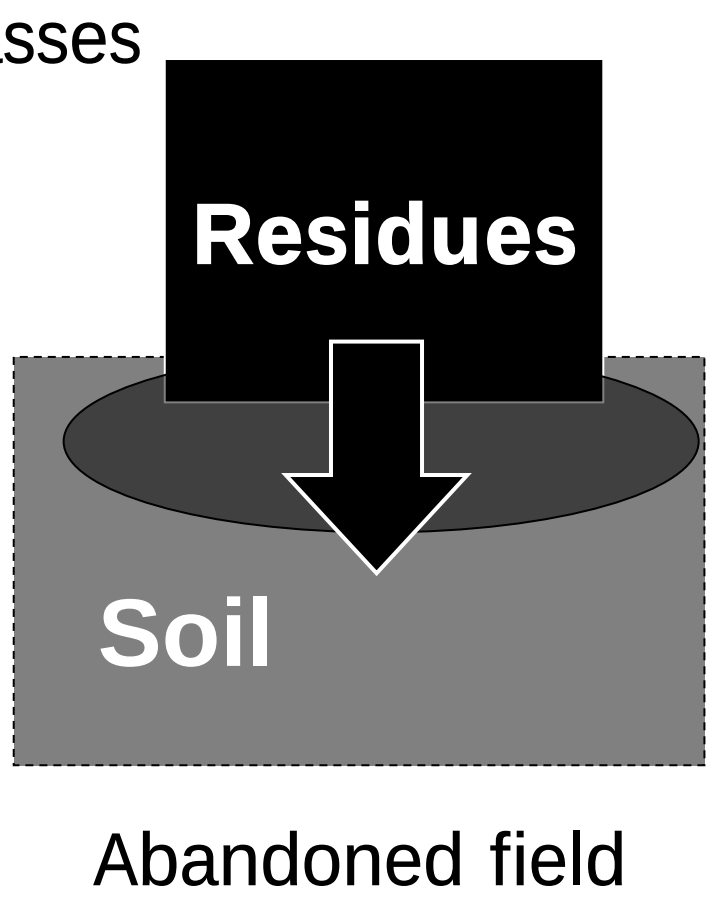

Crop
Residues
Soil
Agricultural field
Grasses
Residues
Enhance the C input
Soil
Abandoned field

Hypothesis

Key

1. Fallow management
2. Former agricultural cultivation

to estimating carbon sequestration ability



1. Fallow management

Mowing is one of advantage management schemes to avoid the succession from short grasses to tall grasses

