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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-Blanque(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 comparions 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℃ of electric furnace, after weight(W) of soil dried for 48 hours in 105℃ is found. O · M(%) = [(W-D)/W] × 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.

The *Abies koreana* community in Mt. Halla area

The *Abies koreana* community in Mt. Halla area is developed around west slope of Witsaeoreum(1,714m) and southwest slope of Manse Hill(1,604m), a northwest slope of Keundurewat and Bukseobyuk centering on the top(1,950m), and a fallout shelter(1,500m) in azalea field on Seongpanak Path and community structure and species composition show a unique vegetation owing to the difference in habitat environment between east and west slope. While Kim and Nam(1985) classifies the *Abies koreana* community in Mt. Halla into Saso quelpaertensis-Abies koreana association, Abies koreana association, and Quercus mongolica-Abies koreana association, Song and Naksnishi(1985), and Song(1991) divide it into Saso-Abietetum koreanae and suggest *Betula ermani, Thymus quinquecostatus, Adenophora coronopofolia, Primula modesta* var. *fauriae, Juniperus chinensis* var. *Sargentii, Empetrum nigrum* var. *japonicum, Potentilla matsumurae* as association character species. Lee(1990) considers *Lonicera maackii, Majanthemum bifolium, Saso quelpaertensis*, as character species, named the *Abies koreana* community in Mt. Halla Saso quelpaeratensi-Abitetum koreanae assoc. nov., and divides it into *Abies koreana, Betula ermani* var. *saitoana, Taxus cuspidata, Cacalia auriculata, Ligularia fischeri* as character species and differential species in upper unit.

The *Abies koreana* community distributed around west slope of 1,550~1,620m above the sea in Yeongsil Path, Mt. Halla and east slope of 1,600-1,700m above the sea in Seongpanak Path is comprised of the *Abies koreana-Saso quelpaertensis* community which is distinguished by *Abies koreana* and *Saso quelpaertensis*. Species composition of community is shown as Table 1. It is four layers structure and the tall tree zone is

8-9m in height. coverage indicates that the tree layer is 60~90%; the subtree layer 50~90%; the shrub layer 30~80% and the herbage zone 80~100%. Mean number

