Soil-forming Factors of Andosols after the Kikai-Akahoya Eruption in Takeshima, Kagoshima, Japan: From Relations with the Pleioblastus Linearis Community

Yudzuru INOUE*+, Shinji SUGIYAMA**+, Hisashi OIWANE***, Toshiro YAMANAKA****
and Chitoshi MIZOTA****

[Received 29 April, 2017; Accepted 4 April, 2018]

Abstract

The age when initiation of Pleioblastus linearis (bamboo) community formation with Andosols was initiated and diagnostic properties of Andosols after the ca. 7.3 cal ka BP Kikai-Akahoya (K-Ah) eruption are examined in Takeshima, Mishima Village, Kagoshima, Japan. Takeshima forms the northern rim of the Kikai caldera. It fulfills the effective growth conditions (bio-climatic conditions in humid subtropics: Cfa, and geomorphological conditions through its location on undulating terrain) for the bamboo community. Vegetation succession does not progress because lucidophyllous forest vegetation cannot invade due to the high-density roots of the bamboo community, and is also inhibited by the influence of volcanic gases (mainly SO2). Accordingly, bio-mass derived from bamboo (Pleioblastus linearis) becomes the main source of humus for Andosols formation, and the genesis of Andosols is thereby sustained in Takeshima. Takeshima is near the eruption source vent of K-Ah tephra, which includes abundant volcanic glass, the main parent material of Andosols, needed to hold humus. That is, active forms of Si, Al, and Fe, which result from the weathering of volcanic glass, retain the humus that derives from bamboo (Pleioblastus linearis). As a result, allophanic Andosols are formed in Takeshima; they have silandic properties (SiO2 content of ≥ 60 g kg⁻¹ or Alp/Alo of < 0.5) that meet the requirements for Andosols. Macro-charcoal particles (> 500 µm) are hardly detected in the humic horizon of Takeshima. This low presence indicates that burning was not carried out to maintain the grass (bamboo) vegetation (Pleioblastus linearis). Past vegetation in Takeshima is estimated using a phytolith analysis of samples postdating the K-Ah eruption; the bamboo (Pleioblastus sect. Nipponocalamus type) gradually increased until the present. This trend indicates that the bamboo community successfully outcompeted lucidophyllous forest vegetation and bamboo was sustained in the vegetation community for a long period.
Key words: Andosols, Kikai-Akahoya tephra, phytolith, Pleioblastus linearis, humus
キーワード：黒ボク土、鬼界アカホヤテフラ、植物珪酸体、リュウキュウチク、腐植