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Ecological Characteristics of *Sorbus commixta* Hedl. Natural Populations in Mt. Chiri

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Abstract - In order to investigate the basic vegetation information for the efficient management of the *Sorbus commixta* habitat in Korea, 31 plots in Mt. Chiri area were selected of which vegetation types were classified in phytosociological method and ecological characteristics were identified. As a result, the habitat was classified as *S. commixta* community group which was then subdivided to *Prunus padus* group and *Picea jezoensis* group. *Prunus padus* group was classified in *Ainsliaea acerifolia* subgroup and Magnolia sieboldii subgroup, while the *Picea jezoensis* group was classified in *Rhododendron mucronulatum* subgroup and *Echinopanax horridum* subgroup. Thus, the forest vegetation of *S. commixta* was classified in 1 community, 2 groups and 4 subgroups, and found to have 4 vegetation units in total.

Key words - Vegetative structure, *Sorbus commixta*, Natual population, Constancy, Importance value

Introduction

Sorbus commixta usually appears in the mountainside of 500~1,200m height above the sea level and is widely distributed along the alps that constitute Baekdudaegan. The *Sorbus* plant has been used in a variety of purposes ranging from enjoyment, industry, ingredient of food and drug (Lee, 2006). The *Sorbus*, in the early stage of growth, grows better in the shade under big trees than under the sunshine as it tends to avoid strong sunlight. However, it has an ecological characteristic that grows the liking for sunshine as it becomes older. The *Sorbus* is a subtree that height grows to 6~8m and prefers moist soil. It is often observed that its leaves are burnt by strong sunlight in the coastal area. Due to its strong tolerance against the pollution, it is appropriate for enjoyment in urban houses or streets as it provides flowers, fruits and maples altogether. A pure white flower with a strong scent is blossomed in the size of 8~10mm diameter during May, which has enough honey to attract bees. Because the flower is blossomed during the period when other early spring flowers are almost faded, it may become a good source of honey. The *Sorbus* is getting more and more attention particularly because its honey is regarded to contain functional substances that are important to human body. As described, its habitats are restricted in the high mountain areas, the study on the process of formation, breeding environment, physiological and ecological studies, and genetic variation of this community are almost not investigated. Consequently, this study aimed to provide the basic data for the utilization of honey plant as a resource by analyzing the vegetation structures such as stand environment and vegetation density of *S. commixta* group, size of crowding, distribution of species, and similarity, comparing with the coexisting plant species, and identifying the characteristics of crowd structure of *S. commixta.*

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Materials and Methods

Plot setting

31 plots in Mt. Jiri area distributed by the *S. commixta* were selected. The distribution of *S. commixta* in each plot was classified according to the forest canopies of the upper layer that refers to the external physiognomy, and the forest stand that has relatively low artificial interference and good preservation of the *S. commixta* was selected among those areas. Then, the plot was installed in size of 10m × 10m (100㎡) and 31 plots were established.

Stand environment research of habitat

In order to identify the growth environment in *S. commixta* habitat, latitude, altitude, height above the sea level, aspect, relative location, local topography, slope, soil depth, and soil moisture were studied. The latitude, altitude and height above the sea level were measured in independent measurement by using GPS (Global

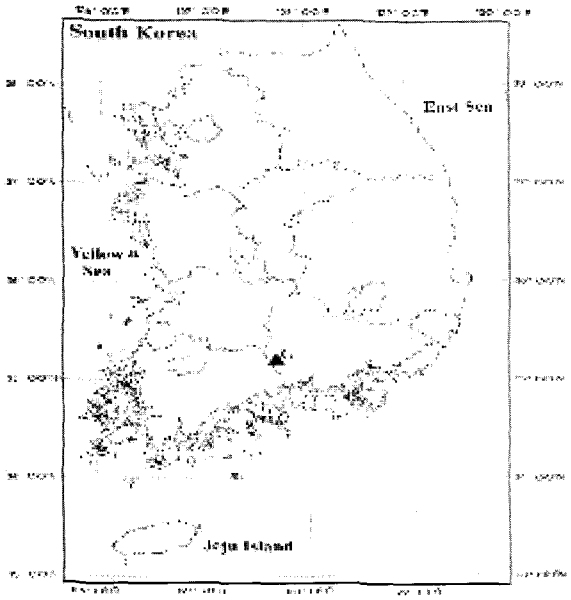

Fig. 1. Location map of vegetative investigation for *Sorbus commixta*. G: Mt. Chri.