Table 1. Vegetation table of Abies koreana community in the Mt. Halla

Serial No.		1	2	3	4	5	6	7
Altitude(m)		1620	1600	1560	1550	1600	1650	1700
Slope aspect		W	WWN	WWS	W	E	E	NEE
Slope degree(0)		10	5	5	20	10	10	10
Quadrat size(m2)		100	100	100	50	100	100	100
Height of tree-1 layer(m)		-	-	-	-	8	9	8
Coverage of tree-1 layer(%)		-	-	-	-	60	80	90
Height of tree-2 layer(m)		5	6	6	4	5	6	6
Coverage of tree-2 layer(%)		90	80	80	90	60	80	50
Height of shrub layer(m)		2.0	2.5	2.0	2.0	2.0	2.0	2.0
Coverage of shrub layer(%)		80	50	50	50	30	70	70
Height of herb layer(m)		1.3	1.0	1.0	1.2	1.0	1.0	1.0
Coverage of herb layer(%)		90	80	95	100	100	90	90
Number of species		23	20	26	9	20	21	19
Differential species of community								
Abies koreana	T1:	.	.	.	.	4.4	4.4	4.4
	T2:	4.4	4.4	4.4	5.5	.	1.1	
Companions								
Taxus cuspidata	T2:	1.1	1.1	1.1	2.2	2.2	3.3	2.2
Sasa quelopaertensis	H:	3.3	3.3	1.1	5.5	3.3	3.3	4.4
Lepisorus thunbergianus	H:	1.1	1.1	1.1	.	2.2	2.2	1.1
Dryopteris crassirhizoma	H:	1.1	1.1	1.1	1.1	.	.	1.1
Quercus mongolica	T2:	.	.	.	.	.	1.1	1.2
	S:	.	1.1	.	.	1.1	.	.
Torreya nucifera	S:	1.1	.	.	1.1	1.1	1.1	1.1
Hydrongea petiolaris	S:	.	.	1.1	.	2.2	2.2	1.1
Symplocos coreana	S:	1.1	.	2.2	.	.	1.1	1.1
Lycopodium serratum	H:	1.1	1.1	1.1	.	.	.	1.1
Cacalia auriculata	H:	+	.	.	.	1.1	2.2	1.1
Sorbus commixta	T2:	.	+.1	1.1	.	1.2	2.2	.
Carex lanceolata	H:	1.1	.	1.1	.	1.1	1.1	.
Lycopodium chinense	H:	3.3	1.1	+	.		1.1	.
Asplenium incisum	H:	+	+	.	.	+	+	.
Asarum sieboldii	H:	+	1.1	+	.	+	.	.
Thalictrum filamentosum	H:		+	+	.	.	+	+
Calamagrostis arundinacea	H:	2.2	2.2	3.3	.	.	.	.
Ligularia fischeri	H:	1.1	1.1	.	.	1.1	.	.
Ilex crenata	S:	1.1	.	.	.	1.1	1.1	.
Cacalia auriculata var. kamtschatical	H:	.	1.1	.	+	.	.	+
Solidago virga-aurea var. asiatica	H:	.	+	+	.	.	+	.
Smilax sieboldii	H:	.	.	1.1	1.1	.	.	1.1
Betula ermani var. saitoana	T2:	1.1	+.2	.	.	.	.	.
Oxalis corniculata	H:	+	.	1.1	.	.	.	.
Viola variegata	H:	+	.	+	.	.	.	.
Rosa multiflora	S:	1.1	.	.	1.1	.	.	.
Carex humilis	H:	.	2.2	2.2	.	.	.	.
Betula ermani	T2:	.	1.2	.	.	.	.	1.1
Acer pseudo-sieboldianum	S:	.	.	1.1	.	.	.	1.1
Arisaema amurense var. serratum	H:	.	.	+	.	.	+	.
Clintonia udensis	H:	.	.	1.1	.	.	.	+

Magnolia sieboldii	T2:	.	.	1.1	.	.	.	1.1
Berberis amurensis	S:	.	.	1.1	2.2	.	.	.
Athyrium yocoscense	H:	.	.	.	.	1.1	.	2.2
Ligularia stenocephala	H:	.	.	.	.	+	1.1	.
Astilbe chinensis var. davidii	H:	.	.	.	.	+	+	.
Elaeagnus umbellata	S:	.	.	.	.	1.1	+	.
Disporum smilacinum	H:	1.1	.	.	.	.	.	.
Viola selkirkii	H:	1.1	.	.	.	.	.	.
Parthenocissus tricuspidata	H:	1.1	.	.	.	.	.	.
Juniperus chinensis var. sargentii	S:	.	+.1	.	.	.	.	.
Galium pusillum	H:	.	.	+	.	.	.	.
Lonicera sachalinensis	S:	.	.	3.3	.	.	.	.
Physocarpus insularis	S:	.	.	.	.	1.1	.	.
Gastrodia elata	H:	.	.	.	.	+	.	.
Mitchella undulata	H:	.	.	.	.	.	+	.

Serial No.; 1,2,3,4: Yongshil course of Mt. Halla,
5,6,7: Songpanak course of Mt. Halla