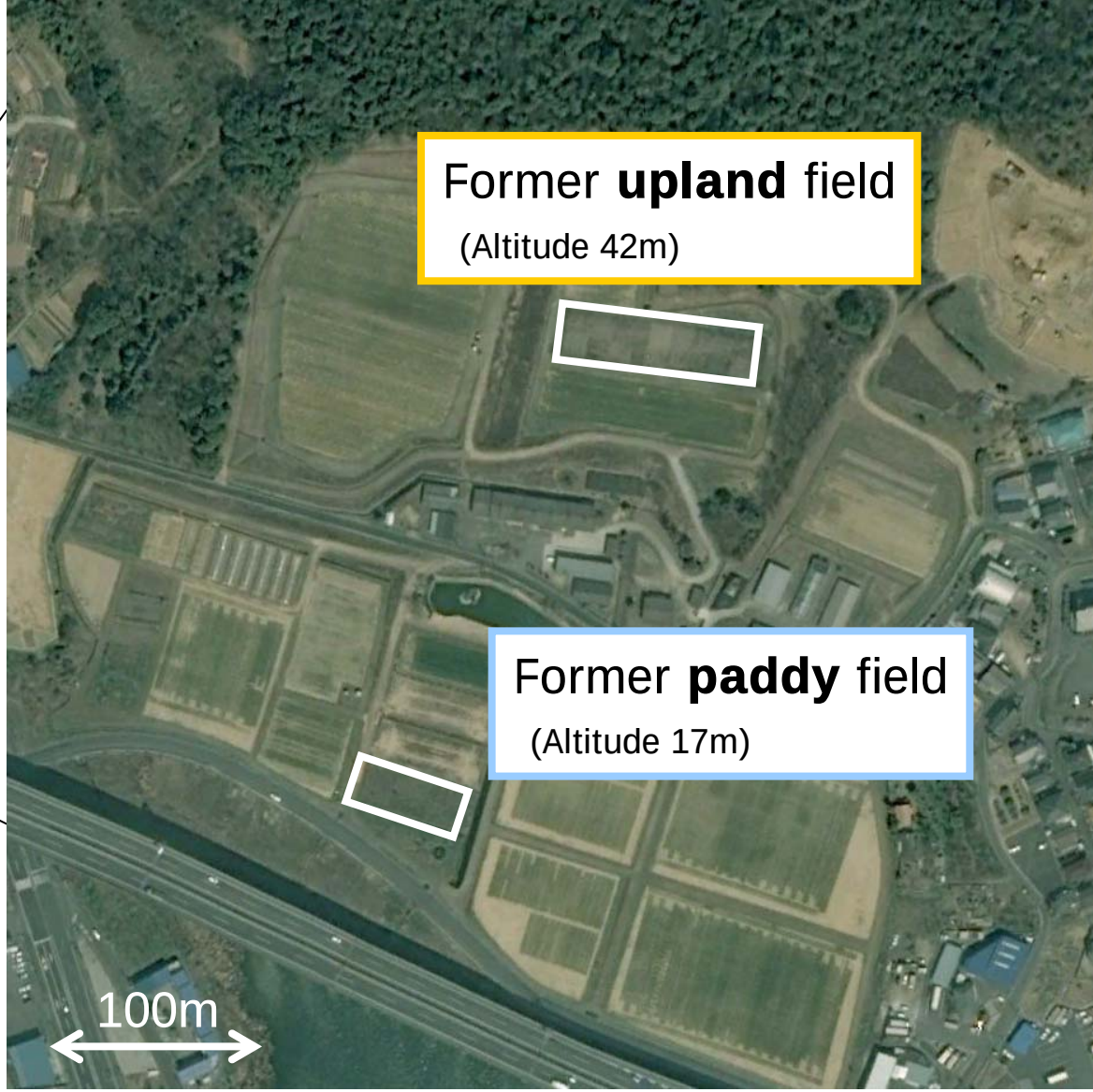
2. Former agricultural cultivation

Paddy

Upland

Site

at Fukuyama, Hiroshima, Japan
(34° 30′ N, 133° 23′ E)



Mean annual temperature was 15.7 ° C

annual precipitation was 942 mm
(from 2007 to 2009)

Design

20 experimental plots (～ January 2007)

- 10 plots in former paddy field
- 10 plots in former upland field

Mowing with

- Leaving residues on the ground (*n*=3)
- Removal of residues (*n*=3)
- Abandoned (*n*=4)

