

## Securing sanctuary for natural monuments in preparation for natural disasters

*Agreement of the Korea Arboretum and Garden Institute and the Cultural Heritage Administration on the conservation of our nation's natural heritage*

***"Preserving wild plant seeds through permanent storage of natural monuments and the Seed Vault"***

On April 20th, the Korea Arboretum and Garden Institute (in short Koagi) (Chairman Ryu Gwang-Su), and the Chief of the Cultural Heritage Administration, Kim Hyun-mo, signed an agreement on working together for preserving the wild plant seeds of natural monuments.

KoAGI regarding the wildfire that happened in Ulsan this March signed the agreement with the Cultural Heritage Administration to protect our nation's important natural heritage. The purpose of this agreement is to securely store our natural monument genetic resources in the Seed Vault, so they can be safely passed on to our future generations.

\* The Seed Vault is one of only two in the world. In preparation for 'doomsday', wild plant seeds are being stored securely in the facility. There are currently only two seed vault facilities in the world; Norway and South Korea.

The agreement is to fortify the connection between the two administrations to better serve the following purposes:  
▲perseverance of natural monument's wild plant seeds ▲technical consulting and research of natural heritage's wild plants ▲exchanging genetic information of natural monument's plants and animals ▲ and preparedness for climate change.

Starting with 38 cases in the Gyeong-buk region in 2022, the project plans to save 172 natural monuments' wild plant seeds over the next 5 years. Through this process, the system will allow KoAGI to become the last sanctuary for the natural monument's wild plants.



Kim Jin-Ki, an assistant manager told, "The purpose of our Seed Vault is to secure, not only wild plant seeds but also anything that can provide us with valuable history and research opportunities."

## 10 seeds are selected for the 5th anniversary of Korea Arboretum and Garden Institute



In celebration of its 5th anniversary, the Korea Arboretum and Garden Institute (Director Ryu Kwang-su) has announced 10 meaningful seeds that have been permanently stored in the Baekdudaegan Global Seed Vault for the past five years.

The selection of meaningful seeds permanently stored in the seed vault was conducted for visitors and internal staff who visited the Baek-Du-Daegan National Arboretum and the National Sejong Arboretum for two weeks from May 9th to 23rd.

The seed character, “Another Universe that cherishes the life of seeds” representing the important 12 seeds including the 10 chosen seeds was made based on the survey by the Exhibit manager team. Anyone can access and use the illustration of the seed character from their official website at free of charge.

\*Baekdudaegan national arboretum  
<http://www.Bdna.or.kr>

The manager Song Chi-Hyeon said, “our Seed Vault safely secures many important national monument’s wild plant seeds in preparation for climate change, wars, and natural disasters.” He also says, “with the help from our new Seed character, we will continue to work on promoting the importance of the Seed Vault.”

The Seed Vault, in preparation for ‘doomsday’, securely and permanently stores wild plant seeds. There are currently only two seed vault facilities in the world; Norway and South Korea.

## A book "The Seed Vault: People of Seed Vault" is published

***The Seed Vault sets the first foothold through publishing a book***

A book has been published about the only Seed Vault in the world that permanently stores wild plant seeds.

The Seed Vault, in preparation for ‘doomsday’, securely and permanently stores wild plant seeds. There are currently only two seed vault facilities in the world; Norway and South Korea.



The author of the book thoroughly explains the process from how to collect the plant seeds to how to secure them at a low temperature from their views.

The C.E.O. of the publisher, ‘Si-Wol’ says, “I decided to publish this book in the hope of promoting the meaningful stories of the space and the people at the

Seed Vault. These people at the facility have worked hard for our future generations.”

The manager of the Seed Vault management center, Song Chi-Hyeon said, “this book is very interesting because it contains stories about the Seed Vault that have not been very well known to a lot of people.”

