



Acid fog deposition and the declining forest in Tanzawa mountains, Japan.

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Since 1988, we have investigated fog chemistry in Mt. Oyama, Tanzawa mountains, Japan, and acid fog has been frequently observed there. We have observed fog on Mt. Oyama by using a night view video camera placed at the base of the mountain, by using a visibility meter at the top of the mountain, and by an active fog sampler at the mountainside. We have reported the fog frequency at the top of Mt. Oyama to be 46% measured by the video camera, but it was overestimated. The visibility measured at the top of the mountain is the most reliable index, and the top of the mountain is covered with fog for about 30%. The frequency of about 15% was added for the case of the visibility of a few km when it was measured by a night view video camera placed at the base of the mountain (8.5 km far from the top). Fog-water deposition increases with the increasing altitude to be much larger than the rain-water deposition. The factors affecting on the occult precipitation intensity were investigated by the simultaneous measurement of the rainfall intensity under a canopy, the wind speed and direction, and the visibility at the top of the mountain. Air pollution has been improved recently in Japan, but acid fog is not improved and has been affecting the leaves of the trees. In Tanzawa mountains, many fir trees and beech trees are declining, while cedar trees show no decline symptoms. We have investigated the effect of acid fog on the trees of these species by exposing simulated acid fog on the seedlings of the species. Seedlings of fir and beech are much damaged by the long term exposure of pH 3 fog, while cedar seedlings are not affected by the acid fog. By the exposure of simulated acid fog, the epicuticle wax is eroded at first, then the cross linking polycation between sugar chains of cell wall is ion-exchanged with proton and the cell wall is swollen, and the membrane calcium is desorbed from the membrane, which lowers the tolerance of the trees to the climate change. Fir and beech trees in Tanzawa mountains are damaged by acid fog, although ozone also affects them additively.