

# Korea National Arboretum Annual Report 2015



## The Charter of Government Official

We are the proud government officials of the Republic of Korea.  
 We fulfill the value constitutionally oriented, committed to the country, and serve the people.  
 We pursuit peoples well-being and happiness and we contribute to the nation's peaceful reunification and sustainable development.  
 Hence, we will fulfill the followings with firm resolve and resolution.  
 One. We will take priority in public interest, we will do all the responsibility transparently and fairly.  
 One. We will fulfill our task actively based on creativity and expertise.  
 One. We respect the diversity of our society, and we implement democratic administration with the people.  
 One. We make integrity a way of life, and we act according to the norms and sound common sense.

## The Practice Code of Charter of Government Official

- One. We will take priority in public interest, we will do all the responsibility transparently and fairly.
- We reject unjust pressure, and we will not be bound by a personal interest
  - We open and share the information and process the task transparently
  - We obey faithfully the procedure and we engage ourselves in even-handed manner
- One. We will fulfill our task actively based on creativity and expertise.
- With creative thoughts and challenging spirit, we lead change and innovation
  - We commit in an active manner with a sense of ownership in working
  - We increase our ability and our quality through constant self-improvement
- One. We respect the diversity of our society, and we implement democratic administration with the people.
- We admit that there are different positions and opinions and we care
  - We abolish special favor and discrimination, and we guarantee equal opportunity
  - We communicate and cooperate with the people through free participation
- One. We make integrity a way of life, and we act according to the norms and sound common sense.
- We do not receive money or favors regardless of any kind of duty
  - We practice sharing and serving, and become a model to others
  - We cherish and keep the honor and dignity as a government official.



	2	3
1	4	5


1 KNA Needle fir trail, this trail is connected from the small lake 'Yukrim lake' to 100 year old needle fir forest.  
 2 KNA Forest museum from the sky, here we have 11,300 pieces of heritages displayed where we can see the forest culture and the history of the forestry.  
 3 KNA Tropical Plants Resources Research Center, we have 3,000 species of tropical and sub-tropical plants.  
 4 KNA Aquatic plant garden view, we have 204 species of aquatic plants including Pigmy water-lily, Fringed waterlily, Buckbean, Four-leaf clover.  
 5 The view of Yukrim lake, in spring Mountain oriental cherry and P. verecunda bloom.

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# Greeting



Korea National Arboretum was separated from the Central experimental forestry station of the forestry research institution on May 24, 1999 for the successful promotion of the Gwangneung forest conservation plan and the need of national management on the forest organism which was set up as the counter measure of the government in 1997, and is responsible for various roles in plants and ecosystems as the best research institution of forest bio species established in the country.

The Korea National Arboretum tasks are to do the survey • collection • propagation • conservation of forest plants, and also the collection • classification • production • preservation of forest bio specimen for the green growth and contribution to have better quality of life through forest bio species conservation and the use technology development, and we are also doing the exchange and cooperation between international and domestic arboreta, useful plant investigation and securing, and registration of the forest plant resources information. Our duty is to educate and promote the public on the forest and Gwangneung forest conservation. To accomplish these duties, we are concentrating on the establishment of national plant resources management system, installation and operating plant conservation center, function improvement and expanding the professional arboretum, exploration and securing domestic and foreign useful plants, build herbarium, expand education and promotion to the public, installation of professional library of the arboretum, conservation and management of the Gwangneung forest ecosystem.

In particular, 2015 was the year of 70th anniversary of liberation. As the commemorating project of the 70th anniversary of liberation, we have arranged English names to 4,173 species of Korean peninsula native plants to inform the international community that they are our plants, giving proper names to our plants considered as Japanese or other country's plants, giving English names to the plants that did not have any names, through straightening the sovereignty of our plants. Starting up with the [English Names for Korean Native Plants] publication, we are creating awareness and compassion of the public through various reports and promotional materials and exhibition.

Internationally, the Korea National Arboretum, as the National Focal Point (NFP) of Global Strategy for Plant Conservation (GSPC), we are taking the initiative in securing the plant sovereignty in the national level, in doing various research for fighting climate change and biodiversity conservation of East Asia Regional level through the East Asia Biodiversity Conservation Network (EABCN) operation. Particularly we have published following books through international joint research; [Flora of the Western Tien-Shan (The Chimgan Mountains)], [Important Plants of East Asia II], [Vietnam, Floristic Diversity of Hon Ba Nature Reserve], [Vietnam's Illustrated Forest Plants (1)(2)].

According to this the Korea National Arboretum is making efforts to develop KNA within World's Top10 best arboreta in the year of 2020 through securing research infrastructure for the national forest biodiversity promotion, establish infrastructure of Korean peninsula rare and endemic in-situ and ex-situ conservation and restoration, expand the National Focal Point role of international treaty, expand garden culture to raise the garden business into new growth engine, and stable conservation management of Gwangneung forest, the UNESCO biosphere reserve. Hence, we have obtained 1,012,515 pieces of specimen until last year, and to help the public to understand the forest bio resources we have published following books ; [DMZ Ecology Culture Map, Civilization part, Animal part], [Korea National Arboretum Garden Portfolio], [Mountain Travel Essay, Gangwondo], [Invasive Exotic Plants in the Forest], [100 Cyperaceous Plants easily found in Korea], [Garden Flora with our flowers], [Forest Education Program in connection with Traditional Games], [Lichens Guide Book], [Korean Traditional Garden], [Korean Peninsula Wooded Land].

Besides, at the time of opening in 1999, 11,000 of people participated in the forest education program, but from 2009 to nowadays, more than 100,000 people participated in annual average, and accordingly, to provide customized forestry education to the participants, the number of programs are explosively increasing.

Here, we have published [2015 Annual Report] introducing arranged main projects and research achievements that Korea National Arboretum have promoted during last year. Through this report, we have introduced the role of the Korea National Arboretum, and I hope it can be help to understand the importance of forest bio species conservation and Gwangneung forest. The Korea National Arboretum is planning to continue various policies and projects for the central role of forest bio species conservation and resources, and also securing sovereignty of plants. And also we are doing all the efforts to fulfill our function as the main forest bio species research institution.

Thank you.

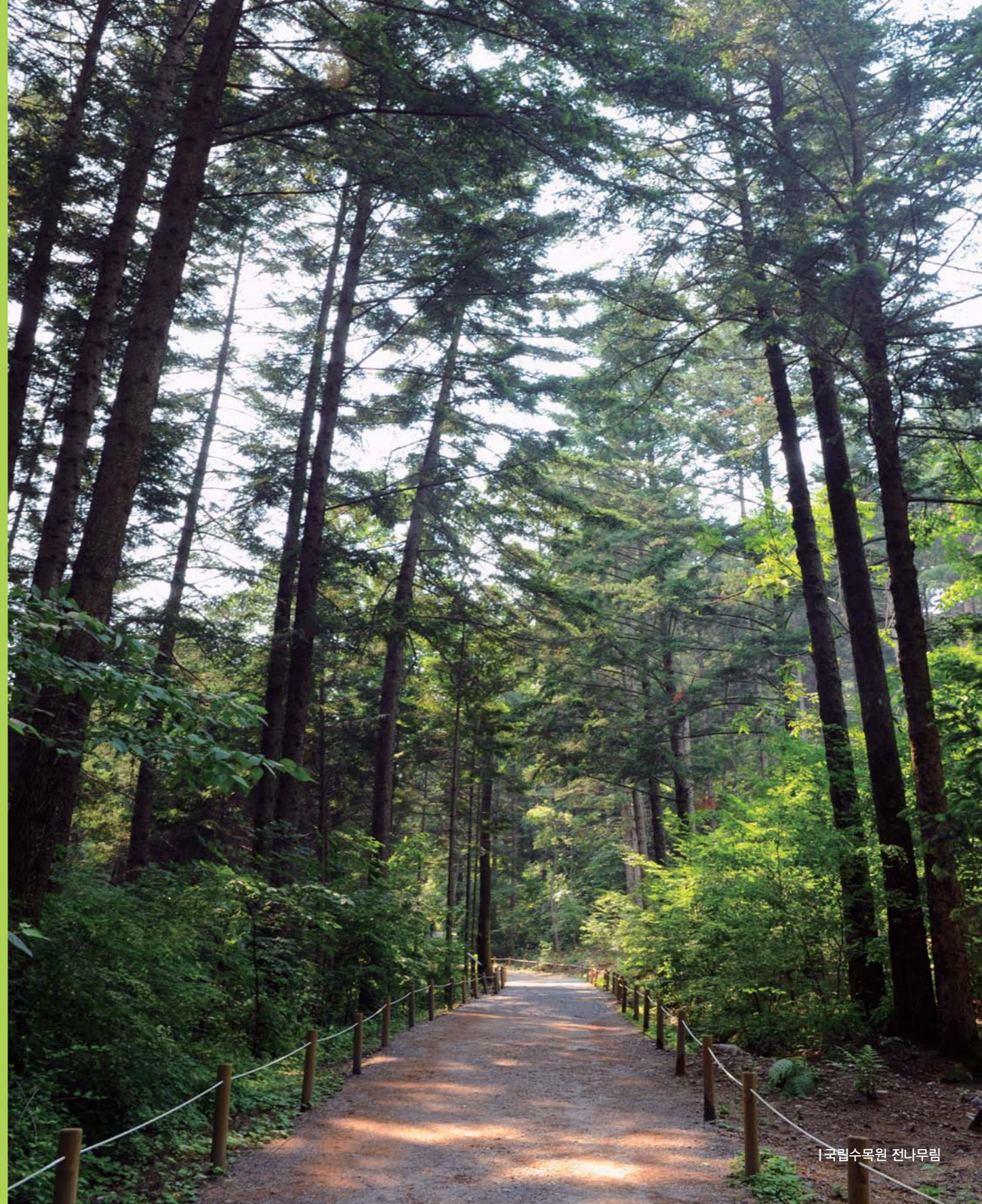
국립수목원장  
이유미

# PART I

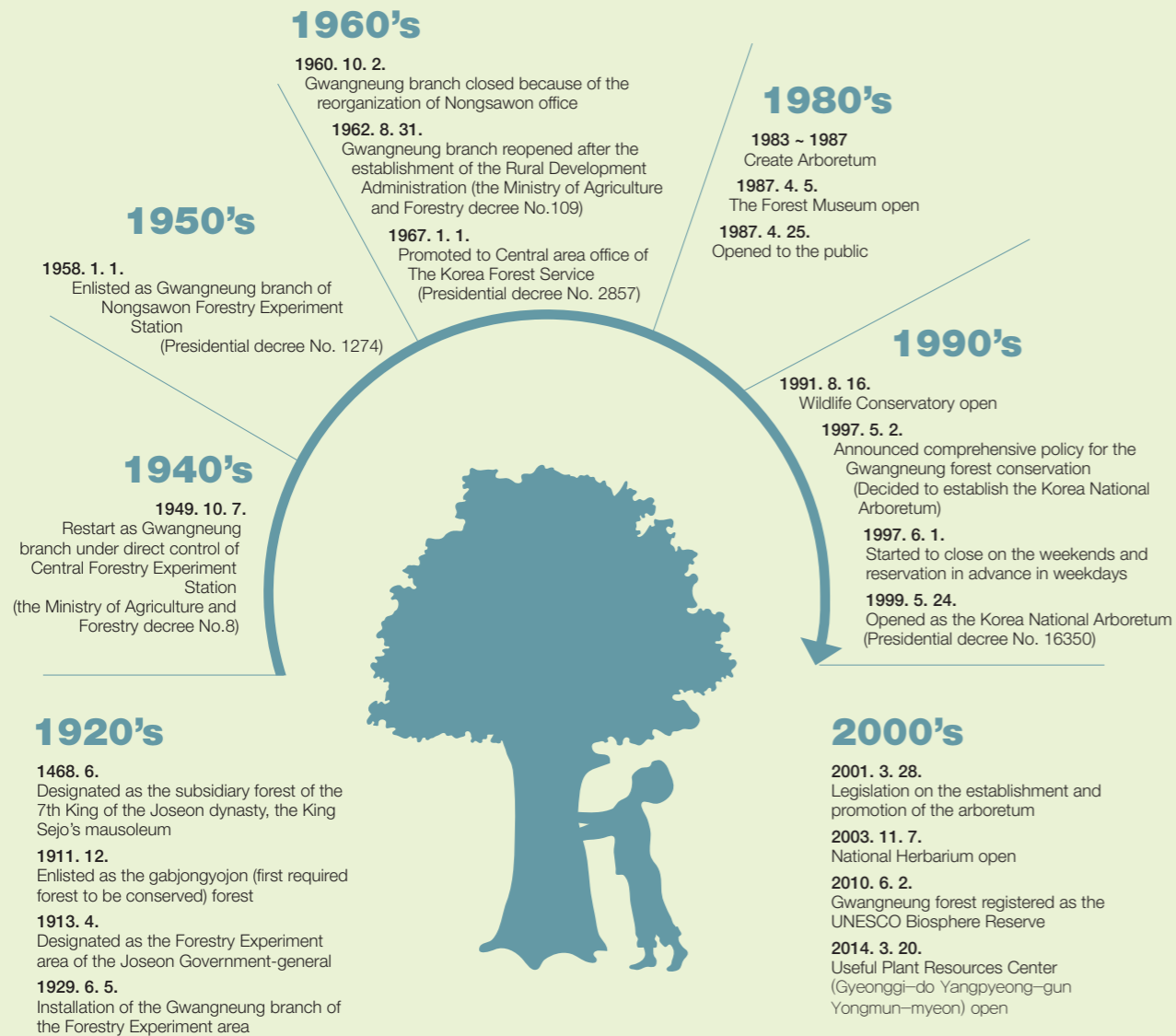
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## Present Condition

- 01 History
- 02 Organization & Number of Employees
- 03 Vision & Goal
- 04 Budget & Facilities



# History



(1 Team and 4 Divisions)

# Organization



## Total No. of employee

(Unit : person, %)

Section	Total *	Senior		Researchers *		Administration & Forestry	Management & Operations
		Official	Total	Senior Researcher	Researcher		
No.of employee	60(16)	1	35	12	23	14	10
Present employee	58(16)	1	34	12	22	13	10
Ratio	100	1.7	58.3	20	38.3	23.3	16.7

\* (16) : 6 Forest Protection Guards, 10 Security Guards

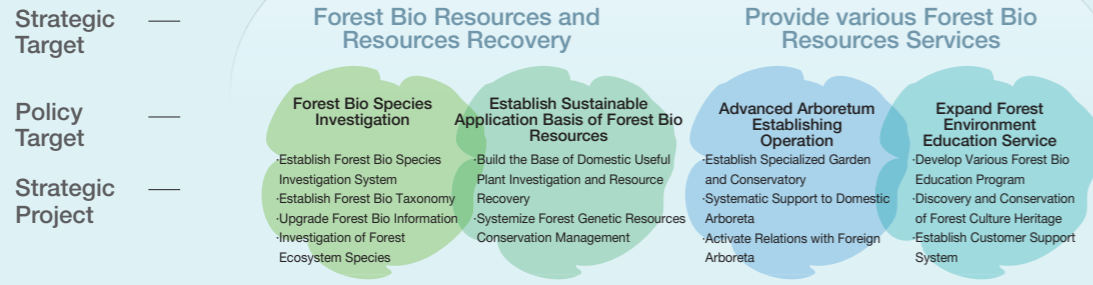


# Vision



**Mission** — Contribution to the Green Growth and improving life quality through Forest Biological species conservation and useful technology development

**Vision** — Be the World's Best Top 10 Arboretum till 2020



**Main Value** —

- Establish Research Planning System
- Strengthen External Cooperation

3C : Creation, Challenge, Cooperation

## Budget & Facilities

### Budget

(Unit : Million Won)

By Business	'13 Budget	'14 Budget (A)	'15 Budget (B)	Variation (B-A)	Remarks
<b>Total</b>	20,970	22,108	22,164	56	General Account
<b>Major Business</b>	16,200	17,309	17,129	▫180	
<b>KNA Operation</b>	2,223	4,549	4,567	18	
<b>Forest Species Research</b>	13,977	12,760	12,562	▫198	R&D
<b>Basic Business Expense</b>	949	901	895	▫6	
<b>Payroll Costs</b>	3,821	3,898	4,140	242	

### Facilities

- Buildings : 22 buildings 20,891 m<sup>2</sup>**
- . Forest Museum (4,798 m<sup>2</sup>) : 5 exhibition rooms, 11,000 pieces of heritages and historical materials
  - . National Herbarium (3,771 m<sup>2</sup>) : 830,000 pieces (42 plants, 37 insects, 4 others)
  - . Sees Bank (91 m<sup>2</sup>) : 4,814 species (domestic 1,695 / overseas 3,119)
  - . 6 buildings including Tropical Plant Resources Research Center (3,834 m<sup>2</sup>, 3,000 species), Temperate House (1,810 m<sup>2</sup>, 423 species)
  - . Useful Plant Resources Center (2.7ha, Yangpyeong) : 6 buildings including Research area, Accommodation building, Temperate House and Vegetation Garden
  - . DMZ Botanic Garden (18ha, Yangu) : International Research Center, Exhibition Conservation Garden, Accommodation building
- Property : 1,128ha (Exhibition garden 100ha, wildlife conservatory 100ha, scholarship conservation forest 928ha)**





P A R T II

Korea National Arboretum  
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## Major Achievements of 2015

- 01 Enlarge Achievements and Strengthen Public Relation Using the Results of the Research
- 02 Secure Research Infrastructure to Promote National Forest Biodiversity
- 03 Establish In-situ and Ex-situ Conservation, and Infrastructure Restoration of Rare and Endemic Plants of the Korean Peninsula
- 04 Expand the Role of the National Focal Point of the International Agreement
- 05 Expand Garden Culture to Promote the Garden Industry to the New Growth Motive
- 06 Stable Conservation Management of the Gwangneung Forest, the UNESCO Biosphere Reserve



# 2015 highlight

Korea National Arboretum was separated from the Central Experimental Forestry Station of the forestry research institution on May 24, 1999 for the successful promotion of the Gwangneung forest conservation plan which was set up as the counter measure of the government in 1997, and is responsible for a variety of roles in plants and ecosystems as the best research institution of forest bio species established in the country.

## 01

### Enlarge achievements and strengthen public relation using the results of the research

Promotion of public relations planning through the results of research projects for many years, raise the status of the Korea Forest Service and the Korea National Arboretum through the expansion of public relations, expand research achievements and MOU through expansion of providing public data.

## 02

### Secure research infrastructure to promote national forest biodiversity

Over fulfillment of the target securing the forest bio species, explore new variety. unrecorded species and collect specimen of unsecured from the Korea National Arboretum, strengthen forest biology systematics research to secure National biological sovereignty.

## 03

### Establish in-situ and ex-situ conservation, and infrastructure restoration of rare and endemic plants of the Korean Peninsula

Ex-situ conservation of 74% of endangered species to achieve international level (GSPC 2020, 75%), distribution survey and monitoring for the assessment of rare. endemic plants threat.

## 05

### Expand garden culture to promote the garden industry to the new growth motive

Support policy development to reflect social issues and expand garden culture recognition, run and exhibit programs of garden culture in living life.

## 04

### Expand the role of the National Focal Point of the International Agreement

Establish EABCN (East Asia Biodiversity Conservation Network) operation system, successful initiation of Green Road Project of Central Asian Forest Biodiversity Conservation, implement domestic and international cooperation projects for promoting GTI (Global Taxonomy Initiative).

## 06

### Stable conservation management of the Gwangneung forest, the UNESCO Biosphere Reserve

Achieve 6 straight years of zero wildfire launching customized wildfire prevention and public relations activities, monitoring key population, old and large trees and abiotic environment, promote Gwangneung forest management for the cooperation and coexistence with the community.

P A R T III

Korea National Arboretum  
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## Major Management Projects of 2015

- 01 Gardens & Education Division
- 02 Plant Conservation Division
- 03 Forest Biodiversity Division
- 04 General Affairs Division



## 01 Gardens & Education Division

### 1 Gardens and Forest Management

#### Garden Renovation

The gardens are under renovation during recent 4 years, and in 2015, they were created based on 13 sub-themed gardens on the basis of plant taxonomic evolution concept. We have transplanted 8 species of tall trees, 15 species of shrubs, and 10 species of herbs, total 864 pieces in 18,280m<sup>2</sup> of total area, and planted 9,820 pieces of herbs of 23 species, and 1,655m<sup>2</sup> of grass.

#### Garden Reorganization

On top of that, we have reorganized the Climbing Plant Garden and the Rose of Sharon Garden, we have created the growing environment basis to 1,800m<sup>2</sup> sized Lily Garden, and we are also planning to plant 104 species. We have planted 424 pieces of 42 taxa of 25 genes from 11 families including *Lonicera coerulea* var. *edulis*, also planted 754 pieces of 31 species from 5 families including *Carex bostrichostigma* in the Grass Garden.