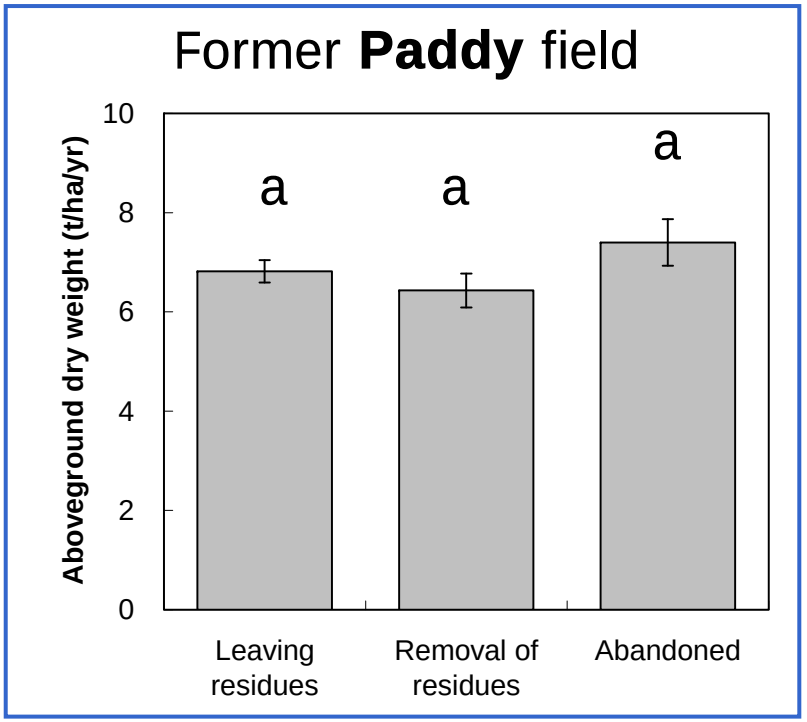


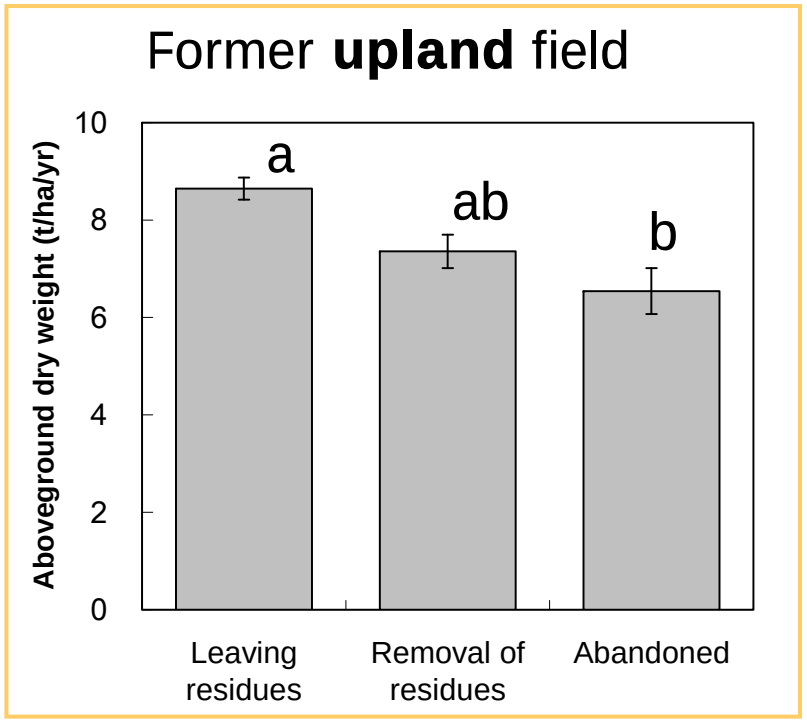
These include 4 permanent quadrads (1m × 1m) at a plot

Schedule

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
2006						**Rice**						
			Wheat				**Fallow crop (Sunflower)**					
2007	**Soil sampling**				Mowing			Mowing				Mowing
2008					Mowing			Mowing				Mowing
2009					Mowing			Mowing				Mowing
2010	**Soil sampling**											

Results 1. Aboveground dry weight





Fallow management

n.s.

Mowing with leaving residues plot has significant larger aboveground dry mass than abandoned plot.

Former cultivation

n.s.

Results 1. Aboveground (dominant species)

