



Dispersion of Vascular Plant in Kumo-do, Korea

Yu-Mi Lee¹, Byoung-Chun Lee¹, Soo-Hyun Park¹, Jin-Man Kim¹, Sang-Myong Lee², Hwa-Yun Lee², and Hyun-Tak Shin^{3*}

¹Korea National Arboretum, Jikdong-ri, Scheul-eub, Pocheon-si, Gyeonggi-do 487-821, Korea

²National Science Museum, Guseong-dong, Yuseong-gu, Daejeon 305-705, Korea

³Gyeongsangnam-do Forest Environment Research Institute, Daecheon-ri Jinju-si Gyeongnam 660-871, Korea

Abstract : The vascular plants observed in the area were composed of a total of 228 taxa; 72 families, 172 genus, 201 species, 25 varieties, 1 sub-species and 1 cross species. The only endangered plants found in the area were *Milletia japonica* (Siebold & Zucc.) A.Gray. The endemic plants growing in the Geumodo except transplanted plants were *Lespedeza x maritima* Nakai and *Carpinus coreana* Nakai. which accounted for 0.8% of the vascular plants in Geumodo, 228 taxa. Specialized plants of Geumodo were a total of 41 species; 30 taxa in Grade I, 1 taxon in Grade II, 9 taxa in Grade III and 1 taxon in Grade V. *Milletia japonica* (Siebold & Zucc.) A.Gray was the only species found in important Grade IV to V. Currently, ferries ply to the island, attracting many tourists. This poses a threat to the rare plants living in the island and presses down the island to develop. Therefore, in the long-term perspective, the conservation plan such as comprehensive research and monitoring on the ecosystem shall be established to protect evergreen broad-leaved forests.

Key words : Endangered species, Endemic plants, Conservation plan

Introduction

Geumodo is located south of Yeosu, Jeollanamdo. It is part of Geumo Archipelago formed by neighboring Dolsando, Sorido, Wolhodo, Durido and Gaedo. It is located at 127°46'E and 34°30'N. The highest peak is Daebusan (Mt) (382 m) on the west. The island has many high mountains over 200 m including Ognyeobong (261 m).

Its seashore is very rugged due to well-developed small capes and gulps. In particular, its western land is jugged to the sea just like a peninsula. The coast is rocky and the southwestern coast is a steep cliff. On the island, the weather is warm and there is much rain. The road is built alongside the coast and the mountain ridges. The road running east to west is paved. Ferries ply between Yeosu and the island. The island is part of the Dadohae Marine National Park. It is the second marine national park (Geumodo Zone) following Hallyeo Marine National Park (Odong Zone) to the north. Its beautiful natural environment attracts many tourists.

Although it is geographically close to Dolsando, ferries to Geumodo must be used in Yeosu where the ferry

terminal is located, not to mention ferries to other nearby islands. Geumodo has very precipitous topography and the most of coastal line is rocky with well-developed, steep sea cliffs. Waves with high energy have made huge cliffs on the coast. That's why the island is designated as Dadohae Marine National Park. The temperature is 13.9°C and the annual rainfall is 1,413 mm. Plants such as *Pinus thunbergii* and *Castanopsis cuspidata* var. *sieboldii* Nakai. (*Sieboldii* Chinquapin) cover the higher land while *Camellia japonica* Linne and *Ilex integra* Thunb. form the middle area and *Trachelospermum asiaticum* var. *intermedium* Nakai., *Hedera rhombea* Bean, *Ardisia crenata* Sims and *Ardisia japonica* Bl. are the main plants in the lower area.

Materials and Methods

This study was conducted twice in Geumodo, part of the Geumo Archipelago from June to September, 2008. For the distribution of vascular plants, 1:25,000 topographical map produced by the National Geographic Information Institute ("NGII") and GPS were used to make a list of plants and specific plants were recorded. Appearing vascular plants were identified on the spot. If not possible, the plants were identified after being collected. Flora was arranged according to Lee (1980) which followed Tipppo & Fuller System. However, the arrangement of dicotyledon and

*To whom correspondence should be addressed.

Tel: +82-55-771-6545

E-mail: twinshin@hanmail.net



Fig. 1. Map of the surveyed routes in Kumo-do.

monocotyledon was changed in consideration of plant genealogy. The research findings of Lee (1982) and Baik (1994) were referred to for native plants while the materials of the Korea Forest Service (1996) and the Ministry of Environment (2005) were referred to for rare and endangered plants. Floristically specific plants were classified as Grade V to I in accordance with the 2nd National natural environment research guidelines (Ministry of Environment, 2006).