Table 2. Vegetation table of Abies koreana community in the Mt. Chiri

Serial No.	1	2	3	4	5	6	7	8	9
Altitude(m)	1320	1290	1550	1560	1680	1770	1780	1780	1740
Slope aspect	W	NNW	N	N	W	W	W	S	EEN
Slope degree( )	10	15	15	15	20	15	15	15	18
Quadrat size(m)	100	100	100	100	100	100	100	100	100
Height of tree-1 layer(m)	13	12	14	13	9	8	8	12	8
Coverage of tree-1 layer(%)	70	80	80	80	80	90	80	80	90
Height of tree-2 layer(m)	7	6	6	6	6	6	4	6	6
Coverage of tree-2 layer(%)	50	40	40	40	50	40	30	30	30
Height of shrub layer(m)	2.5	2.0	2.0	2.0	2.0	2.0	2.0	2.5	2.5
Coverage of shrub layer(%)	80	70	70	70	80	60	60	70	50
Height of herb layer(m)	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.5
Coverage of herb layer(%)	80	90	90	90	90	80	95	95	80
Number of species	32	25	30	31	34	27	15	17	14
Differential species of community									
Abies koreana	T1:	4.4	4.4	3.3	4.4	4.5	5.5	4.5	4.5	4.5
Companions										
Agrostis clavata	H:	.	.	1.1	2.2	4.4	4.4	5.5	4.4	4.4
Quercus mongolica	T1:	1.1	.	1.1	.	.	.	.	.	.
	T2:	1.1	1.1	.	.	+.1	1.1	.	.	+.1
	S:	1.1	1.1	1.1	.	.	.	.	.	.
Acer pseudo-sieboldianum	T2:	1.1	.	1.1	1.1	+.1	.	1.1	.	.
	S:	1.1	.	.	.	.	.	.	.	.
Actaea asiatica	H:	.	1.1	+	1.1	.	1.1	.	1.1	1.1
Pnus koraiensis	T1:	.	.	1.2	1.2	1.2	.	.	1.2	1.2
Rhododendron schlippenbachii	S:	.	.	1.1	.	2.2	3.3	3.3	1.1	.
Lepisorus thunbergianus	H:	.	.	1.1	1.1	+	1.1	1.1	.	.
Betula ermani	T2:	.	.	.	.	+.1	+.1	+.1	1.2	+.1
Arundinella hirta	H:	1.1	2.2	1.1	.	1.1	.	.	.	.
Carex lanceolata	H:	2.2	1.1	.	1.1	.	1.1	.	.	.
Poly stichum tripteron	H:	3.3	2.2	.	+	.	1.1	.	.	.
Saussurea seoulensis	H:	1.1	+	1.1	.	.	.	.	.	1.1