#### Garden Plant Management

The newly planted and transplanted plants are input in the Plant species management program and their history are in management. In 2015, 669 pieces of 56 species including *Kamtchaka-bugbane* are formally registered, and 5,379 pieces of 240 species including *Chloranthus japonicus* are temporarily registered.

#### Open The Seasonal Exhibition and Livelihood Garden Competition

The garden 'Dreaming Garret' which was displayed in the 2015 Korea Garden Show, was installed in Korea National Arboretum's garden and was opened to the public, and to improve the visitors convenience, we have reinstalled 17 information panels and 2,700 pieces of plant name labels.

Also have constantly surveyed the plant species in the exhibition gardens, that we have modified the error of 6 species among 515 in the Ornamental Tree Garden, and 6 species among 71 in the Sensible Garden to provide correct and exact plant information to the visitors.

In 2015, we have opened various exhibitions by each season, to inform the wild flowers and the garden, are as follows ; "Sarangbang Garden" (Guest room garden, 3.26~3.27), "See the garden through the arboretum" in Korea Garden Show (4.24~5.10), "Our plants disappearing and only seen in our land" in Rare and Endemic plant exhibition (5.4~5.16), "Wild flowers blossom in our life" in the Blue House Sarangchae Wildflower Exhibition (5.5~8.2), "Sarangbang Garden, Tasty Forest" in the returning to rural life of the Ministry of agriculture and food expo (6.5~6.7), "See the plant evolution through the fern" in Fern exhibition (6.11~7.4). 8 teams have won The 4th Korea National Arboretum

Livelihood Garden contest, have been displayed for 2 months and have been donated and installed in the community. Displaying "Wild Flower Garden in the abandoned land" in the Seoul Garden Expo, we have addressed the message on strong adaptation of the native plants in the garden using the purification function of the plants, and they are still in the scene.

#### Plant Clinic Information Center and Volunteer Work Program

There are many volunteers who are interested in plants, we have had 356 volunteers during 72 programs, and we were designated as '2015 Superior Volunteer demanding place'



### 2 Tropical Plant Resources Research Center Management

#### Limiting Tropical Greenhouse Open Time

The Tropical Plant Greenhouse is restrictively opened 7 times a day accompanied with internal educated forest interpreter's guide from February to November, and total 25,706 people have visited.

#### Special Exhibition Using Tropical Plants

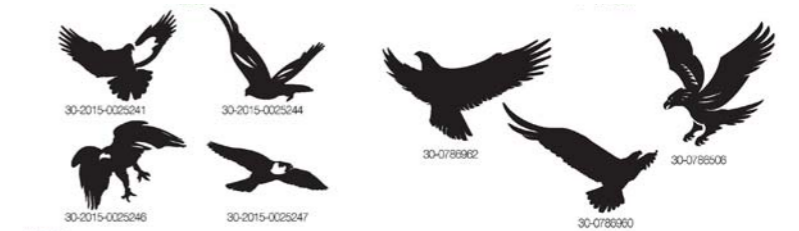
Special exhibition using tropical plants was opened and tropical water lily exhibition has also taken place. And the Mini Gardening exhibition using tropical plants was opened twice.

#### Tropical Plants Breeding Management and Exhibition Environment Maintenance

We have improved, filled up, fertilized and sterilized the soil 4 times, and 15 times of pest prevention as the breeding management for the plants inside the Tropical Plant Resources Research Center, and for the bio species outside the Tropical Plant Resources Research Center, we have installed the 'Bird saver' as a safeguard, to reduce the birds kill hitting the glasses. This 'Bird saver' have been registered in 7 cases of design application.



Tropical Plant Resources Research Center



25,706 people

number of visitors to the Tropical Greenhouse from February to November.



### 3 Useful Plant Resources Center

#### Propagation, Conservation and Operating Management of Useful Plants

Propagation, Conservation and Operating Management of Useful Plants

In the Useful Plant Resources Center, we are collecting, propagating and managing domestic and foreign useful plants. We have propagated 152 species of secured plants to 4,523 pieces including *Hosta yingeri* S.B.Jones (Heuksando lilly), *Justica procumbens*, and for the Passport data management, we have arranged to manage with the history and name label to the 4,390 pieces of 1,698 species. 365 pieces of 208 species are domestic species including *Sarcanthus scolopendrifolius* Makino, *Ribes burejense* F.Schmidt, and 426 pieces of 297 species of foreign species including *Coelogyne macdonaldii*, *Trichocereus andalgalensis*.

We gave 420 new plant names including *Illicium anisatum*, hazel, consequently it has become 9,942 pieces through 7 times of The Garden Plants Checklist Committee.

#### The Maintenance of the Green House and Facility Management

For efficient collection and propagation, we

are managing thoroughly the temperature control, irrigation, boiler maintenance and fire prevention. The prevention of thysanoptera, mealy bug, mite, powdery mildew, aphid have been done 2-6 times a year.

#### Exhibition

We have participated in the Goyang International Flower Foundation (4.27~5.10), and created the exhibition booth using 105 species including *Ribes burejense* F.Schmidt (edible & medicinal), *Astilboides tabularis* (medicinal), Small coralberry (*Ardisia*, ornamental). Above this, we have participated in the Korea National Research Resources Bank exhibition (5.26) opened at the Parliament, and we have decorated the center exhibition garden of the Forest Museum in the name of "The Future of the Forest" (September~October) with 1050 pieces of 6 species including *Gentianales*, *Adenophora taquetii* H.Lev., 300 pieces of Manchurian chrysanthemum, 530 pieces of 7 species including Goldhill, *Miri* of *Coreopsis* species, 230 pieces of German-garlic (*Allium senescens*), and *Allium taquetii* H.Lev. & *Vaniot var.taquetii*.

4,523 pieces

pieces propagated domestic and foreign useful plant resources



Samoonyouchi



Ryuwonchongbo



History of Korean Provisional Government

### 4 Forest Museum Management

#### Storage and Management of the Heritages

We have established more than 10,000 high-quality DB, registered 297 pieces of heritages including *Eea*, *Song gejamok*, report paper of heritage storage, 148 pieces of forestry related posters in the sample heritage management system in processing the preservation and arranged, systemized (standard cultural heritage management system) the heritages we have. Based on the national cultural heritage online management and opening to the public regulation (the instruction of the Ministry of the culture and sports), it is to provide the data in establishing high-quality DB according to high-qualifying national heritage data and opening to the public.

#### Securing Forest History Data

We have bought to secure 248 pieces, and 7 kinds of heritages including *Samoonyouchi*, *Ryuwonchongbo*, ancient books and documents. *Samoonyouchi* is a book with transfer of the capital, geography, and from humanity to vegetation, flowering plants and fruits, *Ryuwonchongbo* is an

encyclopedia of Joseon dynasty with on plants.

#### National and Public Forest Museum Officials Workshop

We have opened the workshop (12.3~12.4) with 14 National Mountain Museum provincial government staffs to seek the revitalization method of between forest museum network.

#### Management of the Forest Museum Exhibits

We have modified 15 exhibition descriptions (indicate the place of origin) and exchanged damaged panels.

Also, repair and maintenance of 10 interaction control facilities like interaction sensors and infrared camera including pine trees and history of mountain management and greenization, and also repaired 30 spots of automated guide in forest cultural center and forest creatures center.

#### Exhibition

We have opened 4 times of special exhibitions with the theme of forest creatures and culture and botanical class work exhibition.



Botanical Class Special Exhibition I



Botanical Class Special Exhibition II



Botanical Class Special Exhibition III



Greeting from KNA Director General



Prof. Bae, Gi-Dong, Hanyang University



Bae, Jae-Soo Researcher, National Institute of Forest Science



## 5 Wildlife Conservatory

### Management of Forest Animals and the Breeder

We are breeding 29 animals of 11 species including tiger, and for the safety of visitors and animal convenience, we have repaired and improved the breeder's door, wire net (3 spots are boar, birds of prey, badgers' cage), and installed sunshade to provide shade (3 spots of 340㎡ in asiatic black bear, wolf and boar cage).

To prevent infection, foot-and-mouth disease vaccination (once) and avian influenza vaccination (6 times) were done.

We have collected the waste of 6 endangered animals of 3 species which are Siberian tiger, Asiatic black bear, wolf, as a routine treatment, and send them to the quarantine medical inspection. It appeared to be no special pathogenic agent. The pre-examination, medical examination and treatment of the animals are done once a three months, we have taken action of breeding management and prescription according to the medical examination of the animals (12 species). The prescriptions of external use medicine, antidiarrhea, nutrient, antibiotic, and vermicide were given to each different species.

### Opening Dates of the Wildlife Conservatory

To provide various convenience to the visitors, the wildlife conservatory is open from May 15 to Nov. 14, for 6 months. Open section starts from the Needle Fir Trail to Wildlife Conservatory, 2km long.



Siberian Tiger

## 6 Korea National Arboretum Education Program

### Strengthen Forest Education Program by Class

240 youth and their families have participated in 4 times of 'Exploring naturalized plants' for the research based education program model application. To promote on this program, there had been a presentation on the "Rare and Endemic Plant Conservation through Education and Network Activities : A Case Study of Korea National Arboretum" in the AZEC2015 in December.

Infant forest experience program is constantly gaining popularity, particularly we have differentiated the program in applying the traditional folk games. Total 3,397 people participated in 64 times of programs and among them 288 people were family member of 97 families.

Started from 1997, "Green Class" to the youth with more than 20 years of tradition, 8,719 of primary school students and 1,412 of middle and high school students have participated.

Above this, there were 68 times of 'Botanical class' to the adults. And we had Horticulture class and Native Plants Photograph class.

3,397 people

Infant participated in the Infant Forest Experience Program

81,382 people

Number of people participated in the Education Program from February to November

### Special Education Program during the vacation

During the summer vacation we had 2 times of "2015 Loving Earth Explorers' Summer Family Forest Camp with Korea National Arboretum" with 131 persons of 40 families participated. To promote this program, there have been the poster presentation with the title "Summer Forest School Program from Korea National Arboretum" in AZEC2015 in December.



### Increase Relaxing/Healing Interpretation Program

Recently, the concern to the mental stability of the soldiers are growing, and we have implemented 'Soldiers' forest healing program', and 556 soldiers have participated during 20 times of the program. Besides 29 times of 'Forest Prenatal Care Program' for pregnant couples, and 149 people of 79 families have participated, and 29 times of 'Gwangneung Forest Mountain Bird Exploration Program' and 245 people have participated. Above this, 297 people participated to the 8 times of 'Visiting Green Class' for the disabled people or disadvantaged people who have difficulties to visit Korea National Arboretum. To promote this program, there had been a poster presentation with the title "The Arboretum goes to School : A Case Study of Korea National Arboretum".

### Korea National Arboretum Interpretation Program

We are providing a variety of explanations in the exhibition garden, tropical greenhouse and forest museum like tour guide to the visitors who are visiting Korea National Arboretum for the first time.

### Forest Education Manual Publication and Commercialization

To expand the forest education program, we have published 'Forest Education Program Data related with the Traditional Folk Plays', and distributed to Korea Forest Service, local government, arboreta, and 130 related institutions, and commercialized the magnetic story telling book 'There's animals in the plants' and 'Tree importance recovery education instrument' made with 21 species of native and planted plants.

### Obtain External Certificate of the Forest Education Program

We have developed sustainable forest education program 'Our Cultural Heritage (Play with our culture in the forest)' and have obtained the UNESCO ESD which is the UNESCO sustainable development education official project (July).



Education Program and Interpretation Program of KNA



Education Manual

‘There are animals in the plants’

- ⊙ In connection with various plant names and animal names, this is a story telling book for fun and eqsy access, and is a manual that forest education experts can use in the forest interpretation or forest education.
- ⊙ It is composed with magnetic book and photographs, 15 photographs of plants, and 15 of animals, total 30 photographs explaining in relation with plants and animals.
- ⊙ There are explanation on the back of the photographs, it is easy to use and portable convenience, and it makes us possible to do the indoor education in case on the rainy day, because there is a magnetic on the book and on the photographs.

Example of the Story Telling Book Composition, 15 kinds in total.

Animal Name

- 1 Dog
- 2 Turtle
- 3 Frog
- 4 Cat

Plant Name

- 1 Foxtail (Gangajipul - In Korean Dog grass)
- 2 Spicata ramie (Geobuk Ggori – In Korean Turtle tail)
- 3 Duckweed (Spirodela polyrhiza – Gegooribap –In Korean Frog meal)
- 4 Gweng nuni



Original Education Book



Final Version of the Education Book



Education Tool

- ⊙ This tool is an experiment education tool applied with wood sample and arm scale comparing the weight of the wood to know the gravity.
- ⊙ It is composed with 21 species of native plants and planted plants found in our forest, you can compare not only the weight but also the texture and the color of the woods.
- ⊙ This is made in the form of a box, convenient to carry and possible to use in the class by team.
- ⊙ In this box, there is a table with gravity of wood species, this is used not only in the class but also it is possible for the students verify and compare the name of the wood and the gravity, and arrange them in order.

Wood Gravity (21 species)

Royal Foxglove Tree 0.28	Japanese Cedar 0.33	Weeping Willow 0.45	Sun Tree 0.46	Ginkgo Tree 0.47	Pine Tree 0.50	Korean Pine 0.50
Larch 0.55	Kalopanax 0.56	Korean Poplar 0.56	Cherry Tree 0.56	Dogwood 0.59	White Oak 0.60	Ash Tree 0.68
Linden Tree 0.68	Yellow Locust 0.69	Zelkova 0.70	Ash Tree 0.71	Birch 0.72	Apricot Tree 0.82	Oriental Oak 0.83

Actual gravity could be a little different.

This is a bronze winning tool of the 2014 the 6th National Forest Interpretation Experiment Education Tool Competition. Prize winner : Korea National Arboretum forest interpretater Park, Yong-Sik



Original Education Tool



Final version of the Education Tool



## 02 Plant Conservation Division

### 7 Seed Bank Management

#### Seed Bank Facility Management

3 units of the long-term storage temperature is 18°C with the humidity of 40%, and 4 units of the short-term storage keep the temperature on 4°C with humidity of 40%.

#### Seed Storage Management

Seeds are recorded through thorough record management from collection to storage. Fill in the table, identify the quantity, and input data by plant species and process classification. The seeds are managed as follows ; Seed receipt → peel off the skin, selection (seed registration) → dry, put in the bottle → seed data input → seed storage. We have input the data of 450 pieces of peeling, selecting, put in the bottle and storage seed management in 2015.



DMZ Native Plants Botanical Garden

### 8 DMZ Botanic Garden

#### DMZ Plant Management

We have planted 159,730 pieces of 435 taxa including diamond-bluebell (*Hanabusava asiatica*) in 4 exhibition gardens of northern district botanical garden. We have trimmed 700 pieces of maple and mountain-ash, and installed supporting stand. We are also doing the plant history management through 1,025 cases of input including rhododendron and 671 cases of name label repair.

We have propagated 100,822 pieces of 134 taxa including *Caragana koreana* Nakai, transplanted 401 pieces of 88 taxa of transferred plants, 122 units of pine trees donated by the Yanggu National Forest Management Office, and planted 400 units of 5 taxa including Siberian Crab that was donated by Mulhyanggi Arboretum.



Seed Germination Experimentation

#### Large Size Trees Transplanting and Landscaping

We have planted 10 large sized trees of 2 species including Multistem Japanese Redpine and transplanted 156 large sized trees of 24 species including Lace-bark Pine for the opening of DMZ Botanic Garden. In addition, we have planted 5 large sized pine trees, and installed supporting stand to 300 units of planted zelkova.

#### Internship Training

We are providing internship including field training to the students attending landscape architecture and forest resources. 8 students have attended in the internship, and in addition, those who want the field trip, we have shown the management scene to 185 students of not only the university student but also to middle and high school students.



Seed Bank Storage

## 03 Forest Biodiversity Division

### 9 Herbarium Management

#### Collect, Produce and Systematic Management of Forest Biological Specimen

We have exchanged 9 times, total 1,710 pieces of specimen with 6 institutions including Taiwan Forest Academy. We are expanding domestic and foreign exchanges such as ; Beijing Herbarium of Chinese Academy of Science (forwarded: 200pieces, received: 110 pieces), Gonmyung Herbarium of Chinese Academy (forwarded: 200pieces), Molton Arboretum of United States of America (forwarded: 200pieces), Central Herbarium of Uzbekistan (forwarded: 200pieces) and National Forest Herbarium (forwarded: 200pieces, received: 200pieces). Especially, we have exchanges with new institutions including Central Herbarium of Uzbekistan, Molton Arboretum of United States of America, Forest Herbarium of Taiwan, and National Forest Herbarium. Recently, donors are increasing. We have received 5 times of plant specimen, total 45,299 pieces, 2 times of insect specimen, total 3,702 pieces, 2 times of animal specimen, total 286 specimen. Accordingly, there had been the 4 times of donation ceremony of specimen. In addition, there had been 34 cases of lending and return.

*Hanabusava asiatica* specimen collected in Geumgangsán in 1913.



#### Korean Plant Name Index

We have carried out 3 times of Native Plants Standard Index Review to consider English name on 4,173 species of native plants for the commemorative project of 70th anniversary of liberation day 'Native Plants Sovereignty.' Besides, we have opened 3 times of Cultivated Plants List Review of 9,888 species in total to revise cultivated plants list.

#### Specimen related Education

Korea National Herbarium is limitedly opened to those who are majoring related specialty, and to the guests from abroad. In 2015, Korea National Herbarium was opened 47 times including specimen inspection, and 3 times of education was done to the arboretum coordinators, and forest education experts.

### 10 Korea Biodiversity Information System Management

#### Korea Biodiversity Information System Maintenance and Management

We are continuously maintaining the Korea Biodiversity Information System to improve the service and data which is the most large biodiversity information in the country. In 2015, we have maintained existing fungi information data, and for the copyright protection, we have improved the automatic watermark service. We have improved also data transfer method to be easily exposed in the private portal site.

#### National Based DB Support Project ' Establishment of National Biodiversity DB Open System'

We have established convergence biodiversity information DB useful in various field like history of 500 species plants, culture, food, related biodiversity, environmental and industrial resources utilization, and expanding related information, and we have opened 6 species in new through the Open API for opening the information to the public.

1,710 pieces

Exchange specimen with 6 institutions





### Promotion of Forest Administration 3.0 through Opening Information

We have led to open the public data in providing 21 times, 24,564 cases of original data according to the utilization purpose of education material, scholar material to companies, organizations, individuals, as 8 companies including Daekyo, Morning Calm Arboretum, Daesang Information Technology, and

Jinju National Museum, Daegu Hwawon High School, Korea Forestry Promotion Institute, Busan City, Ansan City, Gumi City. Especially, we have provided 40,970 cases of biological informations through the MOU with 'Chunjae Encyclopedia' and 'Naver Encyclopedia', and provided 651 cases of plant information to LG Yonam Foundation for the service development of 'Forest.'

### Mobile Information Service based on Beacon

We have installed 169 beacons and developed Korean and English app for the information service to provide mobile guide through the new generation low-power telecommunication technology, the 'Beacon', using Bluetooth. You can see the information on your smart mobile phone on tour guide, forest interpretation data and visiting record.

# 24,564

pieces

Cases of original data provided to companies, organizations and individuals



The spring of Yukrim Lake



## Commemorative Project of 70th Anniversary of Liberation “Rectification of Our Plant Sovereignty”

### What is “Rectification of Our Plant Sovereignty”?

The scientific name of the favorite pine tree that Koreans like the most, is *Pinus densiflora* Siebold & Zucc., which means the pine tree of flowers grow in cluster. The problem is when you search the scientific name on the internet, you will find the English name, Japanese Red Pine. Pine tree grows in Korea, Japan, China and the Maritime Province of Siberia. In Korea the pine tree grown all over the country except high alpine region, but in Japan, it grows in 3 islands out of 4. In China it is called Red pine, in Japan it is called *Matsuo aca Matsuo*, but it is called with 'Japanese' in English and in German.

Plants do not grow, divided with the border like countries. Pine tree grows throughout the country and in Japan, but in 1860's, the botanist Karl Theodor Ernst von Siebold who lived in Japan have first introduced pine tree to international community, and it became Japanese red pine. Therefore, those who know only English name, will understand the pine tree as Japanese tree. But this is not only the case of pine tree. In case of *Aralia elata* (lq.) Seem. that we like to eat, have the English name 'Japanese angelica tree'

The name of the plant does not only provide the data of the plant but also gives the ecological value and historical meaning at the same time. After the Nagoya Protocol in effect on Oct. 12, 2014, the sovereignty of the plant origin have been

reinforced. In this situation, our plants sovereignty is important than ever. Plants sovereignty can be secured through various ways, but it is the only way to secure them is to inform actively our native plants with English name with 'Korea' in them. Plant sovereignty is very important in securing the identity and most basic sovereignty and the existence of our people.