Results and Discussion

Distribution of vascular plants in Geomodo

The vascular plants observed in the area were composed of a total of 228 taxa including transplanted plants; 72 families, 172 genuses, 201 species, 25 varieties, 1 sub-species and 1 cross species. Among the vascular plants recorded, the ferns consisted of 22 taxa; 6 families, 13 genuses, 21 species, and 1 variety and gymnosperms consisted of 2 taxa; 2 families, 2 genuses and 2 species. Dicotyledon was made up of 164 taxa (57 families, 126 genuses, 144 species, 19 varieties and 1 sub-species) and

monocotyledon was made up of 40 taxa (7 families, 31 genuses, 34 species, 5 varieties and 1 cross species). See Table 1.

Pinus thunbergii forest was the dominant plant among the evergreen broad-leaved plants in Geumodo. There was expansive tilted land because the island is populated. On the higher land, *Pinus thunbergii* and *Castanopsis cuspidata* var. *sieboldii* Nakai. (Sieboldii Chinquapin) were dominant. Evergreen broad-leaved plants like *Ligustrum japonicum* Thunb., *Eurya japonica* Thunb., *Pittosporum tobira* Aiton., *Ficus erecta* Thunb and *Camellia japonica* Linne dominantly grow on the middle land while *Trachelospermum asiaticum* var. *intermedium* Nakai., *Hedera rhombea* Bean, *Stauntonia hexaphylla*, *Ardisia crenata* Sims, *Ficus nipponica* Fr. et Sav., *Pyrola japonica* Klenze, and *Pyrola japonica* Klenze grow in the lower land. Given the deciduous broad-leaved trees like *Styrax japonica*. et Zucc and *Euonymus elatus* Sieb. appear, warm-temperate forest and south temperate forest are mixed on the island, which indicates the biodiversity will be very high.

Table 1. The number of vascular plants distributed in Kumo-do

Class of tracheophyta	Family	Genus	Species	Variety	Forma	Subsp.	Hybrid	Total
Pteridophyta	6	13	21	1				22
Gymnospermae	2	2	2					2
Angiospermae Dicotyledoneae	7	31	34	5			1	40
Monocotyledoneae	57	126	144	19		1		164
Total	72	172	201	25	0	1	1	228

Table 2. The list of rare and endangered plants in Kumdo-do

Family name	Scientific name	Korean name
Fabaceae	<i>Glehnia littoralis</i> F.Schmidt ex Miq.	애기둥

Table 3. The list of the Korean endemic plants in Kumdo-do

Family name	Scientific name	Korean name
Fabaceae	<i>Lespedeza maritima</i> Nakai	해변싸리
Betulaceae	<i>Carpinus turczaninowii</i> Hance	소사나무

Rare and endangered plants

Except the transplanted plants, the rare or endangered species found in the island was *Milletia japonica* (Siebold & Zucc.) A.Gray. The endangered plant was living within the afforestation area centered around some mountain paths.

Korean endemic plants

Except the transplanted plants, the native plants were two species; *Lespedeza x maritima* Nakai and *Carpinus coreana* Nakai. They only accounted for 0.8% of 228 taxa, the total number of vascular plants found in the island and for 0.3% of the Korean native plants, 570 taxa (Baik, 1994). Currently the native species found to date grow on the foot of some transplanted areas while some of the plants live between rocks or around a cliff.

Specialized plants

Specialized plants found in Geumodo were composed of 41 species; 30 taxa in Grade I, 1 taxon in Grade II, 9 taxa in Grade III and 1 taxon in Grade V. (Table 4) There was only *Milletia japonica* (Siebold & Zucc.) A.Gray in the floristically important Grade IV to Grade V, which grows mountain paths and major forest areas.

