

# Effect of chemical treatment on mineralization of C and N in Andosols rich in Al-humus complexes

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journal or publication title	Journal of Integrated Field Science
volume	9
page range	115-116
year	2012-03
URL	<a href="http://hdl.handle.net/10097/54472">http://hdl.handle.net/10097/54472</a>

cubation at 25°C.

Most of the plant growth-inhibiting compounds in garbage AC were collected with three extractions using a mixture of methanol: chloroform: water = 2:1:0.8. The hypocotyl and radicle elongations of lettuce were severely inhibited with the extracted materials from AC, but the extracts from the law material had no activity on plant growth inhibition. This result suggests that the inhibition activity of AC is attributed to the compounds produced or modified during the composting process. The extracts were subjected to reverse-phase column chromatography on C18-coated silica gel and the major activity was fractionated into the Hexane-EtOAc (6:4) eluted fraction. The active fraction was then subjected to preparative HPLC and active compound was isolated at 2.4 min in retention time. We are currently promoting the identification of the inhibitory compound.

### **References**

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## **Effect of chemical treatment on mineralization of C and N in Andosols rich in Al-humus complexes**

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Andosols accumulate soil organic matter (SOM) in large amounts mainly due to stabilization of SOC by formation of Al-humus complexes, low soil pH and high Al toxicity. In this study, we changed these factors by chemical treatments and investigated their effects on mineralization of C and N.

We used three soil samples: Mukaiyama A1, Mukaiyama 3A3 (Miyagi Prefecture), and Utsunomiya (Tochigi Prefecture). Soils were treated with chemical reagents such as CaCO<sub>3</sub> (increasing soil pH and decreasing soluble Al), KH<sub>2</sub>PO<sub>4</sub> (decreasing soluble Al with minimum change of soil pH), and H<sub>2</sub>SO<sub>4</sub> (decreasing soil pH and increasing soluble Al). For measurement of soil respiration, we put fresh soils (30 g dry soil equivalent) into conical flasks (500 mL) and incubated the soil samples under lighting condition (25°C) and dark condition (16°C). Then we flew fresh air to flasks and sealed them for 1 h. The concentration of CO<sub>2</sub> in the flasks was measured by IR spectroscopy. For inorganic N measurement, we put fresh soils (150 g dry soil equivalent) into plastic pot (500 mL) and incubated them under dark condition (30°C). Inorganic N (ammonium N plus nitrate N) was periodically measured. We extracted soil DNA from soil samples and investigated microbial community by PCR-denaturing gradient gel electrophoresis with specific 16S rDNA.

The CaCO<sub>3</sub> treatment increased soil respiration in all the soil samples. This was considered to be due to the increase in soil pH and the decrease in soluble Al. The apparent soil respiration may include CO<sub>2</sub> derived from CaCO<sub>3</sub>. The CaCO<sub>3</sub> treatment did not increase amounts of inorganic N as compared to control. In Mukaiyama A1 soil, the treatment even decreased mineralization of N, suggesting the intense immobilization of N. The KH<sub>2</sub>PO<sub>4</sub> treatment largely increased soil respiration and N mineralization in all the soils. This may be due to solubilization of soil organic matter in addition to the decrease of Al toxicity. While the H<sub>2</sub>SO<sub>4</sub> treatment decreased the amounts of soil respiration and N mineralization in Mukaiyama A1 soil, this treatment did not affect in other soils. In comparison among the three soil samples, the amounts of soil respiration and N mineralization of Mukaiyama

3A3 soil were much lower than those of the others. This was possibly due to the lower content of decomposable organic matter because the soil sample was derived from a buried humus horizon. Results of analysis of microbial community indicated that the  $\text{KH}_2\text{PO}_4$  and  $\text{H}_2\text{SO}_4$  treatments remarkably changed soil microflora.

## **Andosols-Cambisols sequence on the Ohira Hills in central Miyagi Prefecture, northeastern Japan**

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Andosols often accumulate a large amount of humus, and contribute to the soil carbon storage. Brown forest soils, accounted for 53% of the land in Japan, consist mainly of cambisols, but include some Andosols and Cambisols with inadequate andic properties. They could form the transition of Cambisols to Andosols as to the expression of andic characters. In the present study, the soil of the Ohira Hills located on the east edge of Andosols area in the central Miyagi Prefecture was investigated to examine the distribution of Andosols and Cambisols with andic characters.

**Materials and Methods:** Soil samples: Soil samples were taken at two points of the ridge and slope areas and one point of foot area on the Ohira Hills in the Miyagi Prefectural Forestry Technology Institute (Ohira-mura, Kurokawa-gun) . Soil analysis: Al, Fe and Si extracted by ammonium oxalate, Al and Fe extracted by sodium pyrophosphate, phosphate absorption coefficient, P retention, pH(NaF), bulk density, volcanic glasses content.

Soil classification: Unified Soil Classification System of Japan-2nd Approximation(2002)- and World reference base for soil resources 2006 (WRB 2006) .

**Results and Discussion:** Andic characters at the soil profiles of ridge and foot areas well developed near surface horizons and gradually decreased with depth. On the other hand, those of slope area weakly developed at all horizons. These suggest that the immixture of volcanic ash on the parent material of the study sites was comparatively small and depending on the topographical features. Although the soil profiles of ridge and foot areas showed Andosols-like characteristics, they were classified as Cambisols or Regosols due to the inadequacy of the horizon thickness with andic or vitric properties. The soil profiles of slope area were classified as Cambisols with weak andic characters. Despite the nonexistence of Andosols in the study sites, the soils of the Ohira Hills would be a part of Andosols-Cambisols sequence which includes Cambisols with various degree of andic characters as a function of topographic factor.

## **Studies on faint podzolization observed in the Andosols around Kuanuma on the eastern footslope of Funagata Volcano in Midwestern Miyagi Prefecture, Japan**

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**[Introduction]** Close distribution of Ando soils, Brown forest soils, and Podzolic soils is shown in the soil map in National Land Survey around Kuanuma in Taiwa-cho, Kurokawa-gun, Miyagi prefecture. Various soils