The Korea Forest Service and the Committee for commemorative project of 70th anniversary of liberation have given proper names to our plants that was considered as foreign plants, and the plants that did not have any names, were named in English. We have arranged English names on 4,173 species of our plants native of Korean Peninsula to inform the international community that they are our plants.

### The Result of “Rectification of Our Plant Sovereignty”

We have published the English Names for Korean Native Plants, reviewed 4,173 species of Korean Peninsula native plants and gave them proper and new names.



Cover of English Names for Korean Native Plants

Korean Lady's Slipper English name page

Korean Red Pine tree English name page

Three-dimension promotion using online and off-line Naver portal site.

- Continuous display of banner on the Naver main page to attract interest.



Naver portal main

Naver news main

Naver knowledge-in main

Naver cafe main

Card News 01

- Display 3 kinds of card news using Naver post

<Declaration of the liberation of our pine tree>



Card News 02

<Our plants growing in our land is known as Japanese plant in foreign countries?>



Card News 03

<Lost history of Korean plants that German Priest has left 100 years ago>



Provide information in the most fast and easy to the public through the broadcast.



KBS news reporting

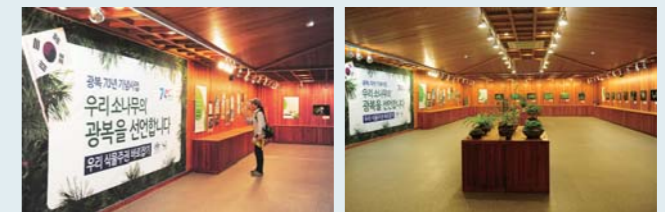
SBS news reporting

YTN news reporting

Form the awareness and consensus of the public through various exhibition.

8.5.~8.15.

「Rectification of our plant sovereignty」 exhibition (Korea National Arboretum Special Exhibition Room)



8.11~8.20.

「Rectification of our plant sovereignty」 exhibition (Daejeon Government Complex central hall)



9.14.~9.30.

「Rectification of our plant sovereignty」 out-door exhibition (Korea National Arboretum Forest Museum main garden)



10.2~10.8.

「Rectification of our plant sovereignty」 Korea Stamp Exhibition promotion booth exhibit (Daejeon Trade Exhibition Center)



10.3.~10.13.

「Rectification of our plant sovereignty」 Seoul Garden Expo promotion booth exhibit (Seoul Peace Park)



11.11~11.13.

「Rectification of our plant sovereignty」 exhibition (The hall of member of the National Assembly)



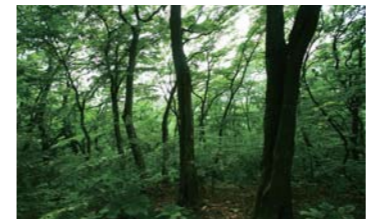
04 General Affairs Division

11 Gwangneung Forest Protection and Management

Safe Protection of the Gwangneung Forest from Forest Disaster

To prevent forest fire, we are running anti-forest fire headquarter, forest ranger, professional forest fire prevention team to protect Gwangneung forest that was protected during more than 540 years. Additionally, we have guided more than 11,000 visitors for the forest fire prevention, and a million signature-collecting campaign of forest fire prevention (995), and no destruction forest fire in Gwangneung forest (276) have been done.

We are also preventing the plant disease, and we are also running the plant disease preventing team and cleaning up the windfall blowdown and dead trees, and controlled oak wilt disease to 628 oaks. Also, we have controlled pine wilt disease injection to 11,848 units of pine trees.



Hornbeam colony of Gwangneung forest

Management System Improvement to the visitors

We have established the system to link internet reservation system with mobile, and we have also stabilized the system and strengthen the security. In addition, we have installed 4 more AED (Automated External Defibrillator) for medical emergency of the visitors.

The 'Culture Day' to the culture flourishing policy

Admission fee is free every last Wednesday of each month and on the children's day to satisfy the visitors.

Implementation of Afforestation Project for the Gwangneung Forest Ecology Conservation

To main healthy Gwangneung forest, we have produced 466m<sup>3</sup> of timber in afforestation like cutting and pruning.

12 Expand Forest Research Building and KNA Visiting Facilities

Expand Korean National Arboretum Visiting Facilities

We are building second parking lot, and visitor center to provide convenience to the visitors and to separate office to secure specimen preservation and exhibition space. The completion date is planned in the end of 2016.

Build Research Building

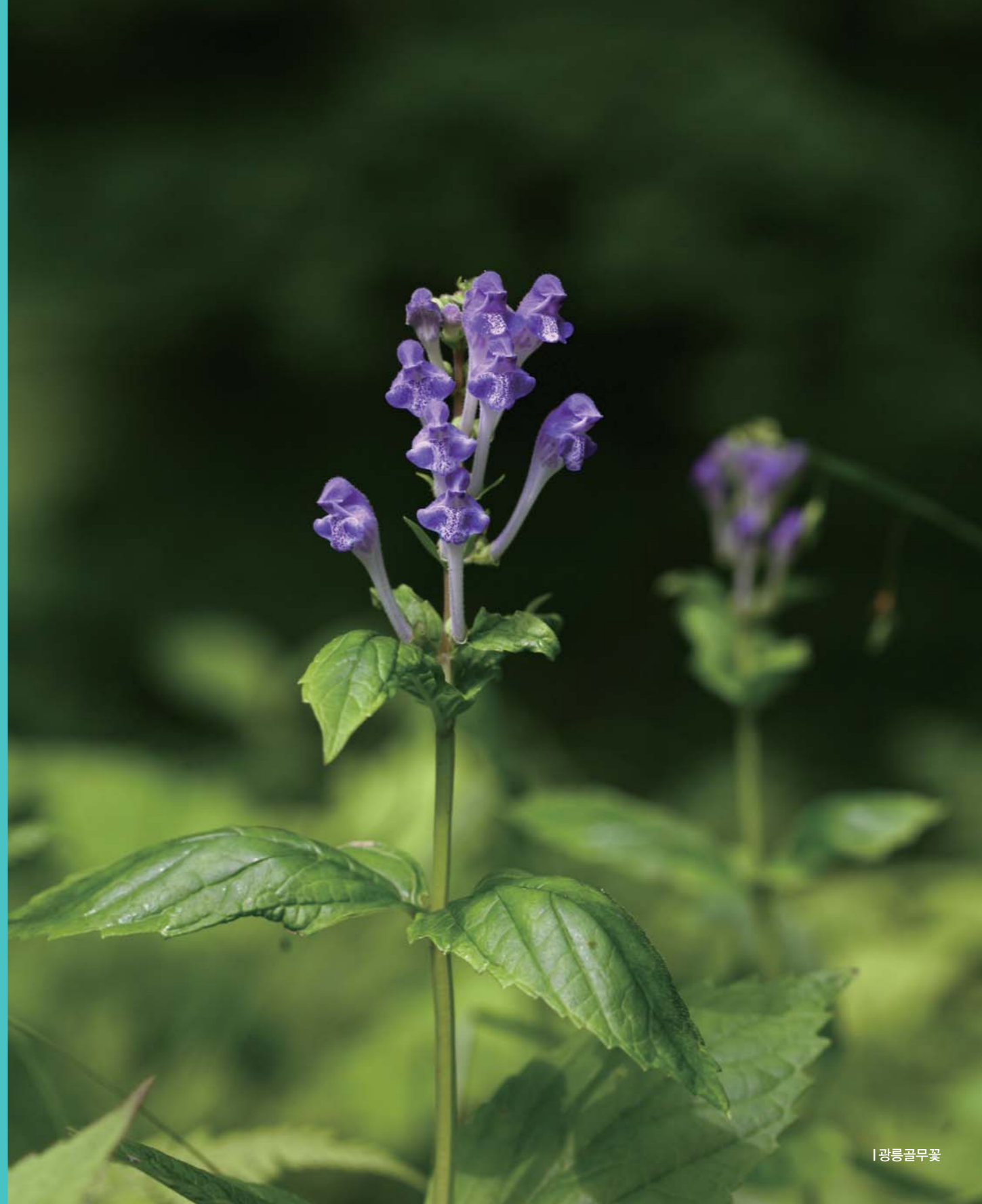
We are building future-oriented composite research building to implement research infrastructure to strengthen forest biology research function.

# P A R T IV

Korea National Arboretum  
Annual Report 2015

## Major Research Projects of 2015

- 01 Forest Resources Survey and Informatization Research Field
- 02 Forest Biological Resources Conservation and Establishing Application Infrastructure Field
- 03 Forest Recreation and Culture Research Field



# 01 Forest Resources Survey and Informatization Research Field

## 1 Actual Condition of Forest Genetic Resources Protection Reserve Designation and Plant Resources

**Subject Summary** The flora within the Forest Genetic Resources Protection Reserve and proposal for the conservation and efficient management through ecological environment systematic survey on the protective valued plants.

**Key Results** Survey on the plant resources status and make a distribution map within the Forest Genetic Resources Protection Reserve Vegetation survey and movement research of the protective valued plants

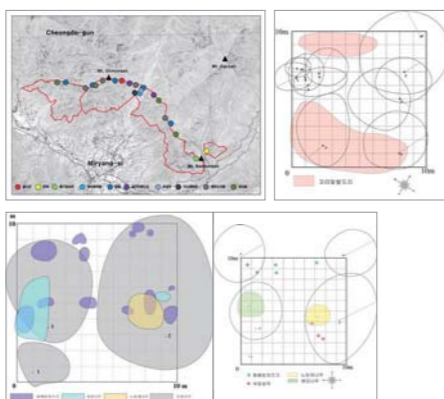
### Development Performance

Survey of the flora within the Forest Genetic Resources Protection Reserve : 8 locations of 4 districts  
 \*Secured 1,397 pieces of confirmative specimen of 547 taxa  
 Protective valued plants environment survey : 9 taxa including *Utricularia yakusimensis* Masam.  
 Plant resources distribution map : 56 taxa including nodding-lily (*Lilium cernuum* Kom)  
 Protective valued plants monitoring : 10 taxa including Korean Iris

### Performance Dissemination

Thesis Publication : 3 theses including Seokmoonbong vegetation structure and vascular plants (Korean Forest Society)

**Expected Effectiveness** Utilization of the basic data for effective management within the Forest Genetic Resources Protection Reserve  
 Systematic management plan and conservation through plant resources present situation identification  
 Strengthen management effectiveness through the unification of the Forest Genetic Resources Protection Reserve  
 Establish survey and changing monitoring system of domestic and foreign forest bio species distribution  
 Possibility for the present status survey and changing analysis of forest ecosystem key area biodiversity



- 1 The distribution map of plant resources <Unmoonsan>
- 2 Plant environment survey on protective valued targets <*Deutzia paniculata* Nakai of Unmoonsan>
- 3 Protective valued plants monitoring : Snake-sage of Unmoonsan <Left: 2010, Right: 2015>



## 2 Domestic and Foreign Potential Plant Resources Exploration and Resources Acquiring

**Subject Summary** Collect and select high possibility of industrialized plant resources through various functional and high value-added useful plant resources exploration

**Key Results** Establish useful biological resources base  
 Acquire useful plant resources which is the origin of bio-industry

### Development Performance

Collect domestic useful plant resources  
 Collect useful plant resources for ornamental and ground cover plants : 40 species including *Dysophylla yatabeana* Makino  
 Collect useful plant resources for edible and medicinal plants : 40 species including *coastae-glehnia*  
Acquire foreign potential plant resources  
 Collect indigenous plant resources of Nepal : 34 species including *Phyllanthus emblica* L.  
 Characteristic assessment of collected plants : 114 species of useful assessment including type and use

### Performance Dissemination

Thesis Printing : 1 in the Korean Society for Applied Biological Chemistry  
 Thesis Publication : 1 in the Korean Society for Horticultural Science  
 Applied Breed : 1 Common Camellia (Winter Sun)  
 Media PR : 18 cases including Choun Biz and Asia Economics  
 Manpower Training : 1 doctor, 1 doctor's course, 2 masters

**Expected Effectiveness** Acquire plant species diversity and provide BT industry original material  
 Create new market in discovering forest plant resources with high useful value as resources  
 Foster new superior breed and upgrade selection efficiency  
 Use as research source material for local forest genetic resources utilization  
 Secure official foreign plant resources under ABS system  
 Forest genetic resources new breed nurturing promotion



- 1 MOU with Nepal DPR (Department of Plant Resources)
- 2 Notification of Transfer of Seeds
- 3 Applied Breed Common Camellia (Winter Sun)



● ● ● 3

### Taxonomic Review on Korean Peninsula Cyperaceae Plants

**Subject Summary** Establish accurate taxonomy through verifying distribution and character measurement on cyperaceae plants distributed in Korean Peninsula, and provide basic data to utilize forest resources on the publication of cyperaceae illustrated book

**Key Results** Establish cyperaceae taxonomy research for the forest plant resources Acquire evidence materials to secure Korean plant sovereignty

**Development Performance**

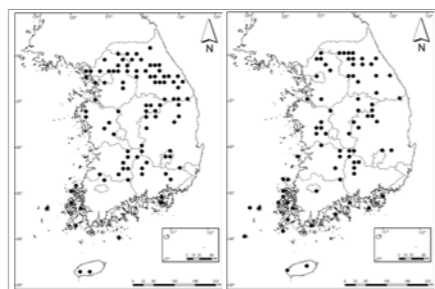
Distribution survey of cyperaceae plants : confirmed distribution of 45 taxa  
 Survey on the characteristics (21 characters of quantitative analysis, 20 characters of qualitative analysis)  
 Genetic information analysis : IR border, IR/LSC border, 5,422bp  
 Chromosome analysis : 250 cases of 42 taxa including Amur-galingale gene  
 Illustrated map : 40 taxa including two leaf-fimbristylis gene

**Performance Dissemination**

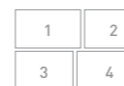
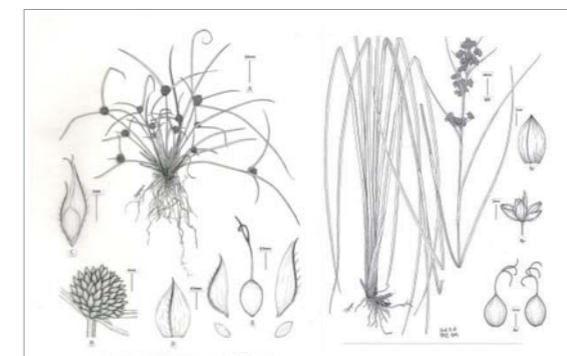
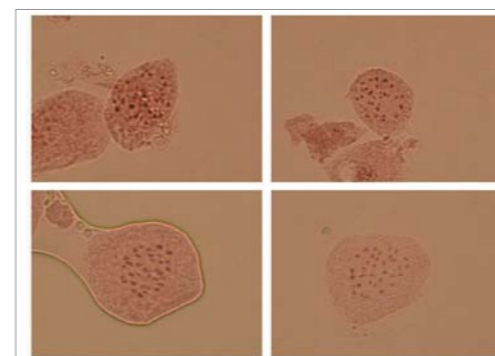
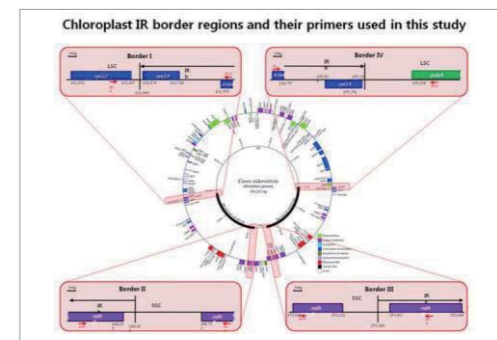
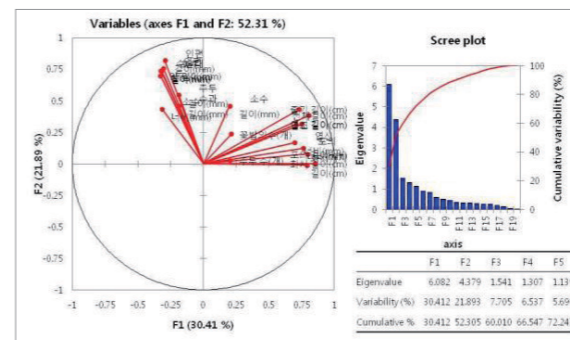
Thesis Printing : 2 theses including Unrecorded plants of the Korean Peninsula (*Eleocharis parvula* (Roem.& Schult.) Bluff, Nees & Schauer (Korean journal of plant taxonomy)  
 Thesis Publication : 2 theses including Diversification of the cyperaceae plants chromosome (Korean journal of plant taxonomy)

**Expected Effectiveness** Provide basic data for the utilization of key forest plant resources  
 Promote cyperaceae plants utilization through accurate taxonomic characteristics and identify the character  
 Acquire evidence to secure our plants sovereignty

Establish cyperaceae genealogy classification research for the forest plants resources  
 Produce cyperaceae plants distribution map and provide distribution information  
 Produce description and illustration for the accurate identification of cyperaceae plants Possibility for the present status survey and changing analysis of Forest ecosystem key area biodiversity



1 The field survey  
 2 Distribution map of cyperacea plants



1 Morphological character analysis  
 2 Genetic information analysis  
 3 Chromosome analysis  
 4 Produce illustration



4 **Advanced Korean Peninsula Forest Biological Specimen Infrastructure**

**Subject Summary** Complete the future utilization value of the specimen through strengthened securing space-time specimen, establish taxonomic research infrastructure through specimen and information management system completion, upgrade expertised and specialized research level through systematic specimen securing.

