

Effects of Open-top Chamber on Soil Oribatid Mites (Acari:Oribatida) at Mt. Kisokomagatake

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INTRODUCTION

Forest limit ecosystem on high mountains was one of the most vulnerable ecosystems against global warming. We investigated effects of artificial warming using an open-top chamber on forest limit ecosystem (2600m in elevation) of Mt. Kiso-komagatake, Chuo-alps, Nagano, central of Japan. Oribatid mites were useful environmental bio-indicator because they distribute most of all terrestrial soil habitats. Therefore, oribatid fauna were compared between artificial warming sites and control site in the study area. We investigate vertical distribution concerned with elevation of oribatid fauna from 2600m to 1250m. On the other hand, Mortality of oribatid species was investigated under different temperature in incubator.

METHOD

Research sites of vertical distribution were established at 1250m, 1700m, 1900m and 2100m above sea level in Nishikoma Station of Shinshu University. We selected two plots (coniferous forest and broad leaved forest) in each elevation site. Five soil samples were randomly corrected using core sampler (100cc) 5cm depth on 26 July 2012. Oribatid mites were corrected using the Tullgren funnel on same day. Additionally, two soil samples (about 400cc) were corrected at 1250m, 1400m, 1700m, 1800m, 1900m, 2000m, 2100m, 2200m and 2600m above sea level on 28 Aug. 2012.

Nine open-top-chambers (1m X 1m, about 2m in height) were established at 2650m above sea level near Mt. Shogigasira. Two soil samples (100cc, 5cm depth) were corrected using core sampler from each open-top-chamber on 20 Sept. 2013. Also two soil samples were corrected from control site close to each open-top-chamber. Two soil samples were set on one Tullgren funnel in laboratory on same day.

Soil samples (about 5000cc) were corrected from 2100m and 1250m above sea level in Nishikoma station of Shinshu University on 17 July 2013 and each soil sample was softly stirred by hand in laboratory and was divided in 15 nonwoven fabric bags (400cc). Each bag was set in unglazed pottery (11cm in diameter). Five potteries were incubated in incubator under 10 degrees centigrade, 20 degrees centigrade and 30 degrees centigrade from 17 July to 12 Aug. 2013.

RESULTS and DISCUSSION

Results of investigation of vertical distribution show that *Cyrtozetes* sp., *Tectocepheus velatus* and *Phthiracarus japonicus* positively increased their population densities correlated with elevation, and especially, *Cyrtozetes* was only found upper from 1900m above sea level.

Results of comparative study using the open-top-chamber show that *Cyrtozetes* and *Phthiracarus* in the open-top-chamber were significantly decreased instead of *Ghilarobizetes* significantly increased.

These results suggest that *Cyrtozetes* and *Phthiracarus* are good indicators for global warming monitoring in high mountain ecosystem.

On the other hand, mortality rate of *Cyrtozetes* and *Phthiracarus* were not affected by temperature from result of incubation one month after. The reason of no affection of temperature on *Cyrtozetes* is probably its long life cycle. More studies will be needed about it.

Keywords: oribatid mites, vertical distribution, global warming, bio-indicator, *Cyrtozetes*