Positioning System). The stand conditions of these areas were classified to the foot of hill, mountainside, and arbor, while the ground type was classified to concave area, convex area, and smooth area. The soil depth was classified to over 60cm, 31~60cm, and less than 30cm, while the soil moisture was classified to appropriate, dry and humid.

The 10 year data (Korea Meteorological Administration, 2006) measured from 1996 to 2005 by the most adjacent observatory was used as the climate of *S. commixta* habitat. For the soil analysis, 500g of soil sample was extracted from 15cm deep and the organic matter was removed to measure pH, T.N., O.M., P_2O_5, Ca, Mg, K, Na, and C.E.C. The soil sample and distilled water were mixed in 1:5 ratio to measure pH, while the chemical constituency was analyzed by the method of Allen *et al.* (1986), T.N by Micro-kjeldahl method, O.M by Tyurin method, P_2O_5 by Lancaster method, Ca^{++} and Mg^{++} by atomic absorption spectrome analysis, K^{+} by flame spectrome analysis and C.E.C. by Brown method.

Vegetation research

The vegetation research was conducted through site visit in October 2005 and February~December 2006. In consideration of the geographical and spatial characteristics of the *S. commixta* plants, a phytosociological method of ZM school was used to conduct the study on the 127 species found in 31 plots. Each plot was classified to upper layer (over 8m), middle layer (2~8m), and lower layer (less than 2m) to study the crown density by each layer. In order to identify the growth status and distribution of the constituent forest vegetations in the *S. commixta* habitat, the appearance frequency, e.g., Constancies of the entire copepods species and of a certain species in the plot were identified, and the constituent ratio by each constancy level was analyzed of which the scale was set to Ⅴ-R; Ⅴ>80%, Ⅳ>60-≤80%, Ⅲ>40-≤60%, Ⅱ >20-≤40%, Ⅰ >5-≤20%, R≤5%.

The woody plants that appear in each plot were classified to tree layer (over 8m), subtree layer (2~8m), and shrub layer (less than 2m) in order to study the coverage by layer. The number of individuals, height and diameter breast height were studied for the tree layer and subtree layer, while the number of individuals and coverage by the copepods species were studied for the shrub layer. Based on the result of vegetation research, the Relative Density (RD), Relative Coverage (RC), and Relative Frequency (RF) were calculated in order to identify the Importance Value (IV) of Curtis and McIntosh (1951) that indicates the importance of each species by vegetation layer.

The distribution type of major constituent species within the *S. commixta* habitat was analyzed by Morista's index according to the method of Brower & Zar (1977). The species diversity was analyzed by species diversity, evenness and dominance. The species diversity of Shannon (H') was introduced to the species diversity that shows the diversity of constituent species, while the maximum species diversity (Maximum H') that shows the maximum capability of the species diversity used H'max = log S (S is number of species). For the distribution of the number of individuals of the constituent species within the forest, e.g., the evenness (J'), the formula of J' = H' / H'max was used, while 1-J' was used for dominance. Also, the diversity Ds=1-λ of Simpson was used.

Results and Discussion

Stand environmental characteristics

In consideration of the height of the central area where the *S. commixta* are growing, the average monthly temperature was calculated according to the theory that the temperature decreases by 0.52℃ in average as the height above the sea level increases 100m in vertical. The result is shown in Table 1.