Table 4. The list of specialized plants in Kumdo-do

Degree	Scientific name (Korean name)	
I	<i>Equisetum hyemale</i> L. 속새, <i>Lygodium japonicum</i> (Thunb.) Sw. 실고사리, <i>Pteris multifida</i> Poir. 봉의꼬리, <i>Thelypteris glanduligera</i> (Kunze) Ching 사다리고사리, <i>Lemmaphyllum microphyllum</i> C.Presl 롱짜개덩굴, <i>Torreya nucifera</i> (L.) Siebold & Zucc. 비자나무, <i>Arisaema ringens</i> (Thunb.) Schott 큰천남성, <i>Hosta minor</i> (Baker) Nakai 좁비추, <i>Allium tuberosum</i> Rottler ex Spreng. 부추, <i>Hemiptelea davidii</i> (Hance) Planch. 시무나무, <i>Celtis biondii</i> Pamp. 쪽나무, <i>Ficus erecta</i> Thunb. 천선과나무, <i>Tetragonia tetragonoides</i> (Pall.) Kuntze 변행초, <i>Machilus thunbergii</i> Siebold & Zucc. 후박나무, <i>Neolitsea sericea</i> (Blume) Koidz. 참식나무, <i>Pittosporum tobira</i> (Thunb.) W.T.Aiton 돈나무, <i>Rubus hirsutus</i> Thunb. 장딸기, <i>Caesalpinia decapetala</i> (Roth) Alston 실거리나무, <i>Rhynchosia acuminatifolia</i> Makino 큰여우콩, <i>Zanthoxylum planispinum</i> Siebold & Zucc. 개산초, <i>Mallotus japonicus</i> (Thunb.) Mell. Arg. 예덕나무, <i>Euphorbia esula</i> L. 흰대극, <i>Euscaphis japonica</i> (Thunb.) Kanitz 말오줌때, <i>Camellia japonica</i> L. 동백나무, <i>Eurya japonica</i> Thunb. 사스레피나무, <i>Hedera rhombea</i> (Miq.) Bean 송악, <i>Peucedanum japonicum</i> Thunb. 갯기름나물, <i>Lysimachia mauritiana</i> Lam. 갯까치수영, <i>Ligustrum japonicum</i> Thunb. 광나무, <i>Vitex rotundifolia</i> L.f. 순비기나무	30
II	<i>Thelypteris torresiana</i> var. <i>calvata</i> (Bak.) K.Iwats 각각시고사리	1
III	<i>Kadsura japonica</i> (L.) Dunal 남오미자, <i>Cinnamomum japonicum</i> Siebold ex Nees 생달나무, <i>Machilus japonica</i> Siebold & Zucc. 쉐달나무, <i>Lespedeza juncea</i> (L.f.) Pers. 팽비수리(파리채), <i>Zanthoxylum ailanthoides</i> Siebold & Zucc. 머귀나무, <i>Poncirus trifoliata</i> Raf. 탕자나무, <i>Melia azedarach</i> L. 멀구슬나무, <i>Rhus succedanea</i> L. 검양나무, <i>Callicarpa mollis</i> Siebold & Zucc. 새비나무	9
IV	-	-
V	<i>Milletia japonica</i> (Siebold & Zucc.) A.Gray	1

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Appendix 1. List of vascular plants distributed in Kumo-do