**Key Results** Collect domestic and foreign forest insects specimen (including type specimen) and original description  
Establish current situation analysis and research direction for possessing insect specimen in the Korea National Herbarium

**Development Performance**

Collect forest creatures specimen : 22,502 pieces (113% from the initial goal)  
Unobtained by the Korea National Herbarium (1,217 pieces of 114 species) secured small number of quantity (107 pieces of 27 species)  
Collect alpine area specimen (Jeollado, Jeju) : 13,320 pieces of 1,114species  
Acquire pollen vector specimen : 813 pieces of 43 species of drone fly family  
Secure specimen of special areas : Baeknyeongdo (2,882 pieces of 400 species, Taean (3,598 pieces of 534 species)  
Collect forest insect specimen of close area to the Korean Peninsula (Japan) : 1,500 pieces of 200 species  
Excavated 2 Korean unrecorded species and 2 new species  
Acquire lepidoptera supplement type (200 pieces of 65 species) and original description (936 pieces)  
Current status analysis of possessing insect specimen of the Korea National Hebarium : 4040,000 pieces

**Performance Dissemination**

Thesis Printing : 4 theses including Taxonomic re-examination of Korean Progonini tribe (JAPE)  
Thesis Publication : 5 theses including Report on the abies koreanan E.H.  
Wilson harming pest (Korean Society of Applied Entomology) Media PR : 1 case in media (KBS Gyeongin Broadcasting Center)

**Expected Effectiveness** Complete national management infrastructure of forest biological resources and arrange the base of securing sovereignty  
Accomplish hub role of providing good basic data needed in applied research  
Accomplish the role of professional taxonomic research institute in integrated service providing on/off-line taxonomic research data  
Achievement Significance Accomplish the fole of the representative North East Asian forest biological herbarium  
Establish research infrastructure of forest biological phylogenesis

- 1 Alpine survey area
- 2 Tephritidae family new candidate species *Acidiella n. sp.*
- 3 Calophyidae unrecorded species *Calophya nigradorsalis*
- 4 Microlepidoptera type specimen genital organs slide specimen
- 5 Thesis publication – Korean Pogonini tribe taxonomic research



5 **Research on Forest Lichen and Fungus Diversity**

**Subject Summary** Explore diversity through forest lichen and fungus distribution survey living in Korea and secure basic data for conservation and resource recovery

**Key Results** Secure lichen and fungus evidence specimen by district Secure Korean lichen and fungus strain and establish DNA bar code data

**Development Performance**

Distribution survey by district : lichen distribution survey in 2 locations, Jeju and East Sea Coast, and fungus distribution survey in 16 locations in Gyeonggi, Gangwon, Jeju western forest  
\*Lichens : Collected 206 pieces of 49 species in Jeju, 1,212 pieces of 80 species in East Sea Coast  
Fungus : Secured 2,401 pieces of specimen of 598 species, 218 pieces of strains of 96 species, 300 pieces of DNA bar code  
Establish mega DB of lichens : Secure data including species description in Korean & English, classification key, microphotograph, DNA bar code, isidium material analysis, distribution information on 123 species of small lichens  
Excavation and announcement of new species and unrecorded lichen and fungus  
\*Lichen : 4 new species, 12 unrecorded species, Fungus : 2 new species, 3 unrecorded species

**Performance Dissemination**

Thesis Printing : 9 theses including announcement on new species and unrecorded of lichen and fungus (Mycobiology)  
Thesis Publication : 5 theses including mycomycetes of Deokjukgundo (Korean Society of Mycology)  
Media PR : 50 cases related to poisonus fungus and lichens in media (KBS 2TV 'Morning')  
Publication : 1 case of lichen ecological illustrated guide

**Expected Effectiveness** Establish species diversity and taxonomic system of lichens and fungus recorded in the country  
Secure base for the utilization of new species and new materials of superior strain collected in the country

Utilize as a origin resources for domestic forest genetic resources utilization research  
Establish biological resources national management infrastructure and secure the foundation of sovereignty

- 1 The candidate species of new breed
- 2 Publication of A Field Guide to Lichens
- 3 News on toadstool

6

### Establish infrastructure for securing sovereignty of indigenous plants traditional knowledge

**Subject Summary** Establish infrastructure for securing sovereignty of traditional knowledge through establishing general DB of tangible and intangible data including the technology of transmission on Korean indigenous plant resources

**Key Results** Secure additionally the traditional knowledge (utilization on medicinal) on uninvestigated area  
Secure information (classification, utilization, cultivation, etc) on plants included in ancient documents for the verification of traditional knowledge on indigenous plants revealed through field survey  
Plant taxonomic comparison and revision (ancient documents) on indigenous plants

**Development Performance**

Excavate ethnobotany utilization of uninvestigated area (Chungcheongdo 274, the Civilian Contro Line 286, South Sea Island 129 taxa) and secure 29 cases of new informations on utility by use (medicinal and edible)  
Secure 1,880 pieces of plant specied data for the plant taxonomic comparison of indigenous plants described in ancient documents  
Secure research information through interpretation on 100 species of plant species data (classification, cultivation method, use) described in the ancient documents (Limwon gyungjae, Sanrim gyungjae, Donggeui bogam, Bonchogangmok)  
Verify the possibility of reproduction on 11 species of plants after reviewing 75 species of technological information among the technology (cultivating technology) described in the ancient documents  
Secure 15 species of plants (seed, body) to create ethnobotany garden and other exhibition gardens

**Performance Dissemination**

Thesis Printing : Wild edible ethnobotany in Ulleungdo (Genetic Resources and Evolution Institute)  
Patent Registration : stem cell cultivated fluid composition including butterbur extract (patent application number : 10-2013-0090961)  
Training Manpower : 3 Masters

**Expected Effectiveness** Industrial, cultural use through providing traditional knowledge general DB data  
Create high value providing traditional knowledge contents (food, health)  
Use traditional knowledge in arboretum, botanical garden and forest museum education  
  
Maintain information on indigenous plants traditional knowledge in critical situation  
Establish the base of securing sovereignty on Korean ethnobotany traditional knowledge  
Meet the standard of traditional knowledge of WIPOEstablish research infrastructure of forest biological phylogenesis



1	2	3
4	5	6

- 1 The result of ethnobotany by district
- 2 Imwon economics
- 3 Ethnobotany (dry)
- 4 Translated content
- 5 Collect unsecured ethnobotany
- 6 Ethnobotany (edible aster scaber root)



7

### Assessment and monitoring of invasive types of naturalized plants in the forest

**Subject Summary** Propose the method of rational management of exotic plants and stable conservation of forest ecosystem through the assessment and monitoring of invasive naturalized plant types in the forest.

**Key Results** Secure data on the invasive exotic plant diversity and invasive types in the forest  
Propose the method of threat assessment and rational management of alien plants ecosystem

**Development Performance**

Monitoring on invasive alien plants in the forest : Forest genetic resources conservation area, forest trail of DMZ surroundings, 3 mountain trails by territory – monitoring on distribution and diversity  
Monitoring escaped alien species in arboretum and botanical garden : 5 arboreta and botanical gardens - diversity and escaping type and distance, density survey and monitoring  
Survey and monitoring of new distribution area : monitoring on ports and sea sides, pastureland, industrial roads – spread trend and inflow route, unrecorded plants, new distribution area  
Analyze characteristics and make educational materials : verify 211 species of invasive exotic plants in the forest, threat assessment on 125 species, propose management method, publish data package

**Performance Dissemination**

Thesis Printing : 2 theses including unrecorded alien plants  
Thesis Publication : 7 theses including statement of unrecorded alien plants and monitoring results  
Seminar Presentation : National Institute of Ecology – Ecosystem vulnerable to climate change (alien plants)  
Policy Proposal : 1 case proposed management method 'invasive alien plants in the forest'  
Publication : 1 case of published data package 'invasive alien plants in the forest'

**Expected Effectiveness** Awareness of threatening alien plants assessment and rational management method in the forest ecosystem  
Awareness on the arboretum and botanical garden sun rise alien plants diversity and threatening ecosystem  
Acquire threat assessment method of alien plants that disturb ecosystem following the climate change  
  
Rational management of the invasive alien plants for the stable forest ecosystem conservation  
Examination on the alien plants planted in the arboretum and botanical garden and secure management plan  
Inspire recognition and education and Pr on the invasive alien plants threatening in the forest

1	2	3
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- 1 'Statement of unrecorded species and survey results'
- 2 'Invasive alien plants in the forest'
- 3 'Arboretum escaped alien species monitoring'





Research on the Korean Peninsula Ethnobotany Speciation and Genesis

Subject Summary

Secure indigenous plants characteristic information, investigate dielectric characteristics of main species, figure out the speciation and genesis, and use in establishing main indigenous species taxonomic system on the indigenous plants and main taxonomic group growing only in the Korean Peninsula

Key Results

Develop SSR of prunus or COS molecular marker Secure base data for the establishment of modern phylogenetic system

Development Performance

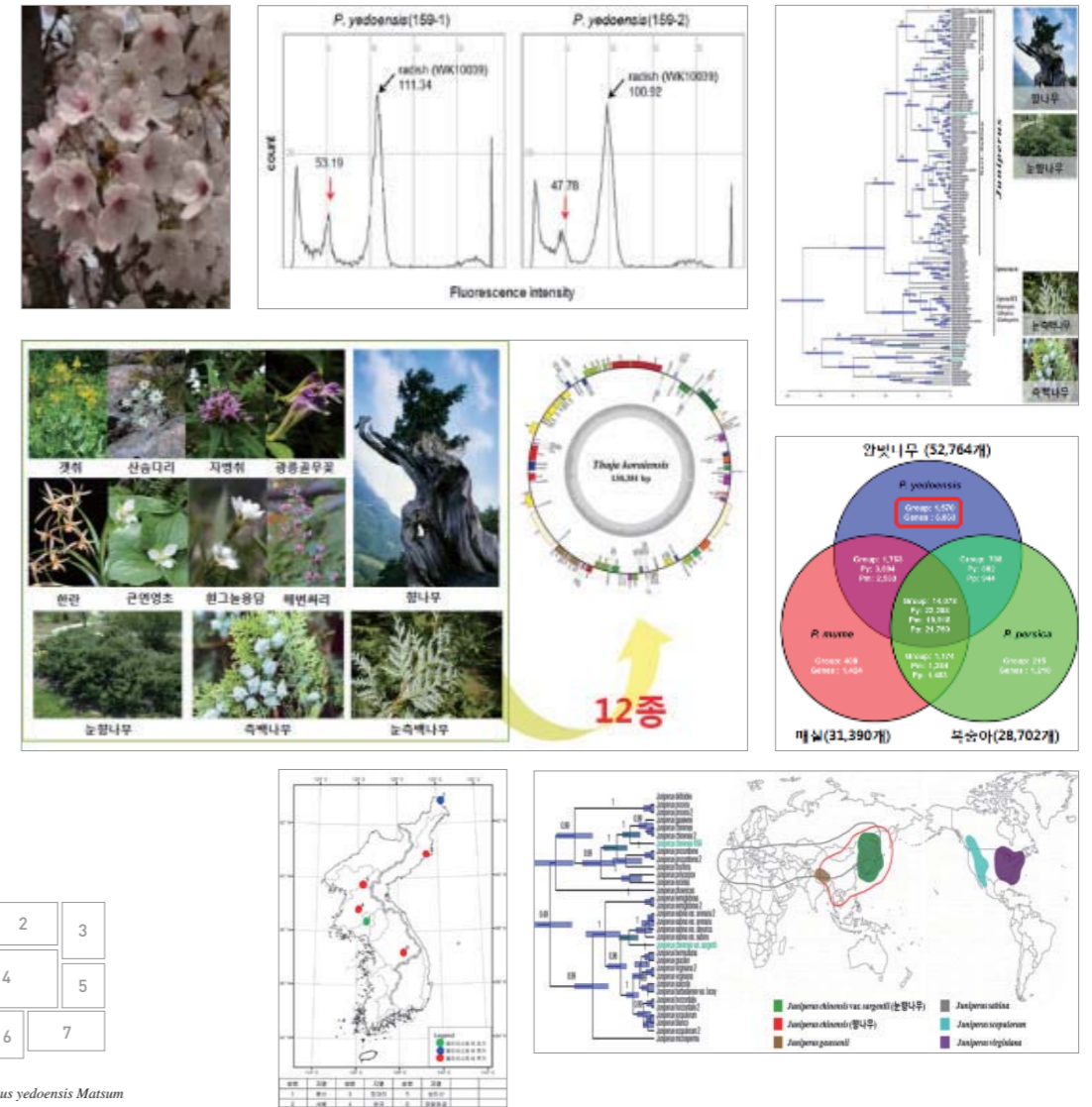
Complete whole dielectric substance of *Prunus yedoensis* Matsum.  
 . 2014 – Chlorophyll(157,859 bp), Mitochondrial dielectric substance (454,599 bp)  
 . 2015 – Nuclear dielectric substance rank (417 Mb), verify 6,063 unique genes  
 Analyze indigenous plants and main taxonomic group chloroplast genome : 12 species  
 Measurement of speciation time and analyze geographical chronicle : 8 species  
 Analyze genetic molecular evolution through basic composition, substitution analysis, phylogeny : 8 species  
 Analyze space-time distribution and plant geographic : 11 species

Performance Dissemination

Thesis Printing : 6 theses including Development of microsatellite markets for the endangered *Pedicularis ishidoyana* (Orobanchaceae) using NGS technology (Applications in Plant Science)  
 Thesis Publication : 7 theses including Molecular phylogeny of Melanthiaceae (Lilales) and the significant chloroplast genomes differentiation providing the new insights into the molecular evolution. (KNA International Symposium Biodiversity Conservation and Seed Vault)

Expected Effectiveness

Expect research results for the characteristic differentiation and verify evolution in cooperation with other research tasks like <Rare and endemic plants conservation and establishment of recovery infrastructure>  
 Use as important information when verifying molecular phylogeny and genesis of other taxonomic group in the future  
 Develop SSR marker of whole dielectric substance, and use in improvement of new species and cultivar  
 Provide important dielectric substance information of endemic plants and speciation, genesis investigation research results  
 Clarify indigenous plants taxonomic limits and phylogenical positioning  
 Possibility on the establishment of dielectric substance research base for building easier modern phylogenical system according to the base research model  
 Determine the evolution and speciation of the Korean Peninsula plants



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- 1 *Prunus yedoensis* Matsum
- 2 Fluorescence intensity analysis
- 3 Analysis of molecular clock of 4 species of Fluorescence
- 4 Target 12 species of Chloroplast dielectric substance map to be produced
- 5 Comparison of the gene cluster of 3 species of *prunus*
- 6 Distribution by era of Cupreesaoeae
- 7 Comparison of distribution area of Sargent Juniper and related taxonomic group



● ● ● 9

### Excavating Research of Potential Mycomycetes in the Soil of Trees and Forest

**Subject Summary** Excavate potential mycomycetes related to the tree species and explore microbial community in our forest soil with the latest next-generation sequencing technology(NGS)

**Key Results** Research on the potential mycomycetes within the Gwangneung forest and Jeombongsan experiment forest Mycomycetes diversity analysis in the Needle fir trail and Hornbeam forest soil

**Development Performance**

Mycomycetes diversity research in the Gwangneung forest and Jeombongsan experiment forest soil  
 Collect targeted tree species and sample  
 \* 4 times by season and by soil stratum (L, H, Ah level) in the Hornbeam forest and Needle fir trail  
Mycoflora soil potential fungi  
 . Jeombongsan : Fir – 303 genes, 1,331OTUs, Hornbeam – 295 genes, 1,133OTUs  
 . Gwangneung : Fir – 109 genes, 347OTUs, Hornbeam – 94 genes, 335OTUs  
 Establish potential fungi inventory : 3,140OTUs  
 Newly found OTUs : 401OTUs

**Performance Dissemination**

Thesis Printing : 1 thesis, Research on the potential mycomycetes distributed in the soil of Mongolian oak by season (J. Microbiology)  
 Thesis Publication : 1 thesis, Research on potential mycomycetes distributed in the soil of Mongolian oak of Gwangneung forest by season (KNA International Symposium)

**Expected Effectiveness** Use in excavating potential fungi useful in cultivating and growing by tree species  
 Basic data to analyze the direct relation between the trees and mycomycetes within the forest

Apply as the original resources for domestic forest genetic resources application research  
 Develop infrastructure of national management and provide the base of securing sovereignty of biological resources

1 2 3

- <Relation analysis between soil physicochemical soil and microbial community>
- <Publication of thesis related to the potential fungi>
- <Submission of thesis related to the potential fungi>



● ● ● 10

### Taxonomic Study of Small Parasitic Wasps living in the Forest

**Subject Summary** Develop exploration and application base of the helpful natural enemy insect resources and establish small parasitic wasps type classification system through the classification research of the small parasitic wasps which is the natural enemy insect of the forest pests

**Key Results** The movement and characteristics selection of Tetrastichinae subfamily species  
 The analysis of the relation between the host insect and parasitic natural enemy performance

**Development Performance**

Movement of *Leptocybe* gene species of Tetrastichinae subfamily : 7 species including *L. invasa*  
 Select the characteristics of *Leptocybe* genus : select 37 forms like feelers  
 Analyze DNA base sequence of *Leptocybe* genus : COI, confirm 7 species  
 Analyze the difference between each species of *Leptocybe* genus  
 Excavate Korean unrecorded species : 4 species of 4 genus  
 Survey of the pupa parasitic wasps of 11 species of butterflies (Limenitis sydyi Lederer and others)

**Performance Dissemination**

Thesis Printing : List of parasitic ichneumon fly of *Ivela auripes* (Korean Society of Applied Entomology journal)  
 Thesis Publication : 2 theses, the list and parasitic rate of parasitic wasps by each growth stage of *Ivela auripes* (2015 KNA International Symposium)

**Expected Effectiveness** Secure Korean small parasitic wasps type specimen diversity in the National Herbarium and establish usage system with systematic arrangement with the classification research of small parasitic wasps type  
 Establish the position as the national and international research institutes in securing accurate and systematic data and specimen of the parasitic insect type as helpful insect resources

Secure data related to small parasitic wasps  
 Secure specimen for the research

1 2 3 4 5

- Supplement type of *Leptocybe invasa*
- Phylogenetic of *Leptocybe* using COI base sequence
- Tetrastichinae unrecorded species  
 Top : *Aprostocetus fukutai*, Bottom : *Quadrastichus saji*
- Parasitic wasps on *Anoplophora glabripennis* eggs – *Aprostocetus fukutai*
- Thesis publication : Report on the small parasitic wasps of *Ivela Auripes*

## Research on the Korean Peninsula Unidentified Native Plants Name

### Subject Summary

Excavate unknown species and provide the standard on the accurate scientific name and common name on our native plants, in studying the taxonomic history of the native plants including collection and statement of the scientific name and taxonomic research through the revision and analysis of statement and collected specimen of the Korean Peninsula native plants

### Key Results

Research on the plant names not found these days but are reported growing in the Korean Peninsula  
Propose taxonomic history data and accurate standard name of Korean Peninsula native plants

#### Research on the scientific names unrecorded in the KPNI

Analyze plant scientific name as distributed in the Korean Peninsula stated in the Japanese document before 1950  
Stated Korean Peninsula distributed plants with 4,000 scientific names

Research on 1,200 scientific names not registered in KPNI

예) *Aconitum puchonroenicum* Uyeki & Sakata : it is called Bujeon Monk'shood (*Aconitum jaluense* Kom.) in North Korea

#### Translate International Nomenclature for Algae, Fungi and Plants in Korean

Acquisition of translation and publication rights of the Melbourne code revised in 2012  
Open the translated version through KPNI

#### Performance Dissemination

Thesis Printing : 1 thesis, Statement of unrecorded plants "Rhododendron keiskei var. hypoglaucum Suto & Suzuki" (The Korean Society of Plant Taxonomy)

Thesis Publication : 2 theses including Analysis on the Korean Peninsula plants standard specimen (The Korean Society of Plant Taxonomy)

Periodical Publication : 3 cases, Type Specimens Collected from Korea Deposited at the Herbarium of Tokyo University vol. 14, 15

### Expected Effectiveness

Excavation on the native plants not found after statement of scientific name  
Increase accuracy of using native plants scientific name through the improvement of International Nomenclature  
Improve accuracy of KPNI through general management on the native plants scientific name stated  
Integrated management and supply on the information of naming area among the taxonomic research area

Analysis of Japanese Books and arrangement of Scientific Names

문헌상 기록은 남아있는 학명

- Aconitum puchonroenicum* Uyeki & Sakata
- Amaranthus mangostanus* var. *japonicus* Miq.
- Arenaria macrocarpa* var. *koreana* (Nakai) Hara
- Arenaria macrocarpa* var. *koreana* (Nakai) Hara
- Euonymus striatus* var. *pilosus* Loesn.
- Giantopteris yabei* Kawasaki
- Polygonum caespitosum* var. *seminudum* Meisn.
- Sambucus velutina* Nakai

3959 분류군

Web DB and original statement, type specimen review and comparison research with close related taxonomic group

원기재문      기준표본 및 근연분류군

Verify the existence of scientific names and reflect the results to the KPNI

KPNI상에 등록된 학명	
정명으로 등록된 학명	1674
이명으로 등록된 학명	1103
KPNI에 미등록된 학명	
KPNI에 이명으로 추가할 학명	327
분류학적 처리가 다른 학명	288
한반도에 분포하지 않는 분류군	88
분류학적 추가확인이 필요한 분류군	316
KPNI에 등록된 학명의 오류	75
명명법상 비합법명	37
기타 (선태류, 지의류, 화석 등)	51
<b>합계</b>	<b>3959</b>

Research of the Korean peninsula unidentified native plant names

Translate Melbourne code and acquire publishing copyrights

국립수목원  
Korea National Arboretum

2016 한글어판 출판      Melbourne Code (2012)

Neotype으로 지정!