Assuming the period with average monthly temperature with over 10℃ as the growing period of the forest tree, the growing period in the area of Mt. Chiri was found to be a short period of 4

Table 1. The monthly mean temperatures at the different altitudinal and meterological data gradient in the Mt. Chiri

Districts	Altitude	Month (℃)											
	(m)	1	2	3	4	5	6	7	8	9	10	11	12
Mt. Chiri	1650	-8.9	-6.9	-2.1	4.3	9.3	13.4	16.8	17.4	12.2	6.0	-0.8	-6.8
Districts	Ann (℃)		Warmth index (℃)			Coldness index (℃)			Precipitation (mm)		Relative Humidity (%)		
Mt. Chiri	4.4		45.1			-51.2			1454.8		72		

months from June to September. The average height above the sea level of the researched land was very high in 1,650m, while the warmth index and the coldness index were low in about 45.1℃ and -51.2℃, respectively. The rainfall was 1,454.8mm and the relative humidity was high in 72%. The result of analyzing the chemical properties of the soil in the researched land is shown in Table 2. The soil acidity was 4.3 in average which indicates subacid that is higher than the average by syngenesis in Korea of 5.3~5.9. The organic matter, total nitrogen and positive ion exchange capacity were above the Korean average, while the available P was rather lower than other *S. commixta* habitats.

Ecological characteristics of *S. commixta*

As a result of classifying the 127 species of natural *S. commixta* in 31 plots by ZM phytosociological analysis method, the habitat was classified as *S. commixta* community which was then subdivided to *Prunus padus* group and *Picea jezoensis* group. *Prunus padus* group was classified in *Ainsliaea acerifolia* subgroup and *Magnolia sieboldii* subgroup, while the *Picea jezoensis* group was classified in *Rhododendron mucronulatum* subgroup and *Echinopanax horridum* subgroup. The forest vegetation of this *S. commixta* was classified in 1 community, 2 groups and 4 subgroups, and found to have 4 vegetation units in total (Table 3).

Vegetation unit

(1) Vegetation unit 1

The vegetation unit 1 was classified in *Prunus padus* group of *S. commixta* community by the appearance of *Prunus padus*, *Polystichum tripteron*, *Pseudostellaria heterophylla* and *Pimpinella brachycarpa* differential species of Species Group 2, while the *Prunus padus* group was subdivided to *Ainsliaea acerifolia* subgroup by the appearance of *Ainsliaea acerifolia*, *Lychnis cognata*, *Aconitum koreanum*, *Hypericum ascyron*, *Pedicularis resupinata* and *Stellaria aquatica* differential species of Species Group 4. For the stand environmental factors of this vegetation unit, the average height above the sea level and the average gradient were 1,572m and 26°, respectively. Such average height above the sea level is the highest among 4 vegetation units. As for the average rate of vegetation coverage by the layer of this vegetation unit, tree layer, subtree layer, shrub layer and herb layer were 74%, 87%, 35%, and 88%, respectively, with the average rate of vegetation coverage of herb layer being the highest among 4 vegetation units. The average number of copepods species of this unit was 36 which was the highest among all vegetation units. This vegetation unit showed the appearance of differential species such as species group 1, species group 2, and species group4, while such differential species as species group 3, species group 5, species group 6, and species group 7 did not appear.

(2) Vegetation unit 2

The vegetation unit 2 classified to *Magnolia sieboldii* subgroup of *Prunus padus* group in *S. commixta* community by the appearance of differential species including *Magnolia sieboldii*, *Clematis koreana*, *Acer tegmentosum*, *Actaea asiatica* and *Chionanthus retusa* of species group 5. In this vegetation unit, the stand environmental factors such as average hight above the sea level and average gradient were 1,435m and 13°, respectively, which were the lowest of all 4 vegetation units. As for the average rate of vegetation coverage by the layer of this vegetation unit, tree layer, subtree layer, shrub layer and herb layer were 53%, 70%,