Hosta longipes	H	1.1	1.1	.	.	1.1	.	.	1.1	.
Thalictrum filamentosum	H:	1.1	+.1	.	.	.	+	.	+	.
Disporum smilacinum	H:	1.1	.	1.1	1.1	+	.	.	.	.
Aster scaber	H:	.	1.1	.	.	.	.	1.1	+	+
Sasa borealis	H:	.	2.2	4.4	1.1	1.1	.	.	.	.
Fraxinus sieboldiana	S:	.	1.1	1.1	1.1	1.1	.	.	.	.
Rhododendron mucronulatum var. ciliatum	S:	.	.	1.1	.	3.3	2.2	.	2.2	.
Solidago virga-aurea var. asiatica	H:	.	.	1.1	.	.	1.1	.	1.1	1.1
Ainsliaea acerifolia	H:	.	.	2.2	1.1	1.1	2.2	.	.	.
Tripterygium regelii	S:	.	.	.	.	1.1	1.1	1.2	1.1	.
Saussurea graciiis	H:	.	.	.	.	+	+	+	.	+
Symplocos chinensis for. pilosa	S:	1.1	1.1	1.1	.	.	.	.	.	.
Dryopteris bissetiana	H:	1.1	.	1.1	.	1.1	.	.	.	.
Callicarpa japonica	S:	2.2	1.1	.	1.1	.	.	.	.	.
Lysimachia clethroides	H:	1.1	2.2	.	.	+	.	.	.	.
Ligularia fischeri	H:	2.2	.	.	.	.	1.1	1.1	.	.
Dryopteris crassirhizoma	H:	.	2.2	.	1.1	1.1	.	.	.	.
Sedum polystichoides	H:	.	.	1.1	1.1	1.1	.	.	.	.
Magnolia sieboldii	T2:	.	.	1.1	1.1	1.1	.	.	.	.
Asarum sieboldii	H:	.	.	+	+	.	+	.	.	.
Synurus deltoides	H:	.	.	.	+	1.1	+	.	.	.
Dennstaedtia wilfordii	H:	.	.	.	3.3	1.1	.	.	.	1.1
Clintonia udensis	H:	.	.	.	1.1	.	1.1	.	2.2	.
Ligularia stenocephala	S:	.	.	.	.	1.1	.	1.1	1.1	.
Astilbe chinensis var. davidii	H:	.	.	.	.	+	+	+	.	.
Schizandra chinensis	S:	3.3	1.1	.	.	.	.	.	.	.
Persicaria perfoliata	H:	1.1	1.1	.	.	.	.	.	.	.
Polygonatum odoratum var. pluriflorum	H:	1.1	1.1	.	.	.	.	.	.	.
Philadelphus schrenckii	S:	1.1	1.1	.	.	.	.	.	.	.
Isodon japonicus	H:	1.1	.	+	.	.	.	.	.	.
Carex siderosticta	H:	1.1	.	1.1	.	.	.	.	.	.
Prumus sargentii	T1:	1.2	.	.	1.2	.	.	.	.	.
Stephanandra incisa	S:	1.1	.	.	.	1.1	.	.	.	.
Cephalotaxus koreana	S:	+.1	.	.	.	.	+	.	.	.
Sanguisorba hakusanensis	H:	.	1.1	1.1	.	.	.	.	.	.
Viola acuminata	H:	.	1.1	.	.	.	.	.	.	1.1
Lycopodium serratum	H:	.	.	1.1	1.1	.	.	.	.	.
Ampelopsis hetrophylla	S:	.	.	1.1	.	1.1	.	.	.	.
Fraxinus mandshurica	T2:	.	.	.	+.1	+.1	.	.	.	.
Euonymus macroptera	S:	.	.	.	1.1	1.1	.	.	.	.
Fraxinus rhynchophylla	T2:	.	.	.	+.1	.	+.1	.	.	.
Pedicularis resupinata	H:	.	.	.	+	.	.	+	.	.
Sorbus commixta	S:	.	.	.	.	1.1	1.1	.	.	.
Aralia elata	S:	.	.	.	.	.	1.1	.	1.1	.

Occurrence in one releve 1:Corylus heterophylla S: 1.1,Torreya nucifera T2:+.1,Hydrangen serrata for. acuminata S:1.1, Tilia taquetii T2: 1.1, Acer mono S: 1.1, Carpinus cordata T2: 1.1, Veronica rotunda var. subintegra H:+, Callicarpa mollis S: 1.1, 2:Corylus heterophylla var. thunbergii S: 1.1, Geranium nepalense subsp.thunbergii H: 1.1, Stewartia koreana S: 1.1, 3:Styrax obassia S: +.1, Rubus crataegifolius S: 1.1, Betula platyphylla var. japonica T2: +.1, Melampyrum roseum S: 1.1, 4:Platycarya strobilacea T1: +.1, Aconitum chiisanense H: 1.1, Enonymus sachlinensis S: +, Cacalia auriculata var.kamtschatica S: 1.1, Abies holophylla T2: +.1, 5:Crypsinus hastatus S: +, Orostachys sikokianus S: +, Acer ukurunduense T2: +.1, Bupleurum longiradiatum H: +, Rhododendron brachycarpum S: 1.1, 6:Dryopteris austriaca S: 1.1, Stellaria aquatica S: 1.1, Dioscorea batatas H: +, 7:Lactuca

triangulata S:+, Lycopodium chinense S: 1.1, 8:Picea jezoensis T2: +.1, Youngia* koidzumiana S: +, 9:Smilacina japonica S:+, Salix hulteni S: +.1