● ● ● 12

## Green Road of Central Asia

### I. Flora Research of Central Asia and Taxonomic Research Infrastructure Establishment

**Name of the Project** Joint research on Korea-Central Asia Biodiversity

**Subject Summary** Cultivation of taxonomic research ability like taxonomic research and manpower training on taxonomic related to the joint research of Korea-Central Asia including flora research and in-situ, ex-situ conservation for the forest biodiversity conservation from the forest destruction by the climate change and farming based on the forest cooperation of Korea-Central Asia

**Key Results** Flora survey of Tien Shan mountains of key area of biodiversity of Central Asia  
 Taxonomic research on Central Asia key taxonomic group and Korea-Central Asia closely related taxonomic group  
 Establish joint research base through signing MOU with Central Asian cooperating institutions  
 Improve taxonomic research ability through technological training, local workshop and professional manpower training

Establishment of the base for joint research and data exchange

Signed MOU with 4 institutions of 4 countries, Kazakhstan, Kirgizstan, Tazikistan, Uzbekistan  
 Establishment of the network system composed of forest biodiversity conservation area and taxonomic research area

Flora research of Tien Shan mountain

Flora research on the Chimgan area of Uzbekistan which is the South-West area of Tien Shan mountain : 260 taxa of 162 genus of 53 families  
 Collect key taxonomic group : Collect taxonomic samples on the key taxonomic group like allium family, prangos family, rosa family, prunus family

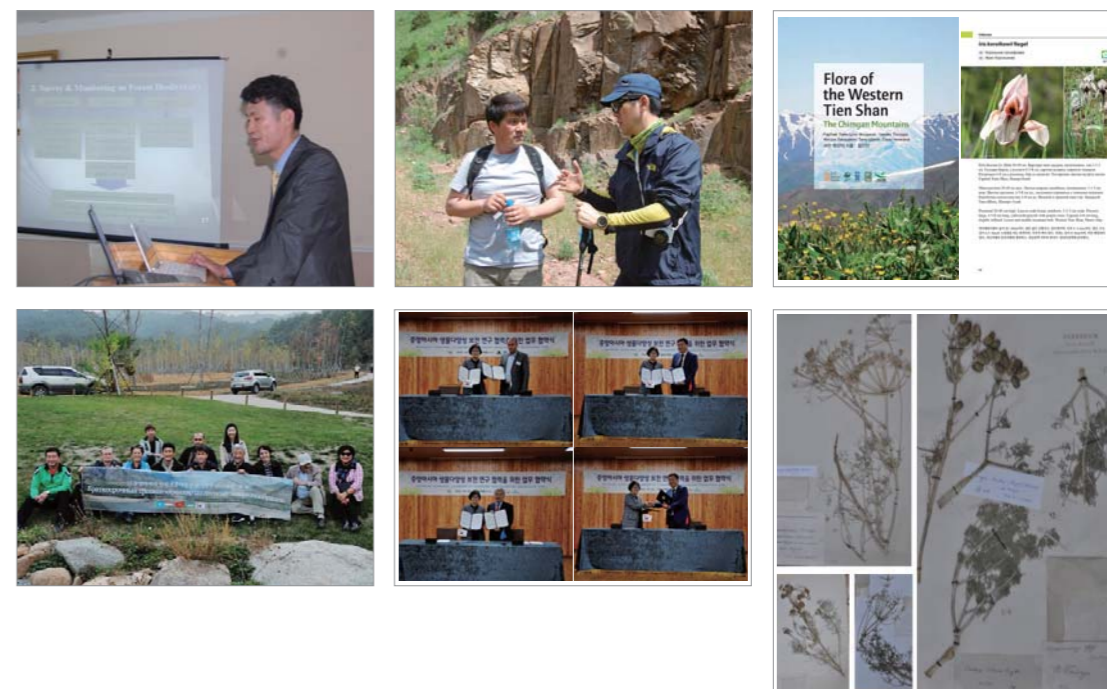
Run the ability improvement program on biodiversity conservation and taxonomic research

Run the program on 3 areas, local workshop (May, Tashkent), short-term technique training (October, Seoul), International Symposium (October, Gwangneung)  
 Long-term technique training program : Long-term technique training in molecule system

**Performance Dissemination**

Thesis Publication : 3 theses including Flora and endemic plants of South-West area of Tien Shan  
 Periodical Publication : 1 case, Flora of the Western Tien Shan : The Chimgan Mountains

**Expected Effectiveness** Establish the base for the Central Asian plant diversity conservation and taxonomic research  
 Secure and share various data for taxonomic research on Korean Peninsula native and close related species  
 Reinforcement of international position on the biodiversity conservation and taxonomic research ability improvement on the earth level  
 Reinforcement of professionalism and differentiation through securing KNA strategical collection and research taxonomic group



1	2	3
4	5	6

- 1 Local Workshop
- 2 Local Survey area of West side of Tien Shan
- 3 Publication of illustration book of West side of Tien Shan area
- 4 Short-term technique training
- 5 Signing MOU
- 6 Molecular systematics research on Prangos genus



● ● ● 13

## Silvics of Korean Peninsula Publication Research

**Subject Summary** Establishment of management infrastructure and published the Silvics of Korea for the taxonomic system reestablishment and forest resources use through general characteristics research on the Korean peninsula distributed arbor

**Key Results** Revised proper names based on the data research and scientific name reviewal on the Korean peninsula woody plant  
Verify mis-classified taxonomic group through reexamination of holding specimen in the herbarium  
Habitat field survey and collecting specimens of the woody plant

### Development Performance

Field inspection : Collected evidential specimen (620 pieces), wood specimen (41 pieces), flower pot (56 pieces), video data (420 pieces) from 72 local areas  
: Collected 201 pieces from Russia, 300 pieces from Mongolia, 797 pieces from China, 758 pieces from Japan, 2,056 pieces from foreign countries in total  
Make the distribution map, statement and index on 32 taxonomic group including Cornaceae, Anacardiaceae, Moraceae, Thorny *Rosa* genus

### Performance Dissemination

Thesis Printing : 3 theses, The Distribution and Dynamics between Sexes, Conservation of Natural Populations of a Rare Woody Plant, *Juniperus chinensis* L. (Cupressaceae), Korea  
Thesis Publication : 2 theses, Plant Diversity in Deokjeokdo (Ongjin-gun) and its Adjacent Regions  
Periodical Publication : 1 case, Silvics of Korea I – Conifers (tentative name)  
Establishment of statement DB : Planning to provide service through Korea Biodiversity Information System (NATURE)

**Expected Effectiveness** Establishment of taxonomic group for the use of wood resources  
Secure formal and geographical basic data and specimen collection of expanding domestic herbarium infrastructure  
Create management infrastructure for securing biodiversity and monitoring the change  
Species and KPNI management through the establishment of reasonable plant taxonomic system

Progress to international level of Korean peninsula arbor taxonomic system  
Informatization of national plant resources and continuous use  
Monitoring and prediction of bio species diversity to deal with the climate change  
Establish taxonomic system of the arbors distributed in East Asia



## 02

## Forest Bio Resources Conservation and Establishment of Application Basis

● ● ● 14

## Establish Conservation Basis of Phylogenesis of Woodborers and Large-Types in the Forest

**Subject Summary** Seek for the management plan in surveying key species habitat condition and register and report unexplored forest insect species through the classification of woodborer beetles

**Key Results** Research on the morphological taxonomy of long-horned beetle (104 individuals, 147 characters)  
Secured habitat condition and breeding characteristics of large long-horned beetles (10 species)

### Development Performance

Secure woodborer beetles specimen : 1,336 pieces of 178 species from 17 families including bark beetle  
Explore new candidate species (1 species of click beetle) and unrecorded species (3 species of long-horned beetle)  
Secure new specimen in the Korea National Herbarium : 22 pieces of 10 species including *Asemum punctulatum* Blessig  
Secure possessing minority of specimen in the Korea National Herbarium : 19 pieces of 7 species including *Brentidae Orychodes insignis* Lewis  
Habitat condition survey of long-horned beetles in Russia : Confirm host plant (elm) and imago emergency hole and larva ankertrass in the Usuri Natural Conservation Reserve  
Breed long-horned beetle in-house : successful breeding, takes 16 months from egg ⇨ imago  
Make standard index of 50 taxonomic group of bark beetle and other groups (20 species)

### Performance Dissemination

Thesis Printing : 2 theses, Report and Distribution of 1 species of *Monomorium* (Oriental Insects)  
Thesis Publication : 5 theses, Diversity and *Callipogon relictus* of Korean long-horned beetles  
Media Public Relation : 3 times of media (YTN Science, MBN)

**Expected Effectiveness** Secure intensive basic data on woodborer beetle needed to be researched  
Provide related policies in the KFS and task development material  
Establishment of infrastructure for the utilization in classification and giving standard name  
Establishment of insect research information applicable to the forest policy

Research on the distribution condition of Korean peninsula forest bio species and analysis of the change monitoring  
Systemize phylogenesis of forest insects species

1	2	3	4
			5

- 1 Woodborer Insects Investigation in 2015
- 2 Survey on the habitat condition of the long-horned beetles – Russia Usuri Natural Conservation Reserve
- 3 (Long-horned beetle unrecorded species) *Miaenia tonsa* (Bates)
- 4 Signed MOU between Korea National Arboretum and Russian Academy of Science Far Eastern branch joint research
- 5 Media Public Relation – Green long-horned beetle found in 29 years



15

### Research and Information Establishment of Forest Insect Species Vulnerable to Climate Change

**Subject Summary** Propose the effective way to maintain insect diversity through the relationship with certain plants in analyzing the results of the monitoring and making the list of forest insect species vulnerable to the climate change

**Key Results** Identify the species and population number through the survey of the vulnerable species (moths, beetles, ants) by altitude  
Identify the population number by species through the survey of pollen vector insects (drone fly/Syrphinae spp.) through the country

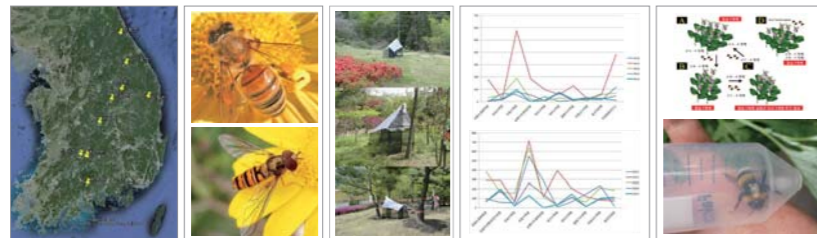
**Development Performance**  
Survey on the vulnerable species by altitude of Jeombongsan : 22 species (moths 14, ants 6, beetles 2) in total  
Survey on the vulnerable species by altitude of Ilwolsan : 18 species (moths 10, ants 8) in total  
Survey on the vulnerable species by altitude of Baekwoonsan : 23 species (moths 11, ants 12) in total  
Survey on the pollen vector insects : Population number and species of honey bees, drone fly/Syrphinae spp. are diminishing every year from 2011-2015  
Survey on the pollen vector insects of rare and endemic plants (Korean lady's slipper/Cypripedium japonicum Thunb.) : Verifies the possibility of pollen vector of Bombus terrestris/bumblebee (75% of setting rate in cross fertilization, 80% of setting rate in self-fertilization)

**Performance Dissemination**  
Thesis Printing : Insect community by altitude in Seongaksan (J. Forestry Research)  
Thesis Publication : 5 theses, Hymenoptera Pollen Vector Insects of Korean Lady's slipper/Cypripedium japonicum Thunb.

**Expected Effectiveness** Prepare usage basis through securing the data of insect species related to the climate change  
Apply as establishment data of conservation plan in identifying vulnerable species to the climate change  
Contribution to the forest biodiversity maintenance through identifying the relation with rare and endemic plants  
Develop policy and task development data related to the KFS

Establish monitoring system for the forest bio resources protection and diversity conservation  
Establish active conservation system on particular forest biology

- 1
- 2
- 3
- 4
- 5



- 1 Survey area of the vulnerable insects by altitude (Jeombongsan, Gariwangsan, Sobaeksan, Woondalsan, Baekwhasan, Seongaksan, Jangansan, Baekwoonsan)
- 2 Pollen vector (insects)  
Top : Honey bees (Hymenoptera)  
Bottom : Drone fly/Syrphinae spp. (Diptera insect)
- 3 Survey trap of pollen vector - Malaise trap
- 4 Seasonal movement of pollen vector insects  
Top : Honey bees (2011-2015)  
Bottom : Drone fly/Syrphinae spp. (2011-2015)
- 5 Research of pollen vector of Korean lady's slipper using Bombus terrestris/bumblebee



16

### Rare and Endemic Plants Conservation and Establishment of Recovery Infrastructure

**Subject Summary** Establishment of national conservation infrastructure to establish rare and endemic plants systematic management and conservation plan

**Key Results** Prepare national rare and endemic plants in-situ and ex-situ conservation policy  
Compose the network for the establishment of national rare and endemic plants effective conservation infrastructure

**Development Performance**  
Rare and endemic plants distribution survey : 509 groups of 140 species  
Monitoring on the local key rare and endemic plants population : 87 groups of 71 species in 9 districts  
Secure rare and endemic genetic resources : 152 pieces of 111 species  
Create ex-situ exhibition conservation garden by area : Midongsan Arboretum (East Asian thrixsperrum, Lychnis kiusiana Makino)  
Collect basic data of rare and endemic plants conservation biology to establish action plan

Thesis Printing : 4 theses, Habitat and population characteristic (ecology and environment) of rare plant, Korean lady's slipper  
Thesis Publication : 14 theses, Environmental characteristics and vegetation (Korea Fores Society) of Narrow-leaf campion/Lychnis kiusiana Makino habitat  
Media Public Relation : 4 times, Korea National Arboretum, National rare and endemic plant time capsule (KBS 9 O'clock news)  
Training Manpower : 1 Doctor, 3 Masters

**Expected Effectiveness** Strengthen regional government capability for national rare and endemic plants conservation  
Establish the network for national rare and endemic plants conservation  
Establish effective conservation infrastructure of national rare and endemic plants

Accomplish GSPC 2020 national target  
Contribution to national biodiversity conservation

- 1 Media Public Relation
- 2 Restoration of rare and endemic plant East Asian thrixsperrum
- 3 Population monitoring of rare and endemic plants
- 4 Ex-situ exhibition conservation garden by area

● ● ● 17

## Mass Propagation and Cultivating Technology Development of Useful Exploration of Plant Resources

**Subject Summary** Investigate forest plants mass propagation condition and develop mass propagation technology possible to supply for environmental-friendly and new material resources use

**Key Results** Develop propagation method of domestic and foreign useful plants by species  
Secure original technology for the industry academic research use

### Development Performance

Develop propagation method of useful plants by species : 20 species including Figwort/Scrophularia koraiensis Nakai, Vicia venosissima

Technological development of propagation standardization : 40 species including Gentiana triflora Pallas, Aristolochia contorta Bunge

Develop propagation method of pteridophyta : 17 species including Athyrium acutipinulum kodama, royal fern

### Performance Dissemination

Thesis Printing : 3 theses, Korea Forest Society

Thesis Publication : 28 theses, Korea Journal of Medicinal Crop Science

Application from new varieties of plants : 1 case, Ivy/Headera rhombea (Little star 1)

Distribution : 1,561 units from 49 species of 6 cases including Hanbat Arboretum

Education, Seminar : 8 times including new staff course, nursery staff course

Manpower training : 2 Doctors, 1 Doctoral course, 1 Master

**Expected Effectiveness** Build infrastructure of useful plant resources recovery  
Excavate and distribute new source of income  
Use in industry academic research follow-up study

Secure original technology for forest plant resources conservation and use  
Secure priority of intellectual property right, plant sovereignty in developing propagation technology by species  
Inhibit overexploitation and protect habitat in supplying propagation method



- 1 Support East Asian thrixspermum restoration business
- 2 Use in creating mass propagation method development exhibition garden
- 3 Application for new varieties of Ivy/Headera rhombea (Little star 1)



● ● ● 18

## Establishment of Asian Hub Seed Bank Basic

**Subject Summary** Prepare the foundation as the Asian hub Seed Bank through forest plant resources seed collection and ex-situ conservation

**Key Results** Plant seed ex-situ conservation for the forest plant resources conservation and create use foundation  
Seed characteristics survey and storage and hastening germination technology development for the long-term storage of the seeds  
Run the Asian hub Seed Bank and build network

### Development Performance

Secure domestic and foreign wild plants seeds : 765 pieces from 551 species (domestic), 532 pieces of 479 species (foreign)

Seed morphological characteristics survey : 163 species from 46 genus of 14 families

Seed physiological survey : 20 species (dormant study), 987 pieces from 536 species (stored seed vitality test)

Establish seed information DB : 150 species (shape), 60 species (in and out)

### Performance Dissemination

Thesis Printing : 3 theses, Seed Morphology of the Subfamily Helleboroideae (Ranunculaceae) and its Systematic Implication (Flora)

Thesis Publication : 13 theses, Achene Morphology of Saussurea Species (Asteraceae, Cardueae) in Korea and its Systematic Implications (Korea Forest Society)

Media Public Relation : 4 case, Domestic and Foreign Seeds 'Time Capsule', the Korea National Arboretum Seed Bank (Yeonhap News)

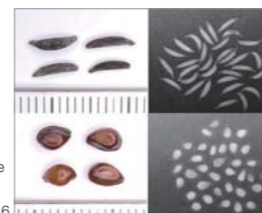
Training Manpower : 2 Doctors, 2 Masters

**Expected Effectiveness Ripple Effect** Secure national bio resources competitiveness through acquiring domestic native plant seeds  
Develop infrastructure for the Seed Vault operation in securing rare and useful plant seeds of Asia  
Use as the basic material of conservation and restoration in developing technology of wild plant seeds hastening germination

Use of Seed Bank like providing seed distribution and information  
Ex-situ conservation and network establishment of sustainable forest genetic resources (seeds)Contribution to national biodiversity conservation



- 1 Seed quality test after seed collection
- 2 Dormancy breaking of Trilobe monk'shood/Aconitum austrokoreense Koidz. in physiological research
- 3 Reported in Yeonhap news on 2015. 5. 6



## Research on the Gwangneung Forest and Experiment Forest Biodiversity Conservation

Gwangneung forest biodiversity monitoring (fish, fur and feather)

Gwangneung forest Biosphere Reserve transition area vegetation diversity assessment

### Subject Summary

Gwangneung forest biodiversity monitoring (fish, fur and feather)  
Gwangneung forest Biosphere Reserve transition area vegetation diversity assessment

### Key Results

Verify the southern race, the fairy pitta/Pitta brachyurus continuous visit to the Gwangneung forest after 2011  
It is difficult to specify that the reason of visiting Gwangneung forest and Gyunggi district is climate change, because the climate of Gyunggi do is mixed with south and central temperate

### Development Performance

Abundant minnow and endemic species zacco koreanus in Gwangneung forest Bonsunsacheon (stream)

Verified the urbanization influence area is the Gwangneung forest transition area due to the abundant snowbells, which is the urbanization indicator species

21 species of 8관 of Gwangneung forest ichthyofauna

Habitat of 5 species including Korean endemic species zacco koreanus (32.0%)

Minnow, zacco koreanus, goby minnow, cat fish, miller's-thumb, Chinese minnow, long-nosed barbel

Reintroduction of zacco koreanus (restoration in 2008) verified stable settlement of the population

Verified the population growth and nutritive conditions are fine (whole length – weight correlation  $b^*=3.1$ )

\* whole length – weight correlation  $b > 3.0$  this shows that the population structure is fine

21 species of fur, 75 species of birds of Gwangneung forest

Habitat of 8 species including natural monument, mandarin ducks, kestrel, black woodpecker

Habitat of natural monument, flying squirrels, endangered marten, wildcats

Prepare Gwangneung Biosphere Reserve vegetation diversity and vegetation map (Naechonmyun and Gasanmyun)

Existence of total 18 vegetation types in 12 forests and 6 streams

Verification of town vegetation element of mountain type snowbell-azalea form of colony

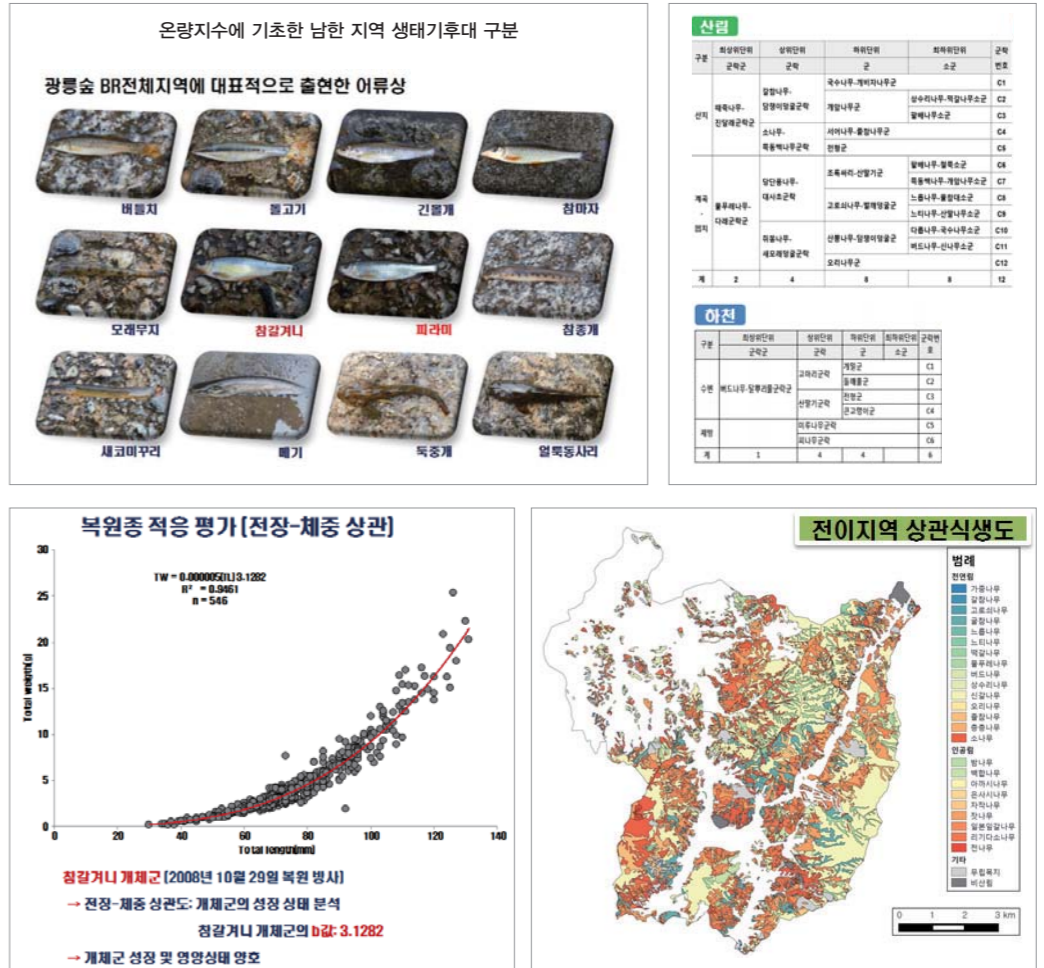
### Expected Effectiveness

As the Gwangneung forest biodiversity promotion activity, verification of stable settlement of zacco koreanus reintroduction population is significant result of monitoring