Table 2. Chemical properties of soil in the Mt. Chiri

Districts	pH	O.M.	T.N.	P_2O_5	C.E.C.	Cation exch. capacity (me/100g)			
	(H_2O)	(%)	(%)	(ppm)	(me/100g)	K^+	Na^+	Ca^{++}	Mg^{++}
Mt. Chiri	4.3±0.3	15.1±2.6	0.79±0.18	22±13	18.49±5.33	0.43±0.06	0.19±0.09	2.53±1.02	1.22±1.05

Table 3. Differentiated table of *Sorbus commixta* forest in the 31 study sites

Vegetation unit	communtiy	group	subgroup
1	I . *Sorbus commixta*	1. *Prunus padus*	A. *Ainsliaea acerifolia*
2			B. *Magnolia sieboldii*
3		2. *Picea jezoensis*	A. *Rhododendron mucronulatum*
4			B. *Echinopanax horridum*

Vegetation unit	1	2	3	4
Altitude (m)	1572	1435	1695	1699
Slope degree (°)	26	13	23	29
Coverage of tree layer (%)	74	53	82	84
Coverage of subtree layer (%)	87	70	81	77
Coverage of shrub layer (%)	35	44	46	37
Coverage of herb layer (%)	88	73	79	66
The number of resent species	36	34	30	24
Releve	5	8	10	8
1. character species and differential species of *Sorbus commixta* communtiy ;				
Sorbus commixta	511	V r+	V r1	V r2
Acer barbinerve	523	V +2	V +3	V 12
Tripterygium regelii	512	V r4	V 13	V +3
Abies koreana	5+2	V r2	V 23	V 13
Pinus koraiensis	3++	IV r1	V r1	IV +2
Carex fernaldiana	3++	II ++	V +2	III r+
Betula ermani	312	V r4	V r2	IV r1
Adenophora remotiflora	5r+	II r+	II ++	III r+
Athyrium yokoscense	5r+	II +2	III r+	III rr
Euonymus macroptera	3r1	V r+	IV r+	III r+
Solidago virga-aurea var. *asiatica*	3++	V r+	IV r+	IV r1
Calamagrostis arundinacea	5++	IV +2	V 24	V 14
Ligularia flscheri	5+1	IV r+	V r+	IV ++
Dryopteris crassirhizoma	5r+	V r1	II r+	II rr
Saussurea grandifolia	511	III r1	III ++	III +1
Acer pseudo-sieboldianum	523	IV +2	V r2	III ++
Taxus cuspidata	522	V 23	V 22	V 23
2. differential species of *Prunus padus* group ;				
Prunus padus	511	V r+		
Polystichum tripteron	2rr	III ++		
Pseudostellaria heterophylla	3++	II ++		
Pimpinella brachycarpa	5+1	V +2	I ++	
3. differential species of *Picea jezoensis* group ;				
Picea jezoensis			I rr	IV r1
Saxifraga oblongifolia			III r+	III r+
Patrinia rupestris			II ++	II rr
Saxifraga fortunei var. *incisolobata*			II ++	III r+
Clintonia udensis			II r+	V r1
4. differential species of *Ainsliaea acerifolia* subgroup ;				
Ainsliaea acerifolia	511	I 11	I 11	
Lychnis cognata	5++	I rr		
Aconitum koreanum	5rr			
Hypericum ascyron	3rr		I rr	
Pedicularis resupinata	5r+	I 11	I rr	
Stellaria aquatica	3rr			
Spiraea fritschiana	4rr			

Continued.