Former **Paddy** field

・Leaving residues
・Abandoned

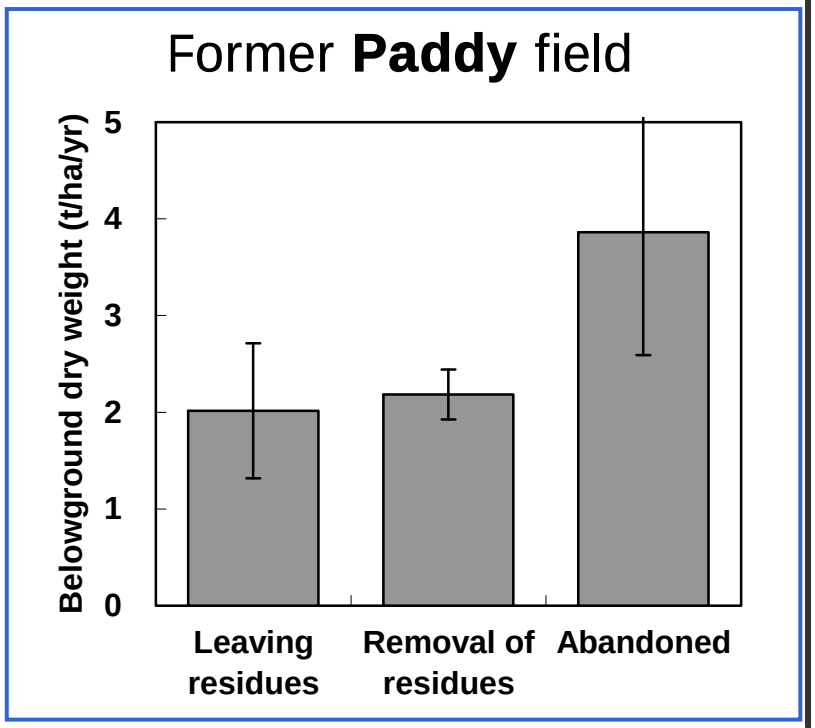
・Removal of residues

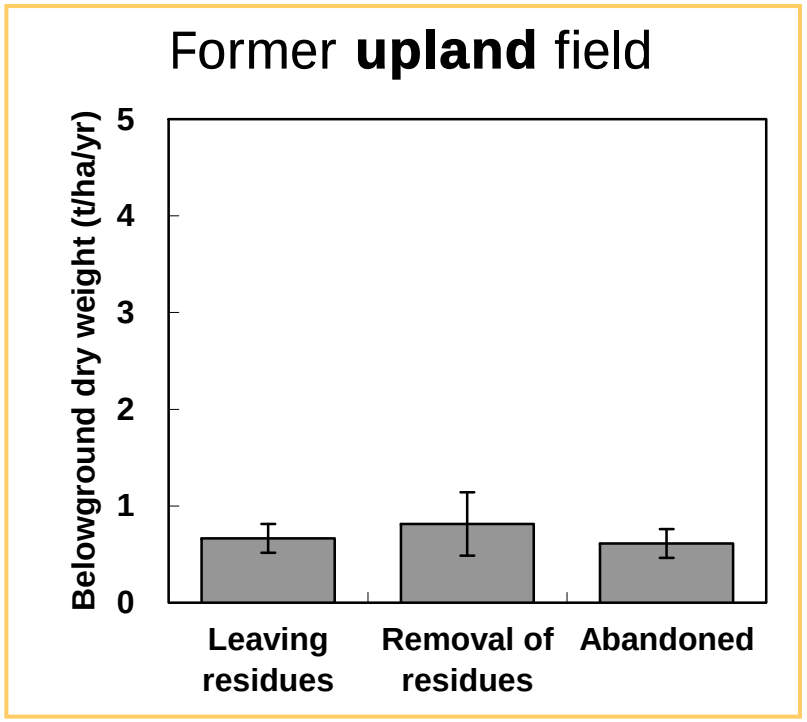
Former **upland** field

・Leaving residues
・Removal of residues

・Abandoned

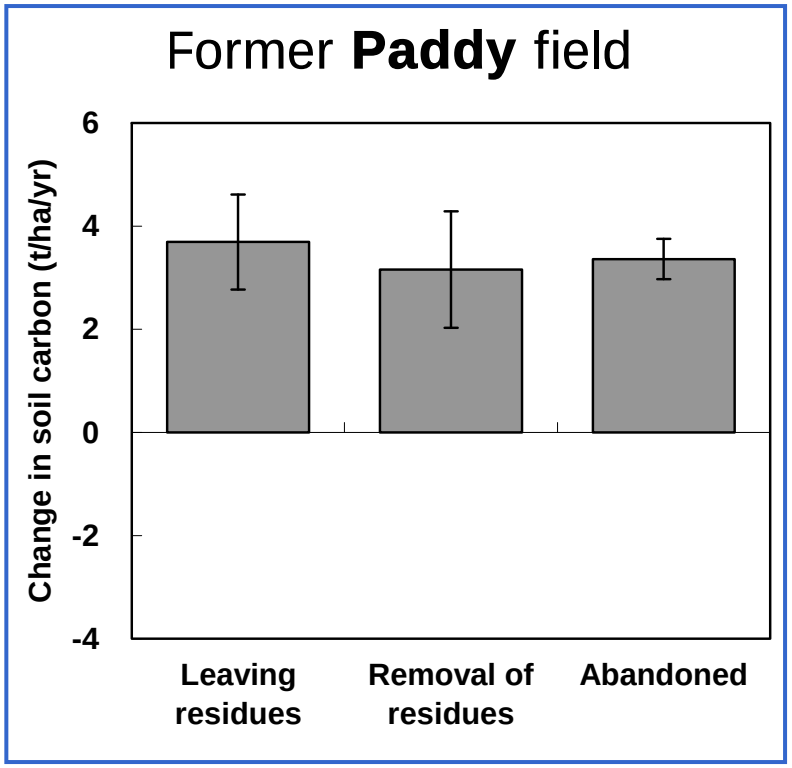
Results 2. Belowground dry weight (0-30cm)