Serial No.; 1,2: Imgollong of Mt. Chiri,
3,4,5,6,7,8,9: Jangtemog and Jesekbong course of Mt. Chiri

of apperance species is 19.7 and *Abies koreana* show some high presence in the tree layer and *Abies koreana, Taxus cuspidata, Quercus mongolica, Sorbus commixta, Betula ermani* var. *saitoana, Betula ermani,* in the subtree layer, *Quercus mongolica, Torreya ncuifera, Hydrongea petiolaris, Symplocos coreana, Tlex crenata, Rosa multiflora, Acer pseudo-sieboldianum, Berberis amurensis* in the shrub layer, and *Saso quelpaertensis, Lepisorus thunbergianus, Drypteris crassirthizoma, Lycopodium serratum, Cacalia auriculata, Carex lanceolata, Lycopodium chinense, Asienium incisum, Asarum sieboldii, Thalictrum fillamentosum, Calamagrostis arumdinacea, Ligularia fischeri, Cacalia auriculata var. asiatica, Smilax sieboldii* in the herb layer. In community characteristics by slope, *Druopteris crassirgizoma, Lepisorus thunbergianus, Calamagrostis arundinacea, Lycopodium serratum, Lycopodium chinense, Asarum sieboldii, Symplocos coreana, Carex humilis, Smilax sieboldii, Ligularia fischeri, Torreya nucifera, Carex lanceolata, Berberis amurensis* displays relatively high presence in a west slope to Yeongsil Path and *Lepisorus thunbergianus, Hydringea petiolaris, Cacalia auriculate, Quercus mongolica, Sorbus commixta, Carex lanceolata, Sycopodium serratum, llex crenata, Athyrium yocoscense, Ligularia stenocepgala, Astilbe chinesis var. davidii, Elaeagnus umbellata, Asplenium incisum, Thalictrum filamentosum* around east slope to Seongpanak Path. 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. Especially, *Dryopteris crassirgizoma, Lycopodium serratum, Calamagrostis arundinacea, Lycopodium chinense, Carex humilis, Berberis amurensis are* referred to main community in a west slope and *Gydringea petiolaris, Cacalia auriculata, Athyrium tocoscense, Ligularia stenocephala, Astilbe chinensis* var. *davidii* in a east slope.

***Abies koreana* community in Mt. Jiri area**

Abies koreana of Mt. Jiri forms its community around Banyabong, Imgeoryeong, Dyaejiryeong, and Tokibong, located in a west slope of the main ridge, and in Yeongsinbong, Yeonhwabong, Jeseokbong, and Jungbong centering on Cheonwangbong and its growing state, structure, and composition species depend on area, altitude, and slope. In particular, in the high zone over 1,650m above the sea, its development is limited owing to the environmental differences in the habitat such as wind, temperature, moisture, and soil, so that allows it to have a unique vegetation. In Mt. Jiri, Park(1989) classifies *Abies koreana, Agrostis clavata, Pnus koraiensis, Lonicea sachalinloncera nakia, Athuroum vidalii, Betula ermani, Ries mximouwiczianumkom, Clemais koreana kom, Sorbus commixta, Malus baccata, Circaea alpina* around Banyabong into Agrosto-Abietetum koreanae association and into character species and differential species. Lim and Kim(1992) suggest that character species of Agrosto-Abietetum koreanae association is referred to *Abies koreana, Agrostis clavata, Caltha palustris* var. *membeanacea, Pedicularis resupinata, Rhododendron tschonskii max., Ainsliaea acerifolia, Astilbe chinensis var. devidii, Aconitum chiisanense.* Cho(1994) indicates that *Quercus mongolica, Acer pseudo-sieboldianum, Sorbus commixta, Betula ermani, Acer ukurunduense, Magnolia sieboldii, Acer*

tschonoskii var. *rubribers* shows relatively high presence as main composition species of the Abies koreana association in a north slope in Jeseokbong and Jangteomok.