## Gu-Sang seed and Mi-Sun present the official promotion video of Seed Vault.

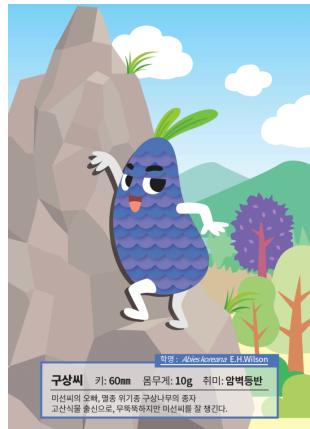
*National seed storage “Seed Vault”, targets generation Z with their official mascots.  
“Gu-sang seed and Mi-sun seed will help promote Seed Vault for the future of humanity.”*



(Click to watch promotion video)

Baek-Du-Dae-Gan National Arboretum under Korea Arboretum and Garden Institute (Chairman Ryu Kwang-Soo) created the official mascots for the world's first wild plant seed storage facility on April 24th.

Gu-Sang seed and Mi-Sun seed, the official mascots of Seed Vault were created with motifs of the Gu-Sang tree and Mi-Sun tree.



\*Gu-Sang was created with the motif of Gu-Sang seed: a specialty plant by the Korea Forest Service. An older brother of Mi-Sun seed. He is a very cheerful youth who loves mountains and enjoys extreme sports.

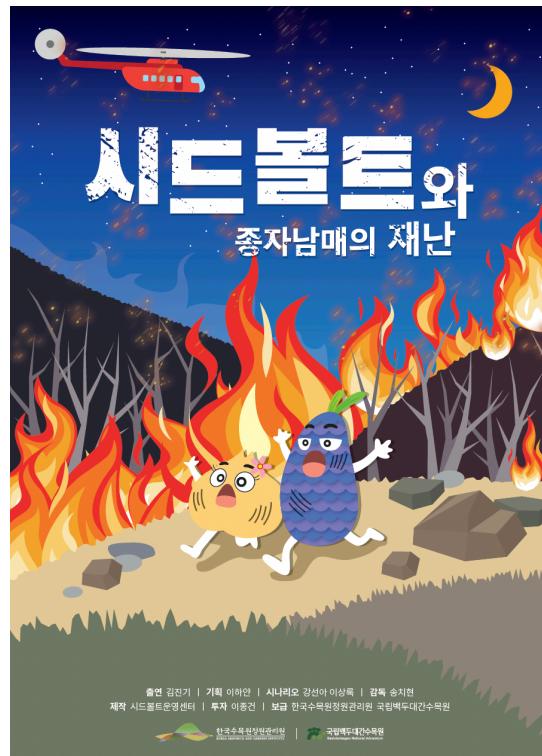


\*Mi-Sun was created with the motif of Mi-Sun seed: a specialty plant by the Korea Forest Service. She is a very friendly Generation Z who loves to take care of her garden.

KoAGI pre-released promotion video of Gu-Sang and Mi-Sun and had mascots inauguration ceremony for their executives. This video is available on Korea Arboreta and Gardens Institute's YouTube page.

These mascots will be utilized not only for promotions but also for educational use and various purposes.

The manager Song Chi-Hyeon said “Gu-Sang and Mi-Sun are K-brands inspired by Korean specialty plants. We will actively promote Seed Vault and forest biological resources with Gu-Sang and Mi-sun in various forms in our daily lives such as YouTube, webtoon, and merchandises.



## Baedudaegan National Arboretum participated in the World Forestry Congress

### *Korea Arboretum and Garden Institute, standing for permanent conservation of plant genetics resources around the world*

Baedudaegan National Arboretum global Seed Vault under Korea Arboretum and Garden Institute (KoAGI) will actively engage in the permanent conservation of genetic resources around the world by strengthening cooperation with Svalbard Seed Vault of Norway.

At the side event held at the 15th World Forestry Congress(WFC), Korea Arboretum and Garden Institute decided to strengthen the system for backing up and storing plant genetic resources around the world in cooperation with the Nordic Genetic Resources center.

The Nordic Genetic Resources Center, where people study the animal and plant genetic resources of Nordic countries such as Norway and Finland, is operating the world's first Seed Vault to permanently preserve plant genetic resources.

Nordic Genetic Resources Center's Seed Vault is located on the island of Spitsbergen, Svalbard.

The team manager White Lee said " Global Seed Vault of Baedudaegan aims to conserve domestic and foreign plant seeds whose survival is threatened by climate change." In the future, we plan to strengthen cooperation and conduct joint research with international organizations to actively verify new technologies that can permanently preserve genetic resources of plants ."

