

A Comparative Study on the Habitat of *Abies koreana* WILSON between Mt. Jiri and Mt. Halla

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Abstract

This examination of vegetation is conducted from June to Oct. 1999 through on the spot survey, centering on the habitat of *Abies koreana* around Imgeolryeong, Jangteomok, and Jeseokbong in Mt. Jiri and Yeongsil path and Seongpanak path in Mt. Halla. Species composition tables of the *Abies koreana* community by altitude and slope in Mt. Jiri and Mt. Halla are made based on the community composition tables examined in quadrat. The *Abies koreana*-*Saso quelpaertensis* community in a west slope of Mt. Halla is found that *Abies koreana* of 4-6m in height forms subtree layer and that of 8-9m in height the tree layer and it reflects a difference between community structure by slope and main composition species. While the tree layer of *Abies koreana* community is 12-14 in height around the area of 1, 290-1, 560m above the sea of Imgeolryong and path from Baekmudong to Jangteomok, it is 8-12m in height in the area of 1, 680-1, 780m above the sea of path from Jangteomok to Jeseokbong. It means that community structure depends on area and attitude. This study finds out that commonly appearing composition species similar to coverage and presence are *Lepisorus*

thunberianus, *Quercus mongolica*, *Solidago virga-aurea* var. *asiatica*, *Ligularia fischeri*, *Carex lanceolata*, *Clintonia udensis*, *Magnolia sieboldii*, *Betula ermani*, *Acer pseudo-sieboldianum*. As soil environment of surveyed area, pH of surveyed spots is similar in Mt. Jiri and Mt. Halla, electrical conductivity is higher in Mt. Jiri, and contents of organic matter is relatively higher in a west slope of Mt. Jiri and Mt. Halla and lower in their south and west slopes. Contents of organic matter and total nitrogen show that the area of 1,550m above the sea in a west slope of Mt. Halla is some higher. For pH and contents of total nitrogen and organic matter, Mt. Halla is higher than Mt. Jiri but for electrical conductivity, Mt. Jiri is relatively higher than Mt. Halla.

Key words : *Abies koreana*, community, vegetation, habitat

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Introduction

Mt. Halla, standing at the southernmost of the Korean Peninsular, attracts world's attention ecologically because it plays the role of bridge connecting the Japanese Islands and Eurasia, occupies a very important ground biogeographically, and has a clear vertical distribution and various species(Kang et al, 1997). In particular, the *Abies koreana* community in Mt. Halla is a very valuable natural resource, which extended to southernmost Cheju-do in a glacial epoch about 20,000 years ago and were selected mostly but some of the top owing to a rise in temperature. Also *Abies koreana* are the only endemic species to Korea, distributed with limitation in a subalpine zone including Mt. Halla, Mt. Jiri, and Mt. Deokyu. They range over about 2,800ha in a subalpine zone of over 1,400m-1,500m above the sea in Mt. Halla and dominate around

Cheonwangbong and Banyabong of Mt. Jiri.

However, *Abies koreana* lives a subalpine zone where environmental changes are great and decreases in number due to a climate change and environmental pollution. In addition, such many artificial interferences as climbers' exploration or building of hiking path make their disruption serious. For example, as hiking paths made of wood and stone were built or expanded in many spots and climbers visit frequently in Mt. Halla, the *Abies koreana* community increases in disturbance area. In Mt. Jiri, they were destroyed, with cutting down for strategy and timber in the past(before or after 1960s) and have been disturbed by wood fire recently. As you see, needle-leaf trees, including *Abies koreana* growing in a subalpine zone, are subject to be disturbed by dry, acid rain, wood fire, vermin, or the earth warm other than artificial interferences(Kanzaki and Yoda, 1986; Klein et al., 1991, Graumlich, 1991) and it reflects that once it is destroyed, it is very difficult to restore. The reason that the *Abies koreana* community in Mt. Halla is easily disturbed by artificial interferences is that its soil is geologically immature without coverage and it is characterized by easy erosion. Although the intensive study on characteristics of growing and plant movement of the *Abies koreana* community is required to protect the community in Mt Halla of a subalpine zone, such a study is nil. Accordingly, this study is aimed at finding out environmental factors of soil and vegetation distribution of the *Abies koreana* community in Mt. Halla, at comparing it with that of Mt. Jiri and analyzing, and at providing valuable basic materials for protecting ecosystem of Korean subalpine zone as well as the *Abies koreana* community and for restoring rare plants.

Methods of Research

This examination of vegetation is conducted from June to October 1999 through on the spot survey, centering on the habitat of *Abies koreana* around Imgeolryeong, Jangteomok, and Jeseokbong in Mt Jiri and Yeongsil path and

Seongpanak path in Mt. Halla. In this study, plants of vascular plants were collected and classified them based on documents such as Lee(1990), Ohwi(1984), etc. The research for growth of plants were carried out by selecting the uniform places with conditions of community location and installing the sample region. By the method of Braun-Blanquet(1964), dominance and sociability of all species and each companions are as follows :(a) Deciding the conditions of location, (b) Recording height and coverage in species and each layer, according to the hierarchy structure of community (Tree layer, Subtree layer, shrub layer, herb layer), (c) Measuring quantity and living conditions regarding comparisons species of the each hierarchy. We expressed the quantity as 7 grades of dominance regarding species putting coverage and number of species together, and the living conditions as 5 grades of sociability. The above research for growth of plants chose the vegetation unit of character species of community according to tabulation technique(Ellenberg, 1956) and made the vegetation table by classification of community.

For soil environment, soil is brought from surveyed spots of vegetation. Drying in the shade soil mixed with distilled water in the ratio of 1:5(w/w) boils for 30 minutes and filtered to measure pH and electrical conductivity of soil, using pH meter(Orin ionalyzer 407A) and conductivity meter(YSI 33) respectively. To measure salinity, drying in the shade soil rubbed by hand is put through a sieve of 1mm and it is mixed with distilled water in the ratio of 1:5(w/w). After boiling for 30 minutes, it is filtered and measured by YSI and UPG 6000. Organic matter contents is obtained from calculation of difference in ignition loss(D) burning for 5 hours in 550°C of electric furnace, after weight(W) of soil dried for 48 hours in 105°C is found. $O \cdot M(\%) = [(W-D)/W] \times 100$, (Total nitrogen contents are got with the micro-kjeldahl method).

Results and Discussion

1) Structure of Vegetation

Abies koreana, a endemic plant to Korea, is distributed around the top of Mt. Halla, Mt. Jiri, Mt. Deokyu, Mt. Gaya, and Mt. Meudeung(Cha, 1969). Studies on the *Abies koreana* community were conducted by Song and Naksnishi(1985), and Yim et al(1990) in Mt. Halla, by Park(1989) in Mt. Jiri, and Lee and Cho(1993) in Mt. Gaya. Because water, wind, sun, and temperature are different according to topography of mountain in the same region, kinds and growing state of plants depend on them(Cha, 1969).

Species composition tables of the *Abies koreana* community by altitude and slope in Mt. Jiri and Mt. Halla are made based on the community composition tables examined in quadrat(table 1, 2). Surveyed tables are completed by classifying community in order of presence based on its differential species rather than in association.