Measurement of roadside air pollution with a biomonitoring method

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Abstract

Though air pollution due to atmospheric particulate matter has been a serious problem in Japan, it is difficult to measure atmospheric particulate matter in widely roadside areas with the limited number of the stations. Therefore we focused on biomonitoring technique with ginkgo leaves. Ginkgo leaves were collected along major arteria roads in spring, summer and autumn in 2014 and 2015. The particles retained on leaves were removed by ultrasonic cleaning into ethanol solution. The ethanol solution including particles was suctioned by an aspirator. Particles were collected on PTFE filter. Particles on filter were quantified by Particle Induced X-ray Emission (PIXE) analysis. The total mass and the traffic-related element mass (Fe、Al、Cr and V) on leaves increased in turn on autumn, summer and spring. It suggested that atmospheric particulate matter accumulated on leaves day by day. The weight percentile of elements of both road and brake wear dust were nearly equal to those of particles on leaves in all seasons and at all locations except for Zn. The weight percentile of elements of particle on leaves were nearly equal to those of SPM measured by roadside monitoring station except for Na and Pb, which were relatively smaller than those in SPM. Though some uncertainties should be solved, these results suggested that biomonitoring technique is the effective method to assess roadside air pollution.