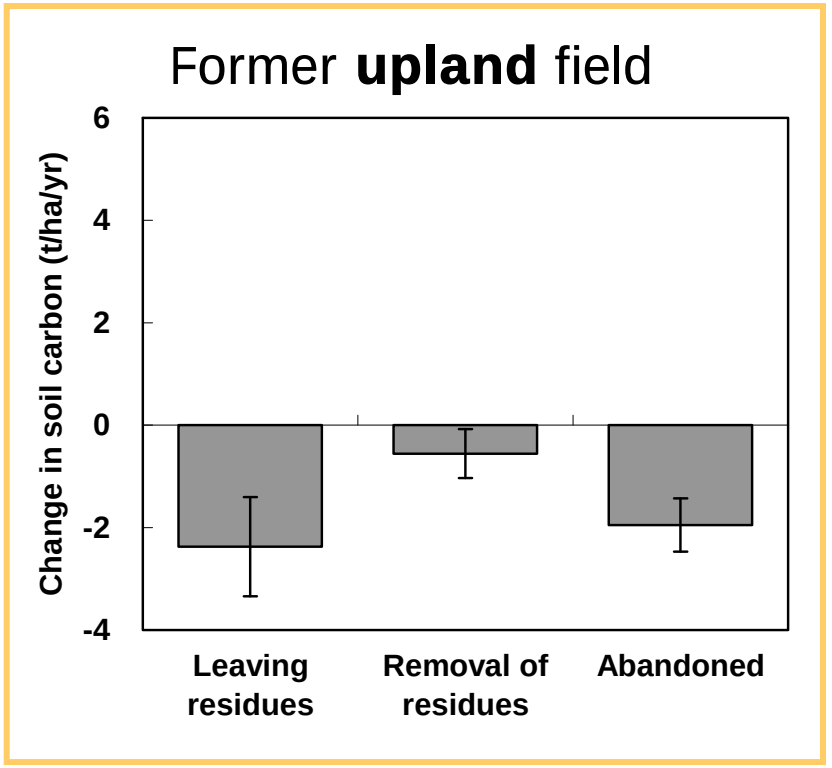




Fallow management	n.s.		n.s.
Former cultivation	Large	>	Small

Results 3. Soil carbon (0-30cm)





Fallow management	n.s.		n.s.
Former cultivation	Large	>	Small

Summary

- Aboveground residues did not effect to soil C
- Perennial grasses (their roots) contribute to soil C storage