Vegetation unit	1	2	3	4
5. differential species of *Magnolia sieboldii* subgroup ;				
Magnolia sieboldii		Ⅲ+1		
Clematis koreana		Ⅳ++		
Acer tegmentosum		Ⅱr+		
Actaea asiatica		Ⅱrr		
Chionanthus retusa		Ⅱr+		
Galium paradoxum		Ⅱr+		
Aconitum jaluense		Ⅳr+		
Meehania uriticifolia		Ⅳr1		
Impatiens nli-tangere		Ⅲr+		
Aconitum pseudo-laeve var. *erectum*		Ⅱr+	I ++	
6. differential species of *Rhododendron mucronulatum* subgroup ;				
Rhododendron mucronulatum			Ⅴ+1	Ⅱ++
Aconitum chiisanense			Ⅱr+	
Syringa reticulata var. *mandshurica*		I ++	Ⅱ++	
Carex humilis		Ⅱ+1	Ⅱ++	
Bupleurum longiradiatum		I ++	Ⅲr+	
7. differential species of *Echinopanax horridum* subgroup ;				
Echinopanax horridum			I ++	Ⅱrr
Gentiana uchiyamai				Ⅱrr
Athyrium niponicum		I rr		Ⅲr+
Angelica gigas				Ⅱ++
Clematis fusca var. *violacea*				Ⅱrr
Isodon inflexus				Ⅱ22
Achudemia japonica				Ⅱrr
Lonicera mackii		I rr		Ⅱ22
Angelica purpuraefolia			I 11	Ⅱ11
Sanguisorba hadusanensis			I ++	Ⅱrr
Pleuropterus cilinervis			I rr	Ⅱ++
8. companions species group ;				
Rubia chinensis var. *glabrescens*		I ++		
Scrophularia kakudensis		I rr		
Disporum ovale		I ++		
Heracleum moellendorffii		I rr		
Ostericum grosseserrata		I ++		
Quercus mongolica		I 11		
Paris verticillata		I rr		
Abies nephrolepis		I rr		
Rosa acicularis		I rr		
Corylus sieboldiana var. *mandshurica*		I rr		
Ribes maximowicianum		I rr		
Lilium distichum		I rr		
Angelica gigas		I ++		
Caulophyllum robustum		I ++		
Syringa wolfi		I rr		
Majanthemum dilatatum		Ⅱ+1		
Pseudostellaria palibiniana		Ⅱr+		
Isodon excisus		Ⅱ++		
Disporum smilacinum		Ⅱ+2		
Veratrum patulum		Ⅱ++		
Smilacina davurica		Ⅱrr		

Continued.

Vegetation unit	1	2	3	4
Ostericum koreanum		II r+		
Spiraea prunifolia var. *simpliciflora*	1++			
Acer mandshuricum	2rr			
Viburnum sargentii	2rr			
Malus baccata	311			II ++
Acer ukurunduense	211	III r1	I ++	
Carex lanceolata	5r+	IV +1		II rr
Leptogramma mollissima	3++			II rr
Filipendula glaberrima	222	I ++	I rr	II rr
Actinidia polygama	312	II ++	I 11	
Aster scaber	5+1		II r+	
Ribes fasciculatum var. *chinense*	5+1		I ++	II ++
Aconitum longecassidatum	522	I rr	III r1	
Symrus excelsus	512		III +1	II ++
Lactuca triangulata	2rr		I rr	
Acer tschonoskii var. *rubripes*	311		I ++	II 11
Symrus deltoides	322	I ++	III r1	II ++
Arisaema amurense var. *serratum*		II rr		
Asarum sieboldii		II ++	I rr	
Cacalia auriculata var. *kamtschatica*	2++	V r+	II ++	II ++
Carex siderosticta	2++	IV r1	I 11	II ++
Sambucus williamsii var. *coreana*	2rr	IV r+	II rr	II rr
Rodgersia chinensis var. *davidii*		III r2	IV ++	II rr
Plantago asiatica	2++		I ++	II ++
Thalictrum actaefolium		II r+	I rr	
Trigonotis icumae	2++	I ++	I rr	
Fraxinus sieboldiana		II r1		
Majanthemum bifolium		II ++	I rr	II rr
Weigela subsessilis		IV +1		II 11
Cephalanthera erecta		I rr		
Deutzia glabrata		I rr		
Aralia elata		I ++		
Malus baccata Var. *mandshurica*			I 44	
Phtheirospermum japonicum			I ++	
Hosta capitata		I rr	I rr	
Rhododendron schlippenbachii		II r2	V 12	IV 12
Scrophularia koraiensis		I ++		
Chrysosplenium flagelliferum		I ++		
Circaea quadrisulcata		I ++		
Pedicularis resupinata var. *oppositifolia*		I ++		
Aster tataricus			I ++	
Euonymus pquciflorus				II ++
Smilacina japonica			I rr	
Actinidia kolomikta			I ++	
Chrysanthemum zawadskii			I ++	
Lycopodium serratum				II 11
Sedum polystichoides			I ++	

44%, and 73%, respectively, with the average rate of vegetation coverage of tree layer, subtree layer and shrub layer were the lowest among all 4 vegetation units. The average number of copepods species of this unit was 34. This vegetation unit showed the

appearance of differential species such as species group 1, species group 2, and species group 5, while such differential species as species group 3, species group 4, species group 6, and species group 7 did not appear.

(3) Vegetation unit 3

The vegetation unit 3 classified to *Picea jezoensis* group of *S. commixta* community by the appearance of differential species including *Picea jezoensis, Saxifraga oblongifolia, Patrinia rupestris, Saxifraga fortunei* var. *incisolobata* and *Clintonia udensis* of species group 2, and subdivided to *Rhododendron mucronulatum* subgroup by the appearance of differential species including *Rhododendron mucronulatum, Aconitum chiisanense, Syringa reticulata* var. *mandshurica, Carex humilis* and *Bupleurum longiradiatum* of species group 6. For the stand environmental factors of this vegetation unit, the average height above the sea level and the average gradient were 1,699m and 29°, respectively, which were the highest among all 4 vegetation units. As for the average rate of vegetation coverage by the layer of this vegetation unit, tree layer, subtree layer, shrub layer and herb layer were 84%, 77%, 37%, and 66%, respectively, with the average rate of vegetation coverage of tree layer being the highest and those of shrub layer and herb layer being the lowest among all 4 vegetation units. The average number of copepods species of this unit was 24 which was the lowest among all vegetation units. This vegetation unit showed the appearance of differential species such as species group 1, species group 2, and species group 6, while such differential species as species group 3, species group 4, species group 5, and species group 7 did not appear.

(4) Vegetation unit 4

The vegetation unit 4 was classified to *Echinopanax horridum* subgroup of *Picea jezoensisgroup* in *S. commixta* community by the appearance of differential species including *Echinopanax horridum, Gentiana uchiyamai, Athyrium niponicum, Angelica gigas, Clematis fusca* var. *violacea* and *Isodon inflexus* of species group 7. For the stand environmental factors of this vegetation unit, the average height above the sea level and the average gradient were 1,695m and 23°, respectively. As for the average rate of vegetation coverage by the layer of this vegetation unit, tree layer, subtree

Table 4. Importance values of production technique study forest in the Mt. Chiri

Species	tree layer	shrub layer	herb layer
Betula ermani	45.4	22.9	6.4
Acer pseudosieboldianum	17.6	34.7	14
Pinus koraiensis	24.5	7.5	3.5
Sorbus commixta	14.6	16.6	5.9
Taxus cuspidata	77.3		
Abies pseudosieboldianum	67.1		
Prunus padus	3.2	13.6	2.4
Picea jezoensis	8.5	8.4	4.1
Acer tschonoskii var.*rubripes*	16	57.8	25.6
Acer tegmentosum	2.5	3.1	1.8
Euonymus macropterus		7.3	12.8
Acer ukurunduense		4.4	4.1
Acer mandshuricum	2.5	2.5	
Tripterygium regelii		4.6	34
Abies koreana		50.5	17.6
Rhododendron schlippenbachii			16.8
Sasa borealis			35.7
Aralia elata		2.5	
Other species	(4 species) 20.8	(4species) 63.6	(11species) 15.3
Total	300	300	200