- Equisetum hyemale* L. 속새
Lygodium japonicum (Thunb.) Sw. 실고사리
Demstaedtia hirsuta (Sw.) Mett. ex Miq. 잔고사리
Pteris multifida Poir. 봉의꼬리
Deparia pseudoconilii (Serizawa) Serizawa 나도좁진고사리
Cyrtomium falcatum (L.f.) C.Presl 도깨비고비
Dryopteris uniformis (Makino) Makino 곰비늘고사리
Dryopteris lacera (Thunb.) Kuntze 비늘고사리
Dryopteris bissetiana (Bak.) C.Chr. 산죽제비고사리
Dryopteris chinensis (Bak.) Koidz. 가는잎죽제비고사리
Dryopteris hikonsensis (H.Ito) Nakaïke 큰죽제비고사리
Dryopteris sacrosancta Koidz. 애기죽제비고사리
Thelypteris decursive-pinnata (v.Hall) Ching 설설고사리
Thelypteris glanduligera (Kunze) Ching 사다리고사리
Thelypteris japonica (Bak.) Ching 지네고사리
Thelypteris torresiana var. *calvata* (Bak.) K.Iwats 각시고사리
Athyrium yokoscense (Franch. & Sav.) Christ 뺨고사리
Athyrium niponicum (Mett.) Hance 개고사리
Deparia japonica (Thunb.) M.Kato 진고사리
Asplenium incisum Thunb. 꼬리고사리
Lepisorus onoei (Franch. & Sav.) Ching 애기일엽초
Lemmaphyllum microphyllum C.Presl 풍짜개덩굴
Torreya nucifera (L.) Siebold & Zucc. 비자나무
Pinus thunbergii Parl. 곰솔
Alopecurus japonicus Steud. 뚝새풀
Agropyron tsukushiense var. *transiens* (Hack.) Ohwi 개밀
Brachypodium sylvaticum (Huds.) P.Beauv. 숲개밀
Bromus japonicus Thunb. 참새귀리
Dactylis glomerata L. 오리새
Molinia japonica Hack. 진퍼리새
Sporobolus fertilis (Steud.) Clayton 쥐꼬리새풀
Pennisetum alopecuroides (L.) Spreng. 수크령
Setaria faberii Herrm. 가을강아지풀
Setaria pycnocoma (Steud.) Henrard ex Nakai 수강아지풀
Setaria viridis var. *pachystachys* (Franch. & Sav.) Makino & Nemoto 갯강아지풀
Setaria glauca (L.) P.Beauv. 금강아지풀
Digitaria ciliaris (Retz.) Koel. 바랭이
Paspalum thunbergii Kunth ex Steud. 참새피
Eriochloa villosa (Thunb.) Kunth 나도개피
Oplismenus undulatifolius (Ard.) P.Beauv. 주름조개풀
Echinochloa crusgalli (L.) P.Beauv. 돌피
Miscanthus sinensis f. *gracillimus* (Hitchc.) Ohwi 가는잎억새
Spodiopogon cotulifer (Thunb.) Hack. 기름새
Arthraxon hispidus (Thunb.) Makino 조개풀
Cymbopogon tortilis var. *goeringii* (Steud.) Hand.-Mazz. 개솔새
Themeda triandra var. *japonica* (Willd.) Makino 솔새
Lolium multiflorum Lamarek 쥐보리
Carex dimorpholepis Steud. 이삭사초
Carex tristachya Thunb. 반들사초
Carex lenta D.Don 줄사초
Cyperus globosus All. 드렁방동사니
Cyperus iria L. 참방동사니
Arisaema ringens (Thunb.) Schott 큰천남성
Commelina communis L. 닭의장풀
Juncus setchuensis var. *effusoides* Buchenau 푸른갯골풀
