

# Available Si in alluvial paddy soil

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Silica is a beneficial element for rice plants and is absorbed in large quantities during the crop season. Available soil Si (aSi) is derived from primary or clay minerals, organic matter, and sesquioxides. However, the most significant source of aSi in alluvial paddy soils is currently unknown.

## OBJECTIVE

To investigate the factors that determine soil aSi in alluvial paddy soils in the Shounai District of northeastern Japan.

## MATERIALS AND METHODS

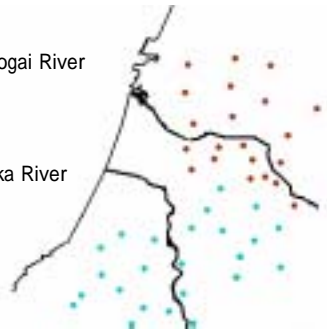


Fig. 1. Soil sampling locations.

- : Mogami River area
- : Aka River area

Table 1. Geology of the two streams.

Mogami River	tuff
Aka River	granit

**Soil samples** were collected from alluvial paddy fields formed by deposits from the two main rivers (Aka River and Mogami River) in the Shounai district (Fig.1).

**Soil treatments** : Six soils were treated by removing their organic matter (the -OM treatment) and their organic matter and free iron (the -OM -Fe treatment). There was also an untreated control (C).

**Soil analysis** : The amount of aSi was estimated using the anaerobic incubation method at 30 °C. We measured the soil particle-size distribution using the pipette method.

## RESULTS

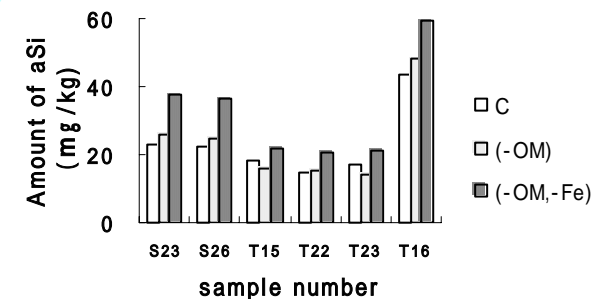


Fig. 2. Amount of aSi in the two soils: C, non-treated (control) soil, -OM, organic matter removed; and -OM -Fe, organic matter and free iron removed.

•The two treatments had little effect on the estimated amount of aSi in the soils.

Table 2. Correlation between soil aSi and the amounts of clay, silt, or sand.

	number of samples	clay	silt	sand
Mogami River	21	0.246	0.098	-0.208
Aka River	24	0.384	0.557**	-0.587**

•We found a significant correlation between the amount of aSi and the silt or sand content in the Aka River soils, whereas no such relationship was observed in the Mogami River soils.

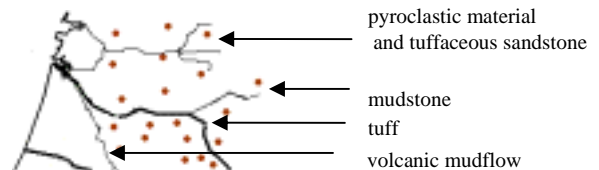


Fig. 3. Geology upstream of some rivers in the Mogami River area.

## SUMMARY

Primary and clay minerals appear to be the most significant source of aSi in the alluvial paddy soils of the Shounai District (Fig.2). The difference between the soils produced by the two rivers might have been caused by the greater complexity of the geology upstream of the Mogami River basin (Table 2 and Fig. 3).



The origin of the aSi in these paddy soils depended on the geology of the river that was responsible for their creation