The *Abies koreana* community distributed in the west and north-northwest of 1,290~1,320m above the sea of Imgeolyeong, in north and west slopes of 1,550-1680m above the sea of path from Bakmudng to Jangteomok, and in west, south, and north-east-east slopes of 1,740-1,780m above the sea of path from Jangteomok to Jeseokbong forms the *Abies koreana-Agrostis clavata* community, distinguished by *Abies koreana* and *Agrostis clavata.* Its composition table is shown as Table 2 and structure includes four stories. Height of the tree layer is 8-14m and its coverage is 70-90%; the subtree layer's 30-50%; the shrub layer's 50-80% and the herb layer's 80~95%. Mean number of presence species is 25 and *Abies koreana* shows relatively high *Abies koreana, Quercus mongolica, Pinus koraiensis, Prunus sargentii* in the tree layer, *Abies koreana, Quercus mongolica, Acer pseudo-sieboldianum, Betula ermani, Magnolia sieboldii, Fraxinus mandshurica, Raxinus rhunchophylla* in the subtree layer, *Abies koreana, Quercus mongolica, Acer pseudo-sieboldianum, Rhododendron schlippenbachii, Fraxinus sieboldiana, Rhododendron ucronulatum* var. *ciliatum, Tripterygium regelii, Callicarpa japonica, Schizndra chinensis, Philadelphus schrenckii, Stephanandra incisa, Euonymus macroptera, Sorbus commixta, Aralia elata* in the shrub layer, *Agrostis clavata, Actaea asiatica, Lepisorus thunbergianus, Arundinella hirta, Carex lanceolata, Polystichum tripteron, Saussurea seoulensis, Hosta longipes, Thalictru filmentosum, Disporum smilacinum, Aster scaber, Sasa borealis, Solidago virga-aurea* var. *Asiatica, Saussurea graciiis, Drypteris bissetiana, Lysimachia clethroides, Ligularia fischeri Sedum polystichoides, Dennstaedtia wilfordii, Ligularia stenocephala, Stmurus deltoides* in the herb layer.

In the community characteristics by slope, *Arudinella girta, Callicarpa japonica, Lysimachia clethroides, Schizandra chinensis, Hosta longipes, Thalictrum filametosum, Symplocos chinensis* for. *polosa, Polystichum tripteron,* has relatively high coverage and presence in west and north-northwest slopes of Imgeolryeong; *Agrostis clavata, Acer pseudo-sieboldianum, Pnus koraiensis, Lepisorus thunbergianus, Dosporum smilacinum, Sasa borealis, Fraxinus sieboldiana, Ainsloaea acerifolia, Sedum polystochoides, Megnolia sieboldii, Dennstaedtia wilfordii* in north and west slopes of path from Baekmudong to Jangteomok and *Agrostis clavata, Actaea asiatica, Pnus koraiensis, Rhododendron schlippenbachii, Lepisorus thunbergianus, Betula ermani, Rhododendron mucronulatum* var. *ciliatum, Ainsliaea aceriforlia, Saussurea graciiis, Clintonia udensis* around west, south, and north-east-east slopes of path from Jangteomok and Jeseokbong. 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. Main community composition species of each slope include: *Arundinella girta, Carex lanceolata, Polystichum tripteron, Callicarpa japonica, Lysimachia clethroides, Schizandra chinensis* around Imgeolryeong; *Hydrangea petiolaris, Cacalia auriculata, Athyrium tocoscense, Ligularia stenocepgala, Astilbe chinensis* var. *davidii* in a east slope; *Agrostis clavata, Acer pseudo-sieboldianum, Pinus koraiensis, Lepisorus thunbergianus, Disporum smilacinum, Sasa borealis, Fraxinus sieboldiana, Ainsliaea acerifolia, Sedum polystichoides, Magnolia sieboldii, Dennstaedtia wilfordii, Rhododendron muconulatum* var. *ciliatum* in north and west slopes of path from Baekmudong to Jangteomok and *Agrostis clavata, Actaea asiatica, Rhododendron schlippenbachii, Betula ermani, Rhododendron*

mucronulatum var. *ciliatum, Solidago virga-aurea* var. *asiatica, Tripterygium regelii, Saussurea graciiis* in west, south, and north-east-east slopes of path from Jangteomok to Jeseokbong.