### **Baedudaegan Global Seed Vault, participated in the 15th World Forestry Congress.**

*Operated public relations booth,  
and raised their voice on the  
importance of depositing global seed*

Baedudaegan Global Seed Vault participated in the 15th World Forestry Congress, which was held at the Seoul COEX for five days from May 2nd to 6th.

Hosted by the Korea Forest Service and Agriculture Organization of the United Nations(FAO), the World Forestry

Congress is the largest international event in the forest sector of all time. In Asia, it has been 44 years since Indonesia hosted it in 1978.

At this event, more than 10,300 forest and environmental officials, including governments, international organizations, and academia from 143 countries, gathered to discuss the forestry and environmental problems of the earth and sought solutions.

At this event, KoAGI discussed the topic of strengthening the role of arboreums and botanical gardens in the conservation of forest biodiversity on May 3rd and, also talked about building and strengthening networks for forest research and education to respond to future climate change on May 6th.

The conference on the 3rd was presented by Kim Yong-Sik, director of Cholipo Arboretum, LiSe Lykke Steffensen, Director of Northern European Genetic Resource Center, and Professor Hugh W. Pritchard of Royal Botanical Gardens, Kew. Various discussions about the role of domestic and foreign arboreums and botanical gardens in the future were held.

Baedudaegan Global Seed Vault operated a promotion booth for arboretum and botanical garden at the World Forestry Congress. Raffle events and SNS events were held for participants. In addition, it actively promoted the functions and roles of the Baedudaegan Global Seed Vault by preparing and issuing a seed deposit form for overseas participants.

## -Research Paper-

### Found out the germination characteristics of the seeds of *Penthorum chinense* (known as octopus legs in Korea), a rare plant native to the Korean Peninsula.

(Author Lee Mi-Hyun, Wild Plant Seed Research Center, Song Chi-Hyeon, Korea Arboretum and Garden Institute)

*Baedukdaegan Global Seed Vault under Korea Arboretum and Garden Institute has been actively researching the seeds of wild plants. The article: Effect of gibberellic acid treatment and alternating temperature on breaking physiological dormancy and germination in *Penthorum chinense* Pursh(Penthoraceae) has been published in an academic journal 'Seed Science and Technology', by Lee Mi-Hyun of Wild Plant Seed Research Center, and Song Chi-Hyeon, the Korea Arboretum and Garden Institute.*

The Octopus legs, which bloom in July and August, form a raceme which as its name suggests, develops with the end of the stem splitting in all directions like octopus legs. They are plants growing near moist streams and rivers but have recently been on the verge of extinction due to the reduction of natural wetlands due to wetland landfills. Octopus legs are vulnerable to competition within the ecosystem. If there are other plants around, they often don't seem to grow properly. However, due to their unusual survival strategies, they have been able to survive harsh conditions like river flooding and drought, and have maintained their names until nowadays. These characteristics also make them a candidate for species used to restore rivers and wetlands.

This paper is about improving the probability of germination to break seed dormancy. To improve the germination of the Octopus leg, 60 tests were conducted at different temperatures on night and day. It turned out that the best temperature for germination was 23/7 °C and 95 percent of seeds were germinated. One noticeable result from this experiment was the greater the temperature difference between day and night the better the germination rate.

For smooth germination of Octopus legs, the daily temperature difference had to be at least 15°C. Also, gibberellin treatment helped to increase the germination rate from 28 percent to 94 percent and shortened many days (6.3 days) required for germination. These results will be utilized as a basis for the use of Octopus legs and the conservation of species diversity.

M.H. Lee<sup>1</sup>, C.H. Song<sup>2</sup>, C.H. Park<sup>3</sup>, K.S. Song<sup>4</sup>, S.Y. Kim<sup>5</sup>, S.H. Kim and C.S. Na<sup>6</sup> (2022).  
Seed Science and Technology, 50, 2, 207-219.  
<https://doi.org/10.1111/sst.12323>



Effect of gibberellic acid treatment and alternating temperature on breaking physiological dormancy and germination in *Penthorum chinense* Pursh (Penthoraceae)

Mi Hyun Lee<sup>1</sup>, Chi Hyeon Song<sup>2</sