

Taxonomic Study on the Plant Resources in Gasado (Jindo)

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ABSTRACT

In this study, an on-site survey was conducted around Gasado island at Jodo-myeon, Jindo-gun, Jeonnam during July 2 to 25, 2002. The naturalized plants investigated in the surveyed sites were revealed 15 families and 39 species, including *Althaea rosea* and *Oxalis articulata*, which are ornamental plants. Only 10 species appeared in Imjado island among the surveyed sites and Imjado Island, including *Elymus sibiricus*, *Lolium perenne*, *Chenopodium album*, *Oxalis articulata*, *Oxalis corymbosa*, *Oenothera odorata*, *Xanthium strumarium*, *Bidens frondosa*, *Ambrosia artemisiaefolia* var. *elatior*, and *Taraxacum officinale*. 6 species were distributed only in Gasado island, Jindo-gun, which included include *Festuca myuros*, *Chenopodium ambrosioides*, *Amorpha fruticosa*, *Malva neglecta*, *Calendula arvensis*, and *Carthamus tinctorius*. 18 species were showed in Soheuksan island.; Yeosu area, 29 species; Imja Island in Sinan-gun, 34 species, and Gasado Island in Jindo-gun revealed 39 species. It is believed that the species of naturalized plants have been expanded compared to the other areas because of close location to the inland and large population fastly. The Urbanization Index(UI) of this area was found to be 19.5. The naturalized plant communities in these surveyed sites were classified into *Rumex crispus*, *Elymus sibiricus*, and *Lolium perenne* community according to the vegetation table. Furthermore, they formed a community around areas that received great artificial influence from human dwellings or roads due to the characteristics of species distribution

Key Words : Gasado, Naturalized plants, Vegetation, Urbanization Index

INTRODUCTION

About 200,000 species of vascular plants grow all over the world and of these, only 3,200 species, 1.6% of the total, can be found growing wild in Korea. These vascular plants are largely classified into medicinal plants, esculent resource plants, ornamental resource plants, timber resource plants, fiber resource plants, and

industrial resource plants according to human usage. Although a plant is categorized according to its ecological and distributional features, the distribution of naturalized plants and resource plants have a different meaning in some respects. While the distribution of native plants is related to geographic and ecological factors, that of naturalized plants is greatly affected by artificial factors(Schmidt and Whelan, 1999).

Naturalized plants are introduced from their native soil in a foreign country by man, animal, or freight and then grow wild in the land they are transported to. Some species are intentionally imported in accordance to policy, which are then absorbed into nature and grow wild (Park, 1995). The distribution of naturalized plants is greatly affected by human factors and reflects the ecological status represented by existing flora, vegetation composition, or competition with native species (McIntyre and Lavorel, 1994). Although these plants have not grown in Korea's growth environment, they can survive with strong adaptation. Thus, they expand at a very high speed in their habitation area and the environmental conditions of habitat they choose to grow in are very broad in scope (Koh et. al., 1997). With active exchanges occurring among countries and sharply increasing overseas visitors, as well as expanding urbanization of the land, the number of naturalized plants has been growing rapidly. The number of species of flowering naturalized plants reaches nearly 200 (Park, 1999), which makes it impossible for us to ignore their existence in the ecosystem (Yang, 2001). Naturalized plants can also grow in areas with poor habitat environment, such as landfill sites, harbors, roads, vacant lots around human dwellings, etc. As these plants infiltrate into the habitat of domestic native plants in accordance with their physiological features, a competition results between new and existing species and the importance of newly introduced species become greater in terms of natural environment preservation. In addition, studies have also been carried out on the role of naturalized plants as pesticides or weed-killers, by utilizing chemicals separated and refined from these plants (Kim and Kim, 1999).

The surveyed site is located in Jodo-myeon, Jindo-gun, Jeollanam-do (Long. 126°28' E, 34°28' N.L.) and covers 695.5ha of land with 544ha of forest land, 115.1ha of fields, and 28.4ha of rice paddies. Gasado

Island, which has 28km of coastline, gently extends from south to north without any hills. Gasado salt abandoned field, located on the center of the island, is used as a field or a rice paddy, contributing to the expansion of agriculture. *Pinus thunbergii* community has developed on the entire island and vegetation disturbance has appeared partly in areas where a mine is being developed or planned.

Therefore, in order to preserve the natural environment of Gasado Island, a fundamental study is needed to be made on the distribution of naturalized plants, species composition of the community, and the competition between naturalized and native plants. In addition, how to turn these naturalized plants into a useful resource along with their ecological functions and features need to be examined as well. Through such studies, we can predict the environmental changes in this area and use this information as a basis to preserve the natural environment.

MATERIALS AND METHODS

This study was conducted through an on-the-spot survey of Gasado area in Jodo-myeon, Jindo-gun during July 2 to 25, 2002.

The naturalized flora in the surveyed site was limited to above vascular plants and defined through literature published by Chung (1965), Lee (1989), Lee (1998), Makino (1969), Ohwi (1984), and Park (1995). A list of naturalized plants growing on Imjado Island was then compiled on the basis of investigated data. Sampling sites were installed at the survey area and the species within the quadrat and dominance and sociability of each composition species were recorded using the Braun-Blanquet (1964) phytosociological method. Examined data of vegetation determined the unit, based on table operation (Ellenberg, 1956) and a vegetation table was made.

Table 1. List of naturalized plants in Gasado

Family name	Scince name	Remark			
		*1	2	3	4
Gramineae	<i>Avena fatua</i> L.	0	0	0	0
	<i>Dactylis glomerata</i> L.	0	0	0	0
	<i>Poa pratensis</i> L.				0
	<i>Bromus catharticus</i> Vahl.			0	0
	<i>Lolium perenne</i> L.			0	0
Commelinaceae	<i>Tradescantia reflexa</i> Raf.				0
Iridaceae	<i>Tritonia crocosmaeflora</i> LEMOINE.		0		0
Polygonaceae	<i>Rumex conglomeratus</i> MURR.		0		
	<i>Rumex crispus</i> L.	0	0	0	0
	<i>Rumex nipponicus</i> FR.		0		0
	<i>Rumex obtusifolius</i> L.		0		
Chenopodiaceae	<i>Rumex acetosella</i> L.	0	0	0	0
	<i>Chenopodium ficifolium</i> SMITH.		0	0	
	<i>Chenopodium glaucum</i> L.		0	0	0
	<i>Chenopodium album</i> L.			0	0
Amaranthaceae	<i>Chenopodium ambrosioides</i> L.				0
	<i>Amaranthus retroflexus</i> L.	0	0	0	0
	<i>Amaranthus lividus</i> L.	0			
Phytolacaceae	<i>Phytolacca americana</i> L.	0	0	0	0
	<i>Phytolacca esculenta</i> VAN HOUTTE.	0	0		
Cruciferae	<i>Lepidium apetalum</i> WILLD.	0	0	0	0
	<i>Thlaspi arvense</i> L.	0	0		
Leguminosae	<i>Medicago hispida</i> GAERTNER.	0	0		
	<i>Trifolium repens</i> L.	0	0	0	0
Oxalidaceae	<i>Amorpha fruticosa</i> L.				0
	<i>Oxalis corymbosa</i> DC.			0	0
	<i>Oxalis articulata</i> SAVIGNY.			0	0
Euphorbiaceae	<i>Euphorbia supina</i> RAFINA		0	0	0
Malvaceae	<i>Althaea rosea</i> CAV.	0	0	0	0
	<i>Malva verticillata</i> L.		0		
	<i>Malva neglecta</i> Wallr.				0
Onagraceae	<i>Oenothera odorata</i> JACQ.			0	
Solanaceae	<i>Solanum nigrum</i> L.	0	0	0	0
Scrophulariaceae	<i>Veronica persica</i> POIRET.		0	0	0
Compositae	<i>Conyza canadensis</i> (L.) CRONQUIST.	0	0	0	0
	<i>Cosmos bipinnatus</i> CAV.		0	0	0
	<i>Calendula arvensis</i> L.				0
	<i>Carthamus tinctorius</i> L.				0
	<i>Erigeron annuus</i> PERS.	0	0	0	0
	<i>Erigeron bonariensis</i> L.	0	0	0	0
	<i>Senecio vulgaris</i> L.	0	0	0	0
	<i>Sonchus asper</i> (L.) HILL.		0	0	0
	<i>Sonchus oleraceus</i> L.	0	0	0	0
	<i>Tagetes minuta</i> L.		0	0	0
	<i>Xanthium strumarium</i> L.			0	0
	<i>Ambrosia artemisiaefolia</i> var. <i>elatior</i> Desc.			0	0
	<i>Helianthus tuberosus</i> L.				0
	<i>Bidens frondosa</i> L.			0	0
	<i>Taraxacum officinale</i> WEVER.			0	0

*1:Ihm et. al.(1993), 2:Kim and Kim(1996), 3: Kim(1999), 4:this study

RESULTS AND DISCUSSION

Naturalized flora

Naturalized plants investigated in the surveyed site included 15 families and 39 species (Table 1). The species recorded in this study (*4 of Table 1) were compared to those from the investigation of Small Heuksando island by Ihm et. al. (1993, *1 of Table 1), the study of Yeosu by Kim and Kim (1996, *2 of Table 1), and the study of Imjado island in Sinan-gun by Kim (1999, *3 of Table 1). The results showed that 14 common species appeared in all the areas, including *Avena fatua*, *Dactylis glomerata*, *Rumex acetosella*, *Amaranthus retroflexus*, *Phytolacca americana*, *Lepidium apetalum*, *Trifolium repens*, *Althaea rosea*, *Solanum nigrum*, *Conyza canadensis*, *Erigeron annuus*, *Senecio vulgaris*, *Sonchus oleraceus*, *Rumex crispus*, and *Lepidium apetalum*. 10 species grow only in Imja island, Shinan-gun which included *Elymus sibiricus*, *Lolium perenne*, *Chenopodium album*, *Oxalis articulata*, *Oxalis corymbosa*, *Oenothera odorata*, *Xanthium strumarium*, *Bidens frondosa*, *Ambrosia artemisiaefolia* var. *elatior*, and *Taraxacum officinale*. 6 species were found only in Gasado island, which included *Festuca myuros*, *Chenopodium ambrosioides*, *Amorpha fruticosa*, *Malva neglecta*, *Calendula arvensis*, and *Carthamus tinctorius*. 18 species were discovered in Soheuksando Island; 29 species in Yeosu area; 34 species in Imja island; and 39 species in Gasado island. It is believed that the species of naturalized plants have more increased compared to other areas due to their close location to the inland, as well as large population. The distribution of naturalized plants could be used as an index to measure the extent of destruction of natural vegetation as well as the degree of urbanization in some areas. The Urbanization Index (UI) of this site against naturalized plants distributed across Korea was 19.5.

Naturalized plant communities

The main naturalized plant communities in this surveyed site include *Rumex crispus*, *Elymus sibiricus*, and *Lolium perenne* community (Table 2). As for the distribution characteristics, the communities were concentrated in areas that have been greatly influenced artificially by inhabitants and roads. The communities were classified through this study and completed the vegetation table according to dominant and differential species of each community by physiognomy rather than by association unit using the order of presence.

Rumex crispus community

Rumex crispus community was distinguished by *Rumex crispus* and could be found from Eoyupo wharf to the roadsides of Gasa Branch Office and Gasado Dumping Ground at Gasado island. The composition of species is shown in Table 3. The height of its herb layer was 0.6-1.0m and its field coverage was 80-95%. The number of species appearing in the community was 4-7. *Artemisia princeps* var. *orientalis*, *Erigeron canadensis*, *Lepidium apetalum*, *Chrysanthemum indicum*, and *Lepidium apetalum* had high presence, and *Oxalis corniculata*, *Rumex acetosa*, *Artemisia capillaris*, *Clenatis apiifolia*, and *Cirsium japonicum* var. *ussuriense* also appeared. *Rumex crispus* was originated from Europe and is widely distributed in North Africa, North America, and Asia (Park, 1995). In Korea, it grows in a variety of sites such as vacant housing lots, the edge of roadsides, gutters, river banks, and boundaries of farmlands. In other words, it forms a big community in the sites, where the nutritive salts of soil is accumulated greatly. The species similar to *Rumex crispus* include *Rumex conglomeratus*, *Rumex crispus*, *Rumex nipponicus*, and *Rumex obtusifolius*, which are distributed in according to a feature of habitat.

Elymus sibiricus community

Elymus sibiricus community was distinguished by

Table 2. Vegetation table of naturalized plants in Gasado

Community type	A			B			C		
	1	2	3	4	5	6	7	8	9
Serial No.	1	1	1	1	1	1	1	1	1
Quadrat size(m ²)	1	1	1	1	1	1	1	1	1
Height of herb layer(m)	0.8	0.8	1.0	0.6	0.7	0.7	0.7	0.9	0.7
Coverage of herb layer(%)	95	90	90	80	90	80	100	90	100
Number of species	3	4	5	7	2	5	4	3	4
Differential species of community									
<i>Rumex crispus</i>	5.5	4.4	4.4	3.3	.	.	.	.	.
<i>Elymus sibiricus</i>	.	.	.	.	5.5	4.4	.	.	.
<i>Lolium perenne</i>	.	.	.	.	.	.	5.5	4.4	5.5
Companions									
<i>Artemisia princeps</i> var. <i>orientalis</i>	2.2	2.2	1.1	.	1.1	1.1	1.1	1.1	1.1
<i>Erigeron canadensis</i>	.	1.1	2.2	.	.	1.1	.	.	.
<i>Lepidum apetalum</i>	.	1.1	.	1.1	.	1.1	.	.	.
<i>Erigeron annuus</i>	.	.	1.1	.	.	+	.	.	.
<i>Chrysanthemum indicum</i>	.	.	1.1	2.2	.	.	.	.	.
<i>Agropyron tsukuyshiense</i> var. <i>transiens</i>	.	.	.	.	.	.	.	1.1	1.1
<i>Oxalis corniculata</i>	1.1	.	.	.	.	.	.	.	.
<i>Rumex acetosa</i>	.	.	.	1.1	.	.	.	.	.
<i>Artemisia capillaris</i>	.	.	.	1.1	.	.	.	.	.
<i>Clenatis apiifolia</i>	.	.	.	1.1	.	.	.	.	.
<i>Cirsium japonicum</i> var. <i>ussuriense</i>	.	.	.	+	.	.	.	.	.
<i>Calystegia japonica</i>	.	.	.	.	.	.	1.1	.	.
<i>Trifolium repens</i>	.	.	.	.	.	.	1.1	.	.
<i>Achyranthes japonica</i>	.	.	.	.	.	.	.	.	+

A:*Rumex crispus* community, B:*Elymus sibiricus* community, C:*Lolium perenne* community

Elymus sibiricus and found from Eoyupo Wharf to the roadsides of Gasa Branch Office at Gasado island in Jindo. The species composition is shown in Table 2. The height of its herb layer was 0.7m and its field coverage was 80-90%. The number of species appearing in the community was 2-5, including *Artemisia princeps* var. *orientalis*, *Erigeron canadensis*, *Lepidum apetalum*, and *Lepidum apetalum*. *Elymus sibiricus* was originally cultivated as grass, but grows wild now. It is a very common species that can be found

near roads or human dwelling in the South. This community is generally formed around roads or vacant lots. As one of the naturalized plants with high fertility, it is expected to be distributed all across the country.

***Lolium perenne* community**

Lolium perenne community was distinguished by *Lolium perenne* and formed a community by the roadsides of Gasa Branch office at Gasado Island in Jindo. The species composition is shown in Table 2.

The height of its herb layer was 0.7-0.9m and its field coverage was 90-100%. The number of species appearing in the community was 3-4, with *Calystegia japonica*, *Trifolium repens* and *Achyranthes japonica* also making an appearance. *Artemisia princeps* var. *orientalis* and *Agropyron tsukushiense* var. *transiens* had high presence. *Lolium perenne* was originated from Europe and is widely distributed in Asia, North America, North Africa, and Siberia. In Korea, it was cultivated as grass or for erosion control after the independence of Korea in 1945, but it grows wild now and is distributed all across the country(Park 1995). This community is generally concentrated near roads or vacant lots.

LITERATURE CITED

- Braun-Blanquet, J. 1964. Pflanzensoziologie. Grundzüge der Vegetationskunde. Springer-Verlag, Wien. New York. 865 pp.
- Chung, T.H. 1965. Flora of Korea. Shinjisa. Seoul(in Korean)
- Ellenberg, H. 1956. Aufgaben und Methoden der Vegetationskunde. Stuttgart. 136pp.
- Ihm, B.S., Kim, H.S. and Lee, J.S. 1993. Studies on flora and degree of green naturality in Sohuksan-do. Bulletin of Institute of Littoral Environment. 10:13-37.
- Kim, J.H. and Kim, H.S. 1999. Variation monoterpenes during leaf development in *Ambrosia artemisiifolia* var. *elatior*. Korean J. Ecol., 22(3):155-161.
- Kim, H.S. and Kim, J.S. 1996. Ecological studies on the flora and distribution of naturalized plants in the Yosu according to the environmental change. Journal of Korean society of Environmental administration. 2:1-14.(in Korean)
- Kim, H.S. 1999. Ecological studies on the flora and community of naturalized plants in Limja-do. Journal of Korean island. 10:21-28.(in Korean)
- Koh, K.S., Kang, I.G., Suh, M.H., Kim, H.j., Kim, D.k., Kil, J.H., Chun, E.S. and Lee, Y.M. 1997. Distribution of naturalized plants in Korea. J. Kor. Biota. 2:139-164.(in Korea)
- Lee, T.B. 1989. Illustrated Flora of Korea. Hyangmoonsa, Seoul.(in Korean).
- Lee, Yong No. 1998. Flora of Korea. 1247pp.
- Makino, T. 1969. Makino's new illustrated Flora of Japan, Tokyo(in Japanese)
- McIntyre, S. and S. Lavorel. 1994. Predicting richness of native, rare, and exotic plants in response to habitat and disturbance variables across a variegated landscape. Conservation Biology 8:521-531.
- Park, S.H. 1995. Colored illustrations of naturalized plants of Korea. Seoul. Ilchokok. 371 pp.
- Park, S.H. 1999. The status of newly founded naturalized plants. Nature conservation 106: 10-14.(in Korean)
- Ohwi Jisaburo. 1984. Flora of Japan. 1066pp.
- Schmidt, K.A. and C.J. Whelan. 1999. Effects of exotic *Lonicera* and *Rhamnus* on songbird nest predation. Conservation Biology 13:1502-1506.
- Yang, Y.H. 2001. Chang and counter plant as naturalized plants native species in Jeju. Nature conservation 113: 27-34.(in Korean)

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