Hosta minor (Baker) Nakai 줄비비추
Allium tuberosum Rottler ex Spreng. 부추
Allium macrostemon Bunge 산달래
Scilla scilloides (Lindl.) Druce 무릇
Asparagus schoberioides Kunth 비짜루
Liriope platyphylla F.T.Wang & T.Tang 맥문동
Smilax china L. 청미래덩굴
Dioscorea tenuipes Franch. & Sav. 각시마
Dioscorea quinqueloba Thunb. 단풍마
Alnus firma Siebold & Zucc. 사방오리
Carpinus turczaninowii Hance 소사나무
Corylus sieboldiana var. *mandshurica* (Maxim. & Rupr.) C.K.Schneid. 물개암나무
Hemiptelea davidii (Hance) Planch. 시무나무
Celtis biondii Pamp. 쪽나무
Celtis sinensis Pers. 팽나무
Cudrania tricuspidata (Carr.) Bureau ex Lavall?e 꾸지뽕나무
Ficus erecta Thunb. 천선과나무
Fatoua villosa (Thunb.) Nakai 뽕모시풀
Boehmeria tricuspis (Hance) Makino 거북꼬리
Boehmeria pannosa Nakai & Satake 왕모시풀
Boehmeria longispica Steud. 왜모시풀
Boehmeria platanifolia Franch. & Sav. 개모시풀
Rumex obtusifolius L. 돌소리쟁이
Rumex crispus L. 소리쟁이
Fallopia dumetorum (L.) Holub 닭의덩굴
Persicaria filiformis (Thunb.) Nakai ex Mori 이삭여뀌
Persicaria senticosa (Meisn.) H.Gross ex Nakai 머느리뒬셋개
Fagopyrum esculentum Moench 메밀
Persicaria longiseta (Brujin) Kitag. 개여뀌
Chenopodium album L. 흰명아주
Amaranthus patulus Bertol. 가는털비름
Phytolacca americana L. 미국자리공
Tetragonia tetragonoides (Pall.) Kuntze 변행초
Portulaca oleracea L. 쇠비름
Sagina maxima A.Gray 큰개미자리
Arenaria serpyllifolia L. 벼룩이자리
Stellaria media (L.) Vill. 별꽃
Clematis terniflora var. *mandshurica* (Rupr.) Ohwi 으아리
Clematis apiifolia DC. 사위질빵
Ranunculus quelpaertensis (H.L?v.) Nakai 왜젓가락나물
Cocculus trilobus (Thunb.) DC. 땡땡이덩굴
Kadsura japonica (L.) Dunal 남오미자
Lindera glauca (Siebold & Zucc.) Blume 감태나무
Lindera erythrocarpa Makino 비목나무
Cinnamomum japonicum Siebold ex Nees 생달나무
Machilus thunbergii Siebold & Zucc. 후박나무
Machilus japonica Siebold & Zucc. 쉼달나무
Neolitsea sericea (Blume) Koidz. 참식나무
Corydalis speciosa Maxim. 산괴불주머니
Lepidium apetalum Willd. 다닥냉이
Lepidium virginicum L. 콩다닥냉이
Rorippa palustris (Leyss.) Besser 속속이풀
Sedum bulbiferum Makino 말뚝비름
Pittosporum tobira (Thunb.) W.T.Aiton 돈나무
Rubus hirsutus Thunb. 장딸기
Rubus parvifolius L. 멍석딸기
Agrimonia pilosa Ledeb. 짚신나물
Agrimonia pilosa var. *nipponica* (Koidz.) Kitam. 좁쌀신나물
Rosa wichuraiana Cr?p. ex Franch. & Sav. 돌가시나무
Pourthiaea villosa (Thunb.) Decne. 윤노리나무
Caesalpinia decapetala (Roth) Alston 실거리나무

- Lespedeza maximowiczii* C.K.Schneid. 조록싸리
Lespedeza maritima Nakai 해변싸리
Lespedeza cyrtobotrya Miq. 참싸리
Lespedeza pilosa (Thunb.) Siebold & Zucc. 팽이싸리
Lespedeza juncea (L.f.) Pers. 땅비수리(파리채)
Desmodium podocarpum var. *oxyphyllum* (DC.) H.Ohashi 도독놈의갈고리
Desmodium podocarpum var. *mandshuricum* Maxim. 애기도독놈의갈고리
Vicia angustifolia var. *segetills* (Thuill) K.Koch. 살갈퀴
Lathyrus japonicus Willd. 갯완두
Rhynchosia volubilis Lour. 여우콩
Rhynchosia acuminatifolia Makino 큰여우콩
Vigna angularis var. *nipponensis* (Ohwi) Ohwi & H.Ohashi 새팔
Pueraria lobata (Willd.) Ohwi 철
Glycine soja Siebold & Zucc. 돌콩
Senna tora (L.) Roxb. 결명자
Milletia japonica (Siebold & Zucc.) A.Gray 애기등
Geranium thunbergii Siebold & Zucc. 이질풀
Oxalis corniculata L. 팽이밥
Zanthoxylum planispinum Siebold & Zucc. 개산초
Zanthoxylum schinifolium Siebold & Zucc. 산초나무
Zanthoxylum ailanthoides Siebold & Zucc. 머귀나무
Poncirus trifoliata Raf. 탕자나무
Melia azedarach L. 멸구슬나무
Mallotus japonicus (Thunb.) M.Arg. 예덕나무
Acalypha australis L. 깨풀
Euphorbia supina Raf. 애기땅빈대
Euphorbia esula L. 흰대극
Rhus javanica L. 붉나무
Rhus succedanea L. 검양꽃나무
Celastrus orbiculatus Thunb. 노박덩굴
Euscaphis japonica (Thunb.) Kanitz 말오줌때
Rhamnus yoshinoi Makino 짝자래나무
Vitis ficifolia var. *sinuata* (Regel) H.Hara 까마귀머루
Ampelopsis brevipedunculata (Maxim.) Trautv. 개머루
Parthenocissus tricuspidata (Siebold & Zucc.) Planch. 담쟁이덩굴
Grewia parviflora Bunge 장구밥나무
Malva neglecta Wallr. 난쟁이아욱
Corchoropsis tomentosa (Thunb.) Makino 수까치개
Actinidia arguta (Siebold & Zucc.) Planch. ex Miq. 다래
Camellia japonica L. 동백나무
Eurya japonica Thunb. 사스레피나무
Hypericum erectum Thunb. 고추나물
Hedera rhombea (Miq.) Bean 송악
Aralia elata (Miq.) Seem. 두릅나무
Daucus carota subsp. *sativa* (Hoffm.) Arcang. 당근
Bupleurum falcatum L. 시호
Torilis japonica (Houtt.) DC. 사상자
Peucedanum japonicum Thunb. 갯기름나물
Cornus kousa F.Buerger ex Miq. 산딸나무
Cornus controversa Hemsl. ex Prain 층층나무
Cornus macrophylla Wall. 곰의말채나무
Rhododendron schlippenbachii Maxim. 철쭉
Lysimachia japonica Thunb. 쯤가지풀
Lysimachia mauritiana Lam. 갯까치수영
Symplocos chinensis f. *pilosa* (Nakai) Ohwi 노린재나무
Symplocos tanakana Nakai 검노린재나무
Styrax japonicus Siebold & Zucc. 때죽나무
Ligustrum japonicum Thunb. 광나무
Ligustrum obtusifolium Siebold & Zucc. 쥐똥나무
Trachelospermum asiaticum (Siebold & Zucc.) Nakai 마삭줄
Trigonotis peduncularis (Trevir.) Benth. ex Hemsl. 꽃마리
Callicarpa dichotoma (Lour.) K.Koch. 쯤작살나무
Callicarpa japonica Thunb. 작살나무
Callicarpa mollis Siebold & Zucc. 새비나무
Clerodendrum trichotomum Thunb. 누리장나무
Vitex rotundifolia L.f. 순비기나무
Teucrium viscidum var. *miquelianum* (Maxim.) Hara 덩굴곽향
Leonurus japonicus Houtt. 익모초
Lamium amplexicaule L. 광대나물
Salvia plebeia R.Br. 배암차즈기
Clinopodium chinense var. *parviflorum* (Kud?) Hara 층층이꽃
Clinopodium gracile var. *multicaule* (Maxim.) Ohwi 탐꽃
Perilla frutescens var. *japonica* (Hassk.) Hara 들깨
Isodon inflexus (Thunb.) Kud. 산박하
Physalis angulata L. 땅파리
Solanum lyratum Thunb. 배풍등
Solanum nigrum L. 까마중
Paulownia tomentosa (Thunb.) Steud. 참오동
Veronica persica Poir. 큰개불알풀
Veronica didyma var. *lilacina* (H.Hara) T.Yamaz. 개불알풀
Justicia procumbens L. 쥐꼬리망초
Plantago lanceolata L. 창질경이
Paederia scandens (Lour.) Merr. 계요등
Galium spurium var. *echinospermum* (Wallr.) Hayek 갈퀴덩굴
Galium gracilens (A.Gary) Makino 쯤네잎갈퀴
Viburnum erosum Thunb. 덜꿩나무
Lonicera japonica Thunb. 인동
Lonicera japonica var. *repens* (Siebold) Rehder 털인동
Cucumis melo var. *makuwa* Makino 참외
Gnaphalium affine D.Don 떡쭉
Carpesium divaricatum Siebold & Zucc. 긴담배풀
Carpesium cernuum L. 쯤담배풀
Xanthium strumarium L. 도꼬마리
Eupatorium makinoi var. *oppositifolium* (Koidz.) Kawahara & Yahara 별등골
 나물
Aster hispidus Thunb. 갯쭉부쟁이
Erigeron annuus (L.) Pers. 개망초
Conyza bonariensis (L.) Cronquist 실망초
Petasites japonicus (Siebold & Zucc.) Maxim. 머위
Erechtites hieracifolia Raf. 붉은서나물
Aster subulatus var. *sandwicensis* A.G.Jones 큰비짜루국화
Dendranthema boreale (Makino) Ling ex Kitam. 산국
Artemisia capillaris Thunb. 사철쭉
Artemisia stolonifera (Maxim.) Kom. 넓은잎의잎쭉
Artemisia princeps Pamp. 쭉
Sigesbeckia pubescens Makino 털진득찰
Eclipta prostrata (L.) L. 한련초
Bidens pilosa L. 울산도개비바늘
Bidens biternata (Lour.) Merr. & Sherff ex Sherff 털도개비바늘
Cirsium japonicum var. *maackii* (Maxim.) Matsum. 엉겅퀴
Lactuca indica L. 왕고들빼기
Sonchus asper (L.) Hill 큰망가지뚱
Youngia japonica (L.) DC. 뿌리맹이