Table 5. Values of species diversity by the Mt. Chiri

Districts	No.of species (S)	No.of individuals (N)	Species diversity ($H^{*\prime}$)	Maximum $H^{*\prime}$ ($H^{*\prime}$ max)	Evenness ($J^{\prime}$)	Dominance (1-$J^{\prime}$)
Mt. Chiri	23	502	1.122	1.362	0.824	0.176

layer, shrub layer and herb layer were 82%, 81%, 46%, and 79%, respectively, with the average rate of vegetation coverage of shrub layer being the highest among all 4 vegetation units. The average number of copepods species of this unit was 30. This vegetation unit showed the appearance of differential species such as species group 1, species group 2, and species group 7, while such differential species as species group 3, species group 4, species group 5, and species group 6 did not appear.

Importance value

In the tree layer, the importance value of Taxus *cuspidata* was the highest, followed by *Abies pseudosieboldianum, Betula ermani* in order. The importance value of shrub layer was *Acer tschonoskii* var. *rubripes* (57.8), *Abies koreana* (50.5), *Acer pseudosieboldianum* (34.7), and *Betula ermani* (22.9) in their order, while in the herb layer, the importance value of *Sasa borealis* was the highest with 35.7, followed by *Tripterygium regelii* (34), *Acer tschonoskii* var.*rubripes* (25.6), *Abies koreana* (17.6), and *Rhododendron schlippenbachii* (16.8).

Species diversity analysis

Table 5 shows the result of analyzing the number of copepods species, species diversity of Shannon, maximum species diversity, evenness and dominance by research areas. In Mt. Jiri, the species diversity (H') of the *S. commixta* habitat was 1.122, which was relatively high. The maximum species diversity (H'max) which is calculated by the number of copepods species was 1.362. The evenness (J') which indicates the relative species diversity that shows greater evenness of the number of individuals by species as it becomes closer to 1 was 0.824, while the dominance (1-J') which is the reverse concept of the evenness was 0.176. In general, the forest stand is dominated by a few species that preoccupied the area in the early stage of forest stand development. However, as the physical environment such as the soil fertility improves and the soil solution matures, the competition between the species increases along with the inflow of a variety of species, which gradually results in a balanced state of the ecological domain by the species. Thus, the evenness increases and the dominance decreases. Whittaker (1975) argued that the forest stand is dominated by 1 species if the dominance is over 0.9, 2～3 species if the dominance is 0.3～0.7, and a number of species if the dominance is less than 0.3. In case of the researched *S. commixta* community, it is regarded that the maturity of the forest stand is high with a number of different species making a uniform status.

Distribution of constituent species

Table 6 is the result of researching Mortista's index of 8 species with relatively high occurrence frequency and importance in Mt. Chiri group in where a grows. As *Taxus cuspidata* has the Mortista's index almost close to 0, it shows uniform distribution. Despite slight differences in Mortista's index for *Euonymus macropterus, Prunus padus, Rhododendron schlippenbachii* and *Acer pseudosieboldianum* with relatively high dominance indexes within the researched stand, they appeared to have aggregated distribution in overall. However, it was found that *S. commixta* has a random distribution with *Tripterygium regelii* (12), in particular, having a strong aggregated distribution.

Table 6. Morisita′ s index of dispersion patterns for several species

Species	Areas
	Mt. Chiri
Taxus cuspidata	0.00
Acer barbinerve	1.04
Sorbus commixta	1.00
Prunus padus	3.73
Tripterygium regelii	12.00
Rhododendron schlippenbachii	1.84
Euonymus macropterus	5.14
Acer pseudosieboldianum	2.17

I_δ = 1: Random distribution, I_δ >1: Aggergated distribution, I_δ < 1: Uniform distribution

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