Comparison of the *Abies koreana* Communication between Mt. Halla and Mt. Jiri

As a result of this research, the *Abies koreana* communication distributed in Mt. Halla and Mt. Jiri depends on geography, altitude, and slope. 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 and that Sasa quelopaertensis, Dryopteris crassirhizoma, Torreya nucifera, Sorbus commoxta, Lycopodium serratum, Symplocos coreana, Cacalia auriculata, Hydrongea petiolaris, Lycopodium chinense, Calamagrostis arundinacea, Ilex crenata* shows relatively high presence in Mt. Halla and *Agrostis clavata, Actaea asiatica, Rhododendron schlippenbachii, arundonella hirta, Poly stichum tripteron, Hosta longipes, Thalictrum filamentosum, Disporum smilacinum, Sasa borealis, Fraxinus sieboldiana, Ainsliaea acerifolia, Tropterygium regelii, Saussurea graciiis* in Mt. Jiri. On the other hand, Yim and Kim(1992) suggest that upper character species of the *Abies koreana* communication is *Abies koreana, Taxus cuspidata, Pnus koraiensis, Betula platyphylla* var. *japonica, Abies holophy, Ligularia fischeri, Hosta capitata, Cacalia auriculata* var. *kamtschatica, Lychnys cognata* and it is classified into Saso quelpaertensi-Abitetum koreanae(Song and Nakanishi) corr. (Yim and Kim 1990), Agrosto-Abietetum koreanae(Park 1980), and Abietion koreana all. nov..

Soil Environment of the Habitat

As a result of measuring soil environment of surveyed area(Table3 and 4), pH ranges 3.58-3.94 and 3.56-423 in Mt. Jiri and Mt. Halla respectively and their means are 3.82 and 3.90 that reflects that Mt. Halla area is some higher. Electrical conductivity of Mt. Jiri and Mt. Halla measures 0, 144-0.199 and 0.002-0.009mmho/cm and their means are 0.617 and 0.004

Table. 3 Soil properties of Abies koreana community in Mt. Chiri.

Serial No.	1	2	3	4	5	6	7	8	9	average
Altitude(m)	1320	1290	1550	1560	1680	1770	1780	1780	1740	
Slope aspect	W	NNW	N	N	W	W	W	S	EEN	
pH	3.86	3.89	3.82	3.80	3.72	3.85	3.94	3.58	3.92	3.82
Cond.(mmho/cm)	0.175	0.174	0.148	0.199	0.157	0.164	0.162	0.144	0.183	0.167
T-N(mg/g dw)	0.95	1.37	0.75	1.29	2.50	1.25	1.40	0.87	1.42	1.31
Org.(%)	15.6	30.7	16.0	20.8	47.1	19.4	21.6	15.5	19.1	22.8

Table. 4 Soil properties of Abies koreana community in Mt. Halla

Serial No.	1	2	3	4	5	6	7	average
Altitude(m)	1620	1600	1560	1550	1600	1650	1700	
Slope aspect	W	WWN	WWS	W	E	E	NEE	
pH	4.03	3.75	3.90	3.85	3.56	4.23	4.00	3.90
Cond.(mmho/cm)	0.003	0.004	0.002	0.004	0.002	0.009	0.003	0.004
T-N(mg/g dw)	2.11	2.56	2.25	3.07	2.35	0.87	2.11	2.18
Org.(%)	43.0	36.6	53.3	72.8	66.4	34.9	38.8	49.4

mmho/cm that shows Mt. Jiri is relatively higher. Especially, a north slope of Mt. Jiri measures 0.148-0.199mmho/cm which is some higher than other surveyed spots. Contents of organic matter range 15.5-47.1 and 34.9-72.8% and their means are 22.8 and 49.4 in Mt. Jiri and Mt. Halla respectively. Total nitrogen contents vary 0.75-2.50mg/g and 0.87-3.07mg/g in Mt. Jiri and Mt. Halla each and their means are 1.31mg/g and 2.18 mg/g. Accordingly, 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.

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