The need of depth study on the appearance and frequency on the urban indicator bio species following the fast development of Gwangneung forest vicinity

1	2
3	4

- 1 Distribution of ichthyic in Gwangneung forest Bonsunsacheon
- 2 Gwangneung forest transition area (Naechonmyun and Gasanmyun) vegetation diversity assessment results
- 3 Verify the stable settlement of reintroduction population of restored zacco koreanus in the Gwangneung forest
- 4 Gwangneung transition area (Naechonmyun and Gasanmyun) vegetation





20

### Study on Exploitation, Collection, Conservation and Utilization of DMZ and Northern Species Plants

**Subject Summary**  
Responsible of forest bio resources ex-situ conservation, develop forest ecosystem damage preventing and restoration technology of North Korea, and research and develop for the peaceful utilization and conservation of DMZ through exploration, survey, collection and research on the biology of DMZ area

**Key Results**  
Developed the first domestic and international DMZ ecological culture map  
The first spatial extent survey on the civilian control line to northern area  
Create planting infrastructure of DMZ native plants botanical garden (wetland and rare and endemic plant garden)

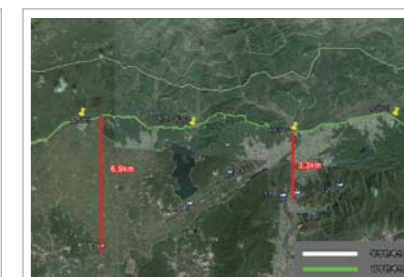
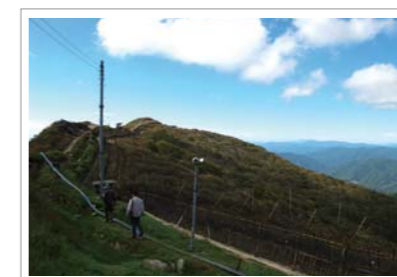
**Development Performance**

Plant collection for the DMZ and northern area ex-situ conservation : 455 taxonomic groups including Hanabusaya asiatica  
Plant propagation and planting for the DMZ botanic garden, exhibition garden creation : Propagation (134 taxonomic group including manchurian peashrub), planting (436 taxonomic groups including wild flag iris)  
Started to survey on the uninvestigated area of DMZ vicinity : 9 areas  
First verified the habitat of rare and endemic plants in the uninvestigated area of DMZ vicinity : Rare (36 taxonomic groups including short-stalk slimtop meadow-rue), endemic (36 taxonomic groups including korean barberry)  
First plant distribution survey on whole DMZ cease-fire line area  
\* Flora : Total 736 taxonomic groups 369 genus of 101 families  
\* Rare plants : 23 taxonomic groups including Halenia corniculata(L.)Cornaz, endemic plants : 28 taxonomic groups including Aconitum pseudo-laeve Nakai  
\* Naturalized plants : 56 taxonomic groups including Sicyos angulatus

**Performance Dissemination**

Thesis Printing : 3 theses, Study on the reduced space range of DMZ (The Korean Association of Regional Geographers)  
Thesis Publication : 8 theses, Flora of DMZ vicinity, Gwangchiryeong area (The Plant Resources Society of Korea)  
Media Public Relation : 24 cases in newspaper (Hankyoreh newspaper and others), 1 case on TV (KBS Yeongdong focus)  
Publication of periodical journal : 3 cases including DMZ ecological culture map  
Manpower Training : 4 Masters

**Expected Effectiveness**  
Operating the ex-situ conservation of DMZ and northern area bio resources  
Clarify the adaptation possibility on the plant species possible to introduce to DMZ botanic garden  
Using various exhibition education technology development including preparation of education method using DMZ  
  
Develop the foundation to study on the DMZ and northern area bio resources  
Provide refuge to the northern area plants from the climate change and disaster  
Preoccupation in the plant species securing competing between countries through DMZ and northern area plant resources collection and propagation



1	
2	
3	4

- 1 Create DMZ native plants botanical garden
- 2 Develop DMZ ecological culture map
- 3 Investigation on the DMZ fire-cease line
- 4 Research on the spatial range of civilian control line area



## Establishment of East Asian Biodiversity Conservation Network

### Subject Summary

Establishment of joint cooperation network for East Asian biodiversity conservation  
Promoting the basic and applied research for the climate change vulnerable species conservation in the regional level

### Key Results

Establish East Asian biodiversity conservation network operation system  
Determine articles of association (ROP), compose management staffs (Chairperson, the Secretary General), open secretariat  
\* Participating institutions : Korea National Arboretum (Korea), Institute of Applied Ecology of the Chinese Academy of Science, South Botanical Garden of the Chinese Academy of Science (China), Botanical Garden-Institute Far Eastern Branch of the Russian Academy of Sciences of Russian Federation (Russia), National University of Mongolia (Mongolia), Forestry and Forest Products Research Institute (Japan)  
Establish and promote action plan for 2015 international joint research  
Selected 5 agendas including Asian integrated plant list

#### Establish East Asian biodiversity inventory

Collect the list and integrate for East Asian integrated plant list composition  
\* Korean peninsula (4,171 taxonomic group of KPNI), China (15,000 taxonomic group of Flora of China), Japan (9,532 taxonomic group of Green list), Far East Russia (4,350 taxonomic group of Flora of Far East Russia), Mongolia (3,127 taxonomic group of Conspectus of the Vascular Plants of Mongolia)  
Publication of East Asian key plant illustration book

- \* ① Important Plants of East Asia II : Endemic Plants Stories,
- ② Resilient Dwarf Relict Plants Tell Stories

#### Joint Research on climate change vulnerable species conservation

Field investigation for the establishment of climate change vegetation monitoring system : 4 places  
\* Japan (Gomagatake), Mongolia (The academic forest of National University of Mongolia), Russia (Mt. Tomannya), China (Baekdusan)

#### Strengthen network research capability and media public relation

Open 2015 EABCN workshop (2015. 6, Japan, Institute of Forestry Research)  
Field discussion on climate change vegetation monitoring  
Run the home page for expansion and sharing the results  
PR : 2 cases including biodiversity of Korean peninsula and international cooperation (2015. 6)

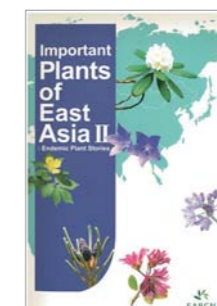
### Expected Effectiveness

Provide biodiversity conservation research platform in East Asia regional level  
Strengthen domestic research capacity through network operation and technological exchange  
Establish East Asia regional biodiversity conservation plan using joint research results  
Expand Korea Forest Service and Korea National Arboretum contribution on international cooperation research of the forestry area



1	2
3	4
5	6
7	8

- 1 East Asia Biodiversity Conservation Network
- 2 EABCN secretariat signboard hanging ceremony
- 3 EABCN working group meeting
- 4 EABCN steering committee
- 5 2015 EABCN joint research seminar
- 6 Climate change vegetation monitoring workshop
- 7 Important Plants of East Asia II
- 8 Resilient Dwarf Relict Plants Tell Stories



● ● ● 22

## Research on the Application of our Wild Flowers for the Expansion of Garden Culture

### Subject Summary

Spread the culture of enjoying wild flowers in people's life and vitalize garden related industry in exploring and enhancing the value of our wild flowers

### Key Results

Discover storytelling resources based on wild flower using culture  
 Survey on wild flower distribution  
 Development of excavating wild flower garden material and planting management technique manual  
 Development of planing design and model garden using wild flowers

### Development Performance

Discover storytelling resources based on the wild flower using culture : 120 species  
 Survey on wild flower distribution : 130 places  
 Development of excavating wild flower garden material and planting management technique manual : 50 species  
 Development of planing design and model garden using wild flowers : 6

### Performance Dissemination

Thesis Printing : 1 thesis, the status and improvement plan of the herbaceous plants selling in on-line (Korean Society for People, Plants, and Environment)  
 Thesis Publication : 4 theses, Development of vegetable garden using wild flowers  
 Policy proposal : 1 case, school garden construction business through cooperation between government departments  
 Symposium : 2 cases, present condition and international symposium prospect for spreading garden culture  
 Presentation in the Seminar : 7 cases, The role of the garden policy and the Korea National Arboretum for spreading the garden culture  
 Exhibition : 3 cases, blue house sarangchae wild flower exhibition  
 Media PR : 3 cases, press release (blue house sarangchae wild flower exhibition)  
 Periodical publication : 3 cases, garden plants illustration book with our flowers  
 Manpower training : 3 Masters

### Expected Effectiveness

Settlement of healthy garden culture in life developing garden materiala using wild flowers  
 Systematic research and distribution of wild flowers  
 PR, use and cultivating technique distribution on the beauty and quality of wild flowers  
 Plan sustainable use of native plant resources  
 Spread the culture of enjoying wild flowers in people's life  
 Increase wild flower farm income and merchandise promotion

1	2
3	
4	
5	6



- 1 Publication of 「Garden plant illustration book with our flowers」
- 2 Publication of 「Korea National Arboretum garden portfolio」
- 3 「Current status and prospect of 2015 Korean garden business」
- 4 Exhibition 「Blue House sarangchae wild flower exhibition」
- 5 Submit garden work in 「2015 Korea garden show」
- 6 Submit garden work in 「2015 Korea garden expo」



● ● ● 23

### Discover Exhibition Material and Develop Management Technique of Tropical Plant Resources Research Center

**Subject Summary** Discover various exhibition plant material and develop management technique based on the plant diversity research and securing resources of the tropical and subtropical region

**Key Results** Investigation on the present condition of domestic and foreign tropical and mediterranean plants use  
Habitat investigation and collection to secure exhibition material  
Management information and accumulation of technology of collected plants from Tropical Plant Resources Center

**Development Performance**  
Investigation on the present condition of domestic and foreign tropical and mediterranean plants use : 26 areas  
Habitat investigation and collection to secure exhibition material : 3 areas including Myanmar (71 taxonomic groups of seeds, 133 taxonomic groups of specimen, 927 pieces of ionic documents)

**Performance Dissemination**  
Thesis Printing : 1 thesis, Predation ability of chilocorus kuwanae silvestri to Saissetia coffeae (Korean Society of Applied Entomology)  
Thesis Publication : 1 thesis, Collaborative Project on Seeds and Plant Conservation between Myanmar and Korea (2015 Korea National Arboretum International Symposium)  
Patent application : 7 cases, including non-electrical environment measurement equipment  
Local workshop : 2 cases including local workshop on ability strengthening in Laos  
Media PR : 2 cases of press release (Tropical Plant Resources Center open to the public)  
Exhibition : 1 case, Tropical garden on the water  
Manpower training : 1 Master

**Expected Effectiveness** Provide practical information in discovering exhibition plants material and developing management technique  
Secure plant genetic resources diversity and discover unrecorded plant resources by country  
Develop exotic plant management technique and guideline according to domestic condition and environment

Secure technique support and industrial property right in the related organization and civilian  
Establish plant industry base and reinforcing partnership by country through forest cooperation agenda implementation

1	
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1 Myanmar (left) and Laos (right) habitat investigation and plant collection  
2 「Local workshop on strengthening capability in Laos」 (Laos)  
3 「2014-2015 CLMV Workshop」 (Vietnam)  
4 Patent application 「Non-electrical environment measurement equipment」  
5 Design registration 「Bird control sticker」  
6 「Tropical garden on the water」 leaflet and exhibition



● ● ● 24

### Research on Plantain Lily Plant Resources Diversity Conservation and Education

**Subject Summary** Establish classification system, select outstanding individual, expertize management technique and create specialized exhibition garden of Plantain Lily distributed in Korea

**Key Results** Establish classification system and select outstanding individual of Plantain Lily  
Create the best Plantain Lily exhibition garden in Asia

**Development Performance**

Taxonomic examination on Korean Plantain Lily plants  
15 cases of literature investigations, 150 pieces in 8 cases of habitat confirmation and collection  
Select outstanding individual  
60 cases of Y-ray radiotherapy, 24 cases of chemical product treatment, 200 cases of characteristics survey  
2 areas investigation of basic cases of using Plantain Lily in exhibition  
3 cases of planting design and development of exhibition technique

**Performance Dissemination**

Thesis Publication : 3 theses, Korean Society for Horticultural Science  
Patent application : 2 cases, Hosta capitata(Koidz.)Nakai (Sun and moon), Hosta minor(Baker)Nakai (Neulpuroom 1)  
Manpower training : 1 Doctor's course, 1 Master

**Expected Effectiveness** Utilization in the exhibition garden and cultivating field  
Utilization in following research in establishing classification system  
Create specialized exhibition garden

Possible to develop species in selecting outstanding individual based on accurate selection of seeds  
Identify growth characteristics of Plantain Lily plants and maximize management effectiveness  
Promotion on forest genetic resources of new species nurturing



- 1 Basic plan of Plantain Lily exhibition garden
- 2 Patent application of Hosta capitata(Koidz.)Nakai (Sun and moon)
- 3 Patent application of Hosta minor(Baker)Nakai (Neulpuroom 1)



## 03

### Forest Recreation and Culture Research Field

● ● ● 25

### Plant Interpretation Technique Development on the Vegetation of Exhibition Garden Trail by Area

**Subject Summary** Develop specialized plant interpretation scenario and distribute the manual on the key vegetation within the trail of the natural recreational forest by region

**Key Results** Develop plant interpretation technique in the trails of national natural recreational forest  
Survey on the type of interpretation resources on national natural recreational forest  
Apply importance and achievement technique of plant interpretation type and plant list

**Development Performance**

Investigation on interpretation resources of national natural recreational forest : 37 places  
Type classification on national natural recreational forest : 37 places  
Investigation on vegetation of national natural recreational forest trail : 11 places, 831 species  
Type classification on plant interpretation : 18 types  
Investigation on the importance and achievement of plant interpretation type : 1 type  
Investigation on the importance and achievement of plant list in 11 places of national natural recreational forest : 1 type  
Develop plant interpretation scenario and publish periodical publication : 1 type of 100 species

**Performance Dissemination**

Thesis Publication : 3 theses,  
Periodical publication : 1 case, plant interpretation manual of exhibition garden trail by region  
Manpower training : 5 Masters

**Expected Effectiveness** Differentiation and specialization of the plant interpretation program within national natural recreational forest  
Supply research results on the plant interpretation and technique  
Apply plant interpretation education and plant interpretation program

Develop and supply scenario of the national natural recreational forest trail specialized plant interpretation  
Contribution on national natural recreational forest education program operation and specialization



1 'Plant interpretation manual by region.'

### Research on the Arrangement by Type and its Utilization of Forest Historical Material by era

#### Subject Summary

Secure basic data and establish the base for the utilization as development of exhibition, education and research materials and various forest culture contents through collecting and arranging interpretation type of domestic uninterpreted forest history (culture) related data

#### Key Results

Collect ancient documents, books and translated data related to domestic and foreign forest history (culture) Utilize the exhibition, education and research data through the interpretation, arrangement and classification of collected data Secure exhibits for securing basic materials and museum exhibition operation for the development of various forest history (culture) contents

#### Development Performance

19 articles and 1 news extracted related to the forest, like forest policy, forest protection, forest management within the geographical book (Yeojidoseo, Sinjoongdongkuk yeojiseungram) of Joseon Dynasty Korean Mountain heritage discover, collection and translation : 157 units listed and 20 translated Translation and explanation of forest diary (sansong) data : 41 cases, Sungju Nam myun, Daechuk dojangbang citizen Park, Sang-Yoon Collect, secure and list the forest historical heritage : investigation on 651 cases of 14 classifications and Korean forest including forestry, forestation and forest protection Collect and analyze the original and the copy of 200 cases including Josaryeong

#### Performance Dissemination

Thesis Publication : 3 theses, based on afforestation argument(I) Joseon Dynasty shipping biography Periodical publication : 1 case of Mountain Trave Essay of Gangwondo for the investigation of forest policy and forest culture historicity Collection of heritages and data (ancient archives) : 258 cases including Sooho Geumyang Moonseo, Joseon forestry diary Manpower training : 2 Doctor's course, 2 Masters

#### Expected Effectiveness

Establishment, set-up and application of systematic information of differentiated forest historic data Application to the exhibition, education and research through the interpretation, arrangement and classification of collected data Application to the advanced exhibition and education technique like museum exhibition type diversification and specialization


Establishment of basic cooperation system like sharing information and specialized knowledge improvement between national and public forest museums of the country Implement the service base to the public through cooperation system like type classification, sharing information and specialized knowledge improvement through annual DB establishment of collected data

- 1
- 2
- 3

- 1 Mountain Travel Essay for the investigation of forest policy and forest culture historicity
- 2 translation and explanation of forest diary (sansong) data
- 3 Translation of forest related data and plant journal during the Japanese colonial



kna 11002-001-001 "성주(星州) 남면(南面) 대척(大尺) 도장방(道長坊) 거주민 박상윤(朴尙潤)"



星州 南面 大尺道長坊居民 朴尙潤  
右謹言 伏以所居之處 依山薄土之地也 年年該書食 如弄作好 殊字幸 元卜十食是加 加出卜十一食七來是乎 道 大字幸 本是陳廢之地 是突 七卜二來加出是乎道 節字處 則無地 處卜六食加出是乎尼 合卜三十二食一 來 年年出處 斗即名下對答是乎尼 貧窮之民 巴未寬徵 對答極爲至寬是乎所 況三十餘食寬徵 豈不痛哉 不廢極寬 跡由 豈敢仰賴于廉察之下爲去乎 伏乞參差是後 使此貧民 無地寬徵之地 千萬望食爲只爲 行下 向數是事 請衣使道 處分  
丁巳十一月日 奉行南州(南州) 謹言 查實錄正 侍無差向奉 奉官 初七日 (官印 一備處)

성주(星州) 남면(南面) 대척(大尺) 도장방(道長坊) 거주민 박상윤(朴尙潤)  
선과 여합니다. 재가 거주하고 있는 곳은 산기슭에 의지하여 토지가 척박한 곳인데, 해당 재당 서연(書員)이 어려워 농건을 부립니다. 관(官)자 담은 원래 복수(卜數)가 10부(食)인데 11부 7속으로 가출(加出)하고, 대(大)자 담은 본래 먹어서 평년대 7속 2속으로 가출 하고, 시(師)자 담은 땅이 없는데 거짓으로 6부를 가출했으나 복수를 알리면 3부 1속입니다. 해당 재당을 내어어 하는 처치이오니 반공 련 박성이 1파나 1속으로나마 억울하게 징수되어도 대답하는 바가 자극이 연동어인데, 해물며 30여 부를 억울하게 징수당하니 여씨 괴롭지 않겠습니까. 원정함이 자극하여 건달 수 없습니다. 이러한 연유로 감히 양행이사님께 우러러 호소합니다. 바라건대 이러한 뜻을 해리 주 세사 이 변한 박성으로 하여금 억울하게 재금을 징수당하는 일이 없게 해 주십시오. 양행어사의 처분을 바랍니다. 정사년(1857) 11월 20 일. 양행어사(樺筆)(神) 【嚴肅】 사심을 조사하고 바로잡아 억울함이 없도록 해라 할 일이다. 본 관에 담당자 초 79일 (官印 一備處)



27

### Material Plants Characteristic Assessment and Application for the Exhibition Garden Function Improvement

**Subject Summary** Establish sustainable base of maintenance and management of the exhibition garden considering low cost and improvement of exhibition garden education function in enhancing conservation and scientific research value and garden story-telling in establishing plant species botanical history management.

**Key Results** Draw the map of planted plants in 5 exhibition gardens (fern garden, rare and endemic plant garden, medicinal garden, sedum garden, shrub garden) See the map

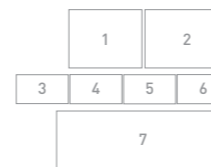
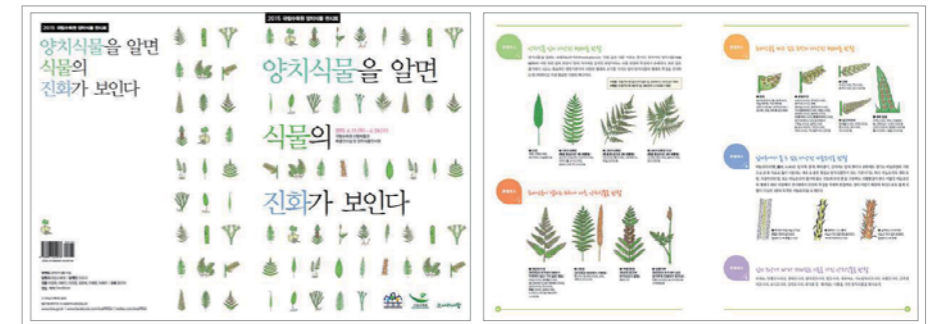
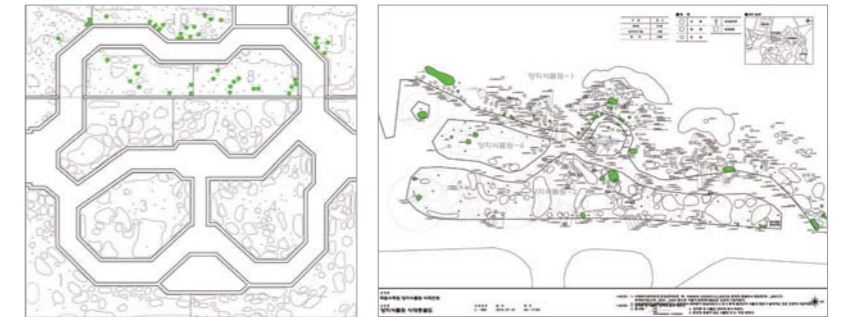
**Development Performance**

Collect genetic resources plant body (ferns, medicinal plants, sedum plants and shrubs)  
 Plant body 5,199 pieces of 224 taxonomic groups  
 Seeds 73 taxonomic groups  
 Specimen 152 taxonomic groups  
 Registration in the plant species management program : 939 pieces of 79 taxonomic groups of 71 genus of 38 families  
 Reviewal on the exhibition garden name tags : 586 tags (12 revised)  
 Life cycle monitoring on 128 taxonomic group of 46 species of weeds in the exhibition garden

Performance Dissemination (Prepare the contents in accordance with the subject of the project)  
 Thesis Publication : 4 theses, Weed monitoring for the effective garden management of the Korea National Arboretum  
 Exhibition : 'You can see the evolution of the plants through ferns'  
 Media PR : 1 case of press release (Hyankyoreh. 6.11)  
 Periodical publication : 7 cases including 'You can see the evolution of the plants through ferns'  
 Manpower training : 4 Masters

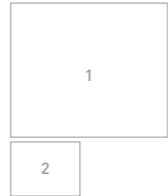
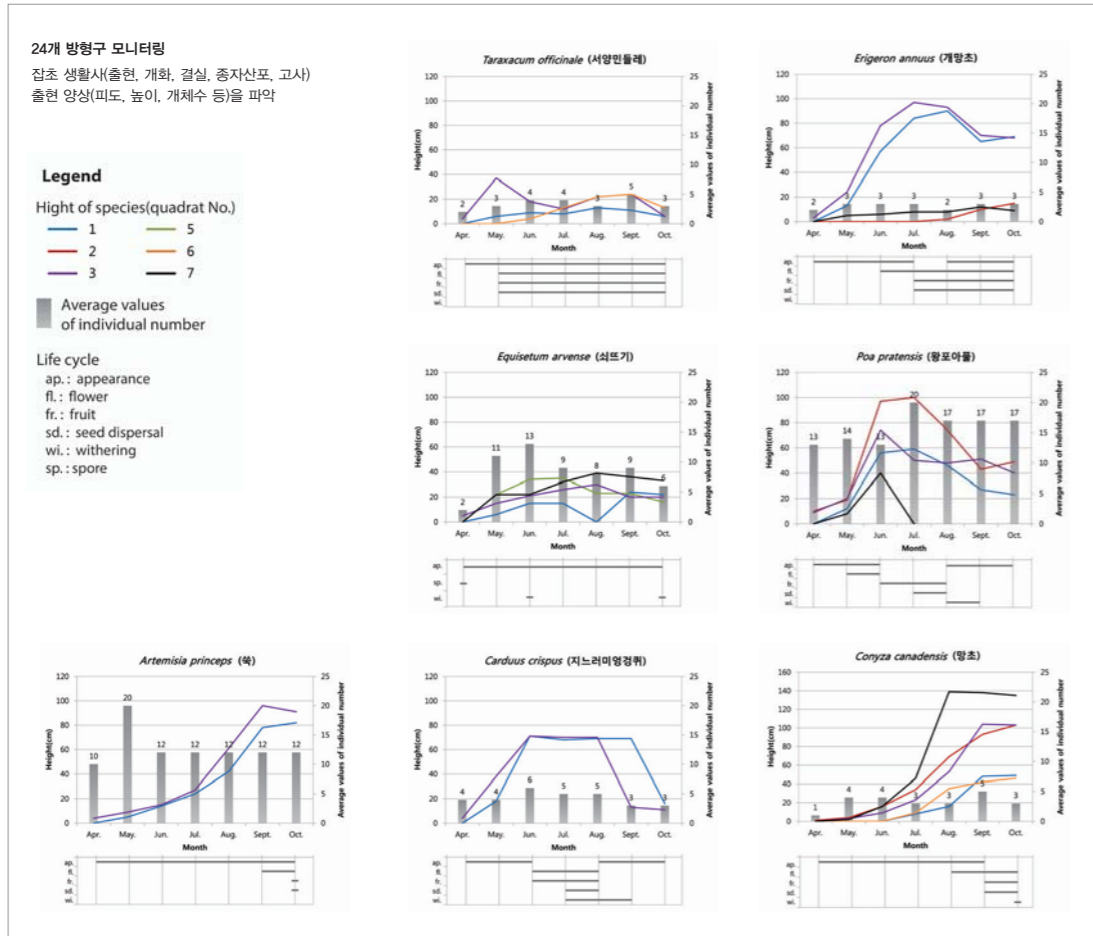
**Expected Effectiveness** Completed the primary garden education of tame tag in reviewing the name tags in the exhibition garden  
 Strengthen exhibition garden education function and provide various high quality services to the visitors using exhibition garden plant guide data

Ex-situ conservation in securing exhibition garden botanical history of plants and strengthen education function  
 Expand research results opening the exhibition in connection with exhibition garden plant research  
 Provide basic manual of weed preparatory management reflecting the monitoring results of the weed's life cycle in the exhibition garden  
 Secure plant species information based on the monitoring data of the exhibition garden (garden materials)

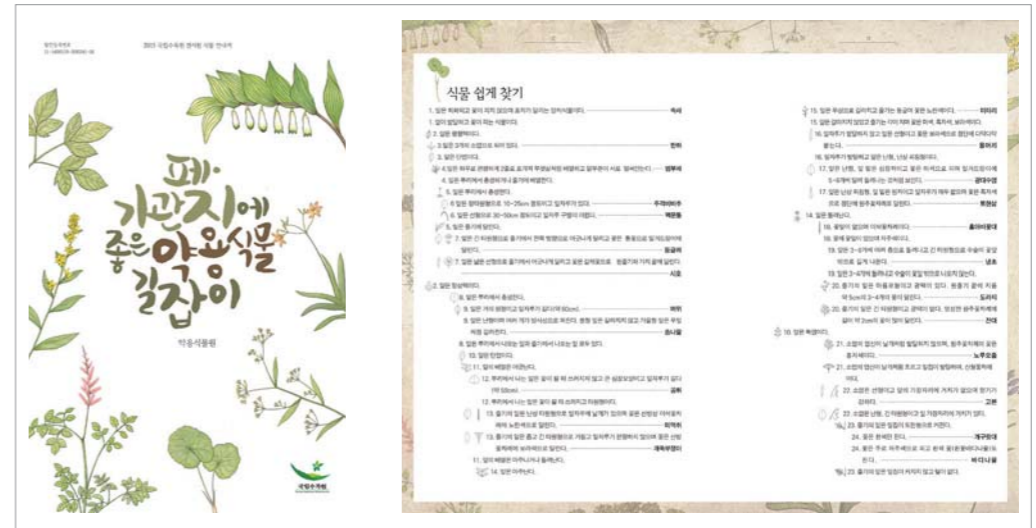


- 1 Fern plantation map of 166 individuals of 40 taxonomic groups of 25 genus of 14 families (temperate house)
- 2 Fern plantation map of 258 individuals of 43 taxonomic groups of 25 genus of 16 families (fern garden)
- 3 Long-tail spleenwort (temperate house)
- 4 Reflexed-margin single-leaf fern (temperate house)
- 5 Tongue fern (fern garden)
- 6 maidenhair fern (fern garden)
- 7 Inside the 'You can see the evolution of the plants through ferns'





1 Life cycle and appearance aspect by month of 128 taxonomic groups of weeds  
 2 Leaflet of Korea National Arboretum flower trail in spring



1 Medicinal garden plant guide  
 2 Medicinal garden plant guide



# PART V

Korea National Arboretum  
Annual Report 2015

## Appendix

- 01 International Cooperation
- 02 Main Event
- 03 Results of the KNA Education
- 04 Periodical Journal Publication
- 05 Publication of Thesis
- 06 Holding Specimen Status



## 01 International Cooperation

### MOU with Foreign Institutions

No.	Signing Date	Country	Institution	Content
1	1999.9.10	China	Northeast Forestry University of The People's Republic of China	Exchange of bio specimen, publications and data Exchange of researchers
2	2003.4.23	Mongolia	Institute of Botany Mongolian Academy of Science, Mongolia,	Technical advisory on plant resources collection and management, plant resources conservation
3	2005.9.2	Germany	The Botanic Garden and Botanical Museum Berlin-Dahlem	Cooperation including joint research, human exchange, periodical publication and information change
4	2005.11.4. 2012.4.17	Germany	Botanischer Garten München-Nymphenburg	Researchers of KNA visit Germany for short and long term training course
5	2007.6.13	Hungaria	Hungarian Natural History Museum	Secure North Korean Bio-speciment (218 pieces of plants, 54 pieces of insects, 25 pieces of bryophytes)
6	2007.7.11	China	Heilongjiang Forest Botanical Garden of The People's Republic of China	Joint research of biota in Heilongjiang Forest, the national protection reserve in China
7	2008.7.7	Ukraine	The M.M.Gryshko National Botanical Gardens of Ukraine	Research on plant diversity collection, investigation and conservation in Ukraine
8	2008.7.18	Laos	Faculty of Science, National University of Laos of The Lao Peoples Democratic Republic	Plant diversity collection and investigation in Laos
9	2008.10.20	China	Institute of Botany, the Chinese Academy of Sciences of The People's Republic of China	Joint research and exchange of plant resources
10	2008.11.11. 2015.10.19	Tunisia	National Institute for Researches on Rural Engineering, Water and Forest of the Republic of Tunisia	Cooperation on plant resources joint research and forest museum field of Tunisia
11	2009.6.16	Australia	The Royal Botanic Gardens and Domain Trust, Sydney in the State of New South Wales, Australia	Research cooperation, education and training, plant resources exchange on plant species diversity conservation, use and information field
12	2009.6.19	Australia	The Royal Botanic Gardens Melbourne in the State of Victoria, Australia	Research cooperation, education and training, plant resources exchange on plant species diversity conservation, use and information field
13	2010.10.5	England	Royal Botanic Garden Edinburgh (RBGE)	Research cooperation, education and training, plant resources exchange on plant species diversity conservation, use and information field
14	2011.4.21	China	Institute of Applied Ecology, Chinese Academy of Sciences of The People's Republic of China	Cooperation in research exchange including joint biota and ecological research
15	2012.6.28	Chile	Instituto de Investigaciones Agropecuarias, Chile	Research cooperation, education and training, plant resources exchange on plant species diversity conservation, use and information field

No.	Signing Date	Country	Institution	Content
16	2012.7.9	England	Royal Botanic Gardens, Kew, United Kingdom	Research cooperation, education and training, plant resources exchange on plant species diversity conservation, use and information field
17	2012.8.6	Russia	Botanical Garden Institute of Far Eastern Branch of Russian Academy of Sciences, Russian Federation	Research cooperation, education and training, plant resources exchange on plant species diversity conservation, use and information field
18	2012.10.12	Multinational MOU	Ecological Restoration Alliance (ERA)	Share ecological restoratin and the results, cooperate and provide cooperative frame between alliance members
19	2012.11.14	Mongolia	The Institute of Geocology of Mongolia	Research cooperation, education and training, plant resources exchange on plant species diversity conservation, use and information field
20	2013.7.10	Mongolia	The School of Biology and Biotechnology of the National University of Mongolia	Research cooperation, education and training, plant resources exchange on plant species diversity conservation, use and information field
21	2014.7.21	Japan	Kake Educational Institution, Japan	Research cooperation, education and training, plant resources exchange on plant species diversity conservation, use and information field
22	2014.10.14	Laos	The National Agriculture and Forestry Research Institute of The Ministry of Agriculture and Forestry, Lao PDR	Research cooperation, education and training, plant resources exchange on plant species diversity conservation, use and information field
23	2014.10.14	Vietnam	Vietnamese Academy of Forest Sciences of the Ministry of Agriculture and Rural Development, Vietnam	Research cooperation, education and training, plant resources exchange on plant species diversity conservation, use and information field
24	2014.10.14	Philippines	Ecosystems Research and Development Bureau, Republic of Philippines	Research cooperation, education and training, plant resources exchange on plant species diversity conservation, use and information field
25	2014.10.14	Multinational MOU	East Asia Biodiversity Conservation Network (EABCN)	East Asian biodiversity conservation
26	2015.3.17	Nepal	The Department of Plant Resources of Government of Nepal	Stable securing of Nepal Useful Plant resources
27	2015.5.10	Uzbekistan	The Institute of the Genepool of Plants and Animals of Academy of Sciences Republic of Uzbekistan	Biodiversity research and conservation between Korea-Central Asia
28	2015.8.12	Cambodia	The Institute of Forest and Wildlife Research and Development of the Forestry Administration, Cambodia	Organize Cooperation system for the establishment of the base of seed research
29	2015.8.24	Russia	Institute of Science State Nature Reserve <<Ussuri>>, named after V.L.Komarov of the Far-Eastern Branch of the Russian Academy of Science	Organize cooperation system including phylogenetic systematics research joint promotion of Russian Callipogon relictus
30	2015.10.22	Kazakhstan	The Kazakh Research Institute of Forestry and Agroforestry of the Ministry of Agriculture Republic of Kazakhstan	Joint collection and exchange of bio resources and research data sharing
31	2015.10.22	Kyrgyzstan	Department of Forest Ecosystems and Nature Reserves of State Agency of Environment and Forestry Protection, Kyrgyz Republic	Joint collection and exchange of bio resources and research data sharing
32	2015.10.22	Tajikistan	The National Biodiversity and Biodiversity Centre Committee of Environmental Protection Under the Government of the Republic of Tajikistan	Joint collection and exchange of bio resources and research data sharing



## MOU with Domestic Institutions

No.	Signing Date	Country	Institution	Content
1	2015.2.27	Company	Chunjae Education Corp.	Use and activation of KPNI
2	2015.3.2	Government office	National Institute of Ecology	Cooperation of Biodiversity conservation and ecological field
3	2015.4.22	Company	Dongwha Parm Corp.	Expand utility through discovering bio resources and sustainable use
4	2015.4.27	Government office	Ansan City	Subjects on conservation promotion, discovering service using forest bio resources and creating, management of urban forest
5	2015.4.30	Government office	Korea Forestry Promotion Institute	Establish cooperative system to enhance the value of forest resources and Korean forestry
6	2015.6.30	Government office	National Institute of Horticultural and Herbal Science	Research and exchanges related to the Horticultural and Herbal Science
7	2015.11.23	Government office	National Institute of Biological Resources	Joint research and human, material exchange for national biodiversity conservation and research
8	2015.11.24	Educational institution	Sangji University	Human exchange and education support for species research and education related to the gardening training agency and arboretum and botanical gardens
9	2015.12.16	Educational institution	Hongik University	Human exchange and education support for species research and education related to Smart urban science business school and arboretum and botanical gardens

## 02 Main Event

No.	Event Name	Event Content	Date	Location
1	2015 Korea Garden Show	Identify the possibility of native plants as garden materials and propose native plants garden model	2015.4.24.-5.1	Goyang City Hosoo Park
2	Plant specimen donation from St.Benedict Waegwan Abbey	Donation ceremony of 420 pieces of dried plant specimen of Andreas Eckardt priest collection	2015.4.28	KNA
3	DMZ arboreta and Botanical garden workshop	The 25th arboreta and botanical gardens specialized management workshop for sharing DMZ plant resources conservation and exhibition garden creating technique of northern region plant resources	2015.7.9.-7.10	DMZ Useful Plant Botanical Garden
4	Rectification of Our Plant Sovereignty	70th anniversary of liberation "Rectification of Our Plant Sovereignty" Special exhibition to encourage the use and PR to the public on the reviewal and recreating results of Korean peninsula native plants English names	2015.8.5.-8.15	KNA
5	Rectification of Our Plant Sovereignty	70th anniversary of liberation "Rectification of Our Plant Sovereignty" Special exhibition to encourage the use and PR to the public on the reviewal and recreating results of Korean peninsula native plants English names	2015.8.11.-8.20	Daejeon Government Complex Central Hall
6	4th Livelihood garden competition	Lead community activation of garden culture in spreading communication sharing garden life experience	2015.9.8.-10.24	KNA
7	2015 Bioblitz Korea	Recognition of biodiversity conservation need to not only bio experts but also to the public, and make an opportunity to do the bio exploration with specialists and the public	2015.9.16.-9.17	Ulsan Taehwa River Park
8	Korea Stamp Exhibition 'Rectification of Our Plant Sovereignty'	70th anniversary of liberation "Rectification of Our Plant Sovereignty" Special exhibition to encourage the use and PR to the public on the reviewal and recreating results of Korean peninsula native plants English names	2015.10.2.-10.8	Daejeon Trade Exhibition Center
9	KNA International Symposium	Strengthen international joint cooperation through EABCN short-term training, seek operation plan and EABCN consultation of figuring out the international trend and national Baekdudaegan arboretum Seed Vault for the forest biodiversity conservation	2015.10.20.-10.23	KNA
10	Exploration on knowing our forest biological species	Continuously promote the interest of forest bio species in providing the opportunity to experience our forest bio species to elementary school students	2015.10.24	KNA
11	Rectification of Our Plant Sovereignty	70th anniversary of liberation "Rectification of Our Plant Sovereignty" Special exhibition to encourage the use and PR to the public on the reviewal and recreating results of Korean peninsula native plants English names	2015.11.11-11.13	National Assembly Member's Office Building Central Hall



### 03 Results of KNA Education

<Status of Korea National Arboretum Forest Education Program Extension>

1999	Field	Education				Interpretation						
	Program	Elementary School Green Class				Arboretum Interpretation						
2005	Field	Education	Disabled	Interpretation		Recuperation/Relaxation		Special Program				
	Program	Elementary School Green Class	Happiness Charging	Arboretum Interpretation	Automatic Guide Rental	Forest culture experimental class		Summer Forest Camp				
2010	Field	Education		Disabled	Interpretation			Recuperation/Relaxation	Special Program			
	Program	Elementary School Green Class	Visiting Green Class	Happiness Charging	Arboretum Interpretation	Willife Conservatory and Museum Interpretation	Automatic Guide Rental	Forest culture experimental class	Summer Forest Camp			
2015	Field	Infant Education		Elementary Education		Teenagers Education			Adult	Disabled		
	Program	Exciting green world	Traditional play in forest kindergarten	Elementary school one grade green class	Elementary school one class green class	Experience one day botanist	Plant taxonomy in the text book	Brain refresh	Plant class	Happiness Charging Program	Visiting green class	
	Field	Interpretation			Recuperation / Relaxation				Special Program		Specialist Training	
	Program	Arboretum interpretation	Wildlife and Museum interpretation	Tropical green house interpretation	Gwangneung forest Mountain Bird Exploration	Forest Prenatal Education	Forest Culture Experimental class	Forest Healing for the Soldiers under attention	Summer Forest Camp	Knowing straight our forest bio species	Naturalized plant Exploration	Interpreter supplementary education

<Number of Forest Education class and participants by year>



No.	Name of the Program	Target	Frequency	Remarks
1	Green class to whole grade	Elementary School students (grade)	97	Forest education teacher training
2	Green class to one class	Elementary School students (class)	24	
3	Visiting Green class	Socially unprivileged people, welfare agency and school for disabled	8	
4	Green class to teenagers	Middle and High school students	28	
5	Happiness Charging Program	Disabled, Social misfits	30	
6	Infant Forest Experiment Program	Infant	71	
7	Arboretum interpretation	Visitors	3,903	
8	Wildlife Conservatory interpretation	Visitors	34	
9	Tropical Plant Resources Research Center interpretation	Visitors	826	
10	Gwangneung forest bird exploration	Visitors (family unit)	29	
11	Forest Pregnancy Program	Pregnant women	29	
12	Forest culture experimental class	Visitors	153	
13	Summer forest camp	Families with Elementary school student	2	
14	Plant class	Adults	68	
15	Soldier O <sub>2</sub> experience	Soldiers (including soldiers under attention)	16	
16	Forest interpreters training practice	Pre-forest interpreters	170	
17	BioBlitz Korea	Older than Elementary school students	1	Field education with biologists
18	Expedition on knowing straight our forest bio species	Elementary school student of Seoul and Gyunggido	1	Biology quiz competition



## 04 Publication

No.	Title of the Book	Publication Department
1	English Names for Korean Native Plants	Forest Biodiversity Division
2	Flora of the western Tien Shan (The Chimgan Mountains)	Forest Biodiversity Division
3	Field Guide to the Sedges 100 of Korea	Forest Biodiversity Division
4	A Field Guide to Lichens	Forest Biodiversity Division
5	Silvics of Korea - Conifers	Forest Biodiversity Division
6	DMZ Ecological culture map – humane	Plant Conservation Division
7	DMZ Ecological culture map - animal	Plant Conservation Division
8	Resilient Dwarf Relict Plants Tell Stories	Plant Conservation Division
9	Important Plants in East Asia II : Endemic plant stories	Plant Conservation Division
10	Invasive Alien Plant Impact on Forest	Plant Conservation Division
11	See the Plant Evolution through Ferns	Gardens and Education Division
12	The Forest Education Program	Gardens and Education Division
13	Vietnam's Illustrated Forest Plants (1), (2)	Gardens and Education Division
14	Vietnam, Floristic Diversity of Hon Ba Nature Reserve	Gardens and Education Division
15	Guide to Plants of Garden of our Flowers	Gardens and Education Division
16	Traditional Korean Gardens (revised)	Gardens and Education Division



## 05 Publication of Thesis

No.	Title of Thesis	Author	Name of academic journal
1	Taxonomic revision of the tribe Pogonini (Coleoptera: Carabidae) from Korea	Ik-Je Choi, Jongok Lim, Jinyoung Park, Jong-Kyun Park	Journal of Asia-Pacific Entomology 18
2	Two new records of the genus Arboridia Zachvatkin (Hemiptera: Auchenorrhyncha: Cicadellidae: Typhlocybinae) from Korea	Sumin Oh, Ik-Kwon Kim, Ki-Kyeong Kim, Hong-Yul Seo, Joon-Seok Chae, Sunghoon Jung	Korean Journal of Applied Entomology 54(1)
3	Taxonomic review of the genus <i>Caloptilia</i> Hubner (Lepidoptera: Gracillariidae) in Korea	Young-Min Shin, Bong-Woo Lee, Bong-Kyu Byun	Journal of Asia-Pacific Entomology 18
4	A new report of the termitophilous tribe Rhyparini Schmidt, 1910 (Coleoptera: Scarabaeidae) based on <i>Rhyparus azumai</i> azumai Nakane, 1956 from the Korea	Ik-Je Choi, Sang-Su Kim, Bong-Woo Lee, Jongok Lim	Korean Journal of Applied Entomology 54(4)
5	Taxonomic Study of the Genus <i>Abundisporus</i> in Korea	Suldbold Jargalmaa, Myung Soo Park, Jae Young Park, Jonathan J. Fong, Yeongseon Jang, Young Woon Lim	Mycobiology 43(3)
6	A new species and a new record of the lichen genus <i>Coenogonium</i> ( <i>Ostropales: Coenogoniaceae</i> ) from South Korea, with a world-wide key to crustose <i>Coenogonium</i> having prothalli	Joshi Y, Gagarina L, Halda JP, Oh S-O, Hur J-S	Mycosphere 6(6)
7	New species and new records of lichenicolous fungi from South Korea	Joshi Y, Kondratyuk S, Lököš L, Halda JP, Oh S-O, Hur J-S	Mycosphere 6
8	Mushroom Flora of Ulleung-gun and a Newly Recorded <i>Bovista</i> Species in the Republic of Korea	Chang Sun Kim, Jong Won Jo, Young-Nam Kwag, Gi-Ho Sung, Sle-gee Lee, Sang-Yong Kim, Chang-Ho Shin, Sang-Kuk Han	Mycobiology 43
9	Two Newly Recorded <i>Entoloma</i> Species, <i>E. eugenei</i> and <i>E. subaraneosum</i> , in Korea	Chang Sun Kim, Jong Won Jo, Young-Nam Kwag, Junsang Oh, Bhushan Shrestha, Gi-Ho Sung, Sang-Kuk Han	The Korean Journal of Mycology 43(2)

No.	Title of Thesis	Author	Name of academic journal
10	New and noteworthy Lichen-forming and Lichenicolous fungi 2	S. Y. Kondratyuk, L. Lőkös, E. Farkas, S.-O. Oh, J.-S. Hur	Acta Botanica Hungarica 57
11	<i>Physcia ucrainica</i> sp. nova (Physciaceae, Ascomycota) from the Crimean peninsula, proved by molecular phylogeny	S. Y. Kondratyuk, L. Lőkös, N. V. Kapetz, L. Ya. Pleskach, J. Kim, A. S. Kondratiuk, J.-S. Hur	Acta Botanica Hungarica 57(1-2)
12	Three New Monotypic Genera of the Caloplacoid Lichens (Teloschistaceae, Lichen-Forming Ascomycetes)	Sergii Y. Kondratyuk, László Lőkös, Jung A. Kim, Anna S. Kondratiuk, Min Hye Jeong, Seol Hwa Jang, Soon-Ok Oh, Jae-Seoun Hur	Mycobiology 43(3)
13	Studies on seasonal dynamics of soil-higher fungal communities in Mongolian oak-dominant Gwangneung forest in Korea	Chang Sun Kim, Jong Woo Nam, Jong Won Jo, Sang-Yong Kim, Jae-Gu Han, Min Woo Hyun, Gi-Ho Sung, Sang-Kuk Han	Journal of Microbiology 54
14	New host records of Ichneumonidae (Hymenoptera), with list of ichneumon wasps parasitizing <i>Ivela auripes</i> (Butler) (Lepidoptera: Lymantridae) from Korea	Jin-Kyung Choi, Ki-Gyoung Kim, Hong-Yul Suh, Mi-Jeong Jeon, Young-Min Shin, Il-Kwon Kim, Jong-Chul Jeong, YoungJin Kim, Jong-Wook Lee	Korean Journal of Applied Entomology 54(2)
15	Preliminary survey of indigenous parasites associated with <i>Phyllocnistis citrella</i> Stainton (Lepidoptera, Gracillariidae) in Jeju, Korea	Sanghyeob Lee, Il-Kwon Kim, Young-Kyu Park, Chung-Won Choi, Bong-Kyu Byun	Journal of Asia-Pacific Biodiversity 8
16	Insect community structures along elevation gradients on Mt. Seongsaksan, South Korea	Young-Min Shin, Il-Kwon Kim, Jong-Woo Nam, Da-Som Kim, Seung Jin Roh, Jun Hyoung Jeon, Jong Kyun Park, Dong-Pyeo Lyu, Bong-Woo Lee, Bong-Kyu Byun	Journal of Forestry Research 26(4)
17	A new record of <i>Rhododendron keiskei</i> Miq. var. <i>hypoglaucum</i> Suto & Suzuki (Ericaceae) in Korea	Yang, Jong-Cheol	Korean Journal of Plant Taxonomy 45
18	A new record of <i>Eleocharis parvula</i> (Roem. & Schult.) Bluff, Nees & Schauer (Cyperaceae) in Korea	Seong-Jin Ji	Korean Journal of Plant Taxonomy 45 (2)

No.	Title of Thesis	Author	Name of academic journal
19	The distribution and dynamics between sexes, conservation of natural populations of a rare woody plant, <i>Juniperus chinensis</i> L. (Cupressaceae), Korea	Jae-Kwon Shin	The Journal of the Plant Resources Society of Korea 28(4)
20	Hazard assessment of green-wall plant <i>Campsis grandiflora</i> K. Schum in urban areas based on pollen morphology and cytotoxicity	Hyun-Jun Kim	Korean Journal of Environmental Biology
21	Flora of vascular plants in Deokjeokdo (Ongjin-gun) and its adjacent regions, Korea	Hyun-Jun Kim	The Journal of the Plant Resources Society of Korea 28(4)
22	Polyploidy in <i>Lilium lancifolium</i> : Evidence of autotriploidy and no niche divergence between diploid and triploid cytotypes in their native ranges	Mi Yoon Chung, Jordi López-Pujolb, Jae Min Chung, Ki-Joong Kim, Seon Joo Park, Myong Gi Chung	Flora 213
23	Two unrecorded alien plants of South Korea: <i>Geranium dissectum</i> L.(Geraniaceae) and <i>Dianthus armeria</i> L.	Su-Young Jung, Jeong-Ki Hong, Soo-Hyun Park, Jong-Cheol Yang, Seok-Min Yun, Young-Sik Kang	Korean Journal of Plant Taxonomy 45(3)
24	Embryo, Seed coat and Pericarp Development in <i>Abeliophyllum distichum</i> Nakai (Oleaceae): A Rare and Endemic Plant of Korea	Balkrishna Ghimire, Mi Jin Jeong, Go Eun Choi, Hayan Lee, Kyung Mee Lee, Cheul Ho Lee, Gang Uk Suh	The Journal of the Plant Resources Society of Korea 28(3)
25	Seed morphology of the subfamily Helleboreoideae (Ranunculaceae) and its systematic implication	Balkrishna Ghimire, Mi Jin Jeong, Go Eun Choi, Hayan Lee, Gang Uk Suh, Kweon Heo, Ja Jung Ku	Flora 216
26	Enhancement of Seed Germination and Seedling Growth of <i>Allium victorialis</i> var. <i>platyphyllum</i> by the Soaking Treatment of Plant Growth Regulators	Mi Jin Jeong, Hyun Jin Song, Seon Jeong Sim, Yeong Rong Seo, Hyeon Jeong Im, Gang Uk Suh, Chandrakant. S. Karigar, Myung Suk Choi	Journal of Agriculture & Life Science 49(1)



No.	Title of Thesis	Author	Name of academic journal
27	Molecular identification of endangered Korean lady's slipper orchids ( <i>Cypripedium</i> , Orchidaceae) and related taxa	Jung Sung Kim, young Tae Kim, Sungwon Son, Joo Hwan Kim	Botany 93
28	Anti-invasive effect of $\beta$ -myrcene, a component of the essential oil from <i>Pinus koraiensis</i> cones, in metastatic	Jeong-Ho Lee, Kicheol Lee, Da Hyun Lee, Soon Young Shin, Yeonjoong Yong, Young Han Lee	The Korean Society for Applied Biological Chemistry 58(4)
29	The Largest Plastid Genome of Monocots: a Novel Genome Type Containing AT Residue Repeats in the Slipper Orchid <i>Cypripedium japonicum</i>	Jung Sung Kim, Hyoung Tae Kim, Joo Hwan Kim	Plant Molecular Biology Report 33
30	Clonal and genetic structure of <i>Iris odaesanensis</i> and <i>Iris rossii</i> (Iridaceae): insights of the Baekdudaegan Mountains as a glacial refugium.	Mi Y. Chung, Jordi López-Pujol, You M. Lee, Seung H. Oh, Myong G. Chung	Plant systematics and evolution 301
31	Evaluation of air quality using lichens in three different types of forest in Korea	Udeni Jayalal, Soon Ok Oh, Jung Shin Park, Joo Han Sung, Sun Hee Kim, Jae-Seoun Hur	Forest Science and Technology 2015, 18
32	Comparative leaf anatomy of some species of <i>Abies</i> and <i>Picea</i> (Pinaceae)	Balkrishna Ghimire, Chunghee Lee, Jongcheol Yang, Kweon Heo	Acta Botanica Brasiliica 29(3)
33	Comparative leaf anatomy of native and cultivated <i>Pinus</i> (Pinaceae) in Korea: implication for the subgeneric classification	Balkrishna Ghimire, Chunghee Lee, Jongcheol Yang, Kweon Heo	Plant systematics and evolution 301
34	Record of <i>Coptoclerus</i> Chapin from Korea with a new species and a note on the distribution of the genus (Coleoptera: Cleridae)	Jongok Lim, Shuhei Nomura, Seunghwan Lee, Youngeun Han & Bong-Woo Lee	Oriental Insects, 2015
35	Oregonin from the stems and leaves of Korean <i>Alnus</i> species (Betulaceae)	Eun-Kyung Ko, Ha-na Choi, Hye-Young Jin, Sun-Eun Choi	Journal of Chemical and Pharmaceutical Research 7(4)
36	Vascular plants in Mt. Taebaeksan (Taebaek-si), Korea	Hyun-Tak Shin, Jung-Won Yoon, Sang-Joon Kim, Tae-Im Huh, Young-Han Kwon, Dong-Ok Lim, Jong-Bin Ahn	Korean Journal of Environment and Ecology 29(3)



No.	Title of Thesis	Author	Name of academic journal
37	Vascular plants of Hak reservoir valley in Korea DMZ	Hyun-Tak Shin, Jong-Bin Ahn, Sang-Joon Kim, Tae-Im Huh, Young-Han Kwon, Yoon-Young Lee, Jung-Won Yoon	Journal of the Plant Resources Society of Korea 28(4)
38	A study on the reduced spatial extent of DMZ	Kyu-Seok Jung, Hyun-Tak Shin, Sang-Joon Kim, Jong-Bin Ahn, Jung-Won Yoon, Young-Han Kwon, Tae-Im Huh	Journal of the Korean Association of Regional Geographers 21(2)
39	Phylogeographics study of <i>Abies koreana</i> and <i>Abies nephrolepis</i> in Korea based on mitochondrial DNA	Jong-Cheol Yang	Journal of the Korean Society of Plant Taxonomists 45(3)
40	Genetic diversity and spacial structure of a population the natural monument (No.432) cymbidium kanran in Sanghyo-dong, Jeju-do	Eun-Hae Kim, Hye-Jin, Kwon, Jae-Kwon Shin, Sungwon Son, Kwan-Ho Bae, Yong-Chan Cho	Agricultural Life Science Research 49(5)
41	Natural hybridization of <i>Iris</i> species in Mt. Palgong-san, Korea	Oh-Kyung Son, Sungwon Son, Gang-Wook Seo, Seon-Joo Park	Journal of the Korean Society of Plant Taxonomists 45(3)
42	Habitat environmental and population characteristics of <i>cypripedium japonicum</i> Thunb., a rare species in Korea	Jung-Won Pi, Ji-Young, Jung, Jung-Gun Park, Hyung-Ho Yang, Eun-Hye Kim, Gang-Wook Seo, Cheol Ho Lee, Sung-Won Son	Journal of the Korean Society of Limnology (ecology and environment) 48(4)
43	Investigation on satisfaction and requirement of the native chrysanthemum exhibition programs to improve exhibition effectiveness and to understand the native plants' value in Korea National Arboretum	Chunghee Lee, Woo-Kyung Choi, Yoo-Jin Song, Choon-Hee Nam, Young-Jae Kim, Hee-Joo Maeng	Environment Education 28(3)
44	Predatory capability of <i>Chilocorus kuwanae</i> (silvestri) (coleptera:coccinellidae) for <i>Saissetia coffeae</i> (Walker)(Hemiptera:coccidae)	Hye-Young Jin, Tae-Hyun Ahn, Bong-Woo Lee, Hye-Sung Jeon, Joon-Seok Lee, Jong-Kyun Park, Eun-Hye Ham	Journal of Korean Society of Applied Entomology
45	Present condition and improvement plan of indigenous herbaceous plants selling on-line	Yoo-Jin Song, Woo-Kyung Choi, Hye-Young Jin	Journal of Korean Society for People, Plants and Environment 18(4)
46	Effect of seed storage methods and shading on seed germination and seedling growth of endangered species, <i>Iris dichotoma</i> and <i>Iris setosa</i>	Soo-Kwang Lee, Hyo-Yeon Kim, Kicheol Lee, Ja-Jung Koo	Journal of Korean Forest Society 104(1)

No.	Title of Thesis	Author	Name of academic journal
47	Effect of shading degree and rooting media on growth of cuttings in caragana sinica (Buc'hoz) Rehder and Sedum middendorffianum Maxim	Hyun-Jin Kim, Yoon-Jin Kim	Korean Journal of Medicinal Crop Science 23(4)
48	The distribution and dynamics between sexes, conservation of natural populations of rare soody plant, Juniperus chinensis L. (Cupressaceae), Korea	Jae-Kwon Shin, Jae-Min Jung, Jin-Soek Kim, Choong-Won Yoon, Chang-Ho Shin	Journal of the Plant Resources Society of Korea 28(4)
49	Endophytic fungi diversity isolated from the roots of Cypripedium macranthum and Cypripedium japonicum	Bong-Hyung Lee, Han-Kyul Han, Hye-Jin Kwon, An-Heum Um	Journal of Mycology
50	Initial responses of vegetation regeneration after strip clear cutting in secondary Korean red pine (Pinus densiflora) forest in Samcheok, Gangwondo, South Korea)	Se-Young Jung, Yong-Chan Cho, Bong-Kyu Byun, Hye-Jin Kim, Kwan-Ho Bae, Hyun-Sup Kim, Joon-Soo Kim	Korean Journal of Environment and Ecology 29(5)
51	Floristic Study of Neunggyeong-bong (Pyeongchang-gun, Gangneung-si) in Korea	Hyun-Joon Kim, Min-Jung Joo, Jung-Jin Ji, Soon-Koo So, Soo-Young Jung, Kye-Sun Jang, Kyung Choi, Jong-Cheol Yang	Journal of the Plant Resources Society of Korea 28(2)
52	Two unrecorded alien plants of South Korea : Geranium dissectum L. (Geraniaceae) and Dianthus armeria L.	Soo-Young Jung, Jung-Ki Hong, Soo-Hyun Park, Jong-Cheol Yang, Seok-Min Yoon, Young-Sik Kang	Journal of the Korean Society of Plant Taxonomists 45(3)
53	A detection of novel habitats of Abies Koreana by using species distribution models (SDMs) and its application for plant conservation	Nam-Sin Kim, Dong-Wook Han, Jin-Yeol Cha, Yong-Soo Park, Hyun-Je Cho, Hye-Jin Kwon, Yong-Chan Cho, Seung-Hwan Oh, Chang-Seok Lee	The Korea Society of Environmental Restoration Technology 18(6)
54	A study on Geotop classification and Geodiversity in Mt. Jeombong experimental forest	Nam-Sin Kim, Dong-Wook Han, Jin-Yeol Cha, Hye-Jin Kwon, Yong-Chan Cho, Seung-Hwan Oh, Seung-Hwa Yoo, Dong-Soo Yoo, Yong-Soo Park	The Korea Society of Environmental Restoration Technology 18(6)
55	Genetic diversity and spatial structure of a population the natural monument (No.432) cymbidium kanran in Sanghyo-dong, Jeju-do	Eun-Hye Kim, Hye-Jin Kwon, Jae-Kwon Shin, Sung-Won Son, Kwan-Ho Bae, Yong-Chan Cho	Agricultural Life Science Research 49(5)



## 06 Retention Specimen Status

Classification	No. of species	Score (total)	4th quarter	2015	
Total	18,817	1,012,515	▲37,748	117,670	
1. Pressed plants	Plant	8,697	509,188	▲21,411	60,130
	Bryophytes	200	2,688		51,715
2. Insects	Insect	6,363	456,329	▲16,217	23
3. Wild Animals	Wildlife	306	1,739		5,042
4. Microorganism	Mushroom	1,494	17,675		500
	Lichens	659	7,030	▲120	260
5. Others	Others	1,098	17,866		
	(Wood specimen, rocks, fossil 등)				

※ New type specimen : 806 pieces (plants: 68pieces, insects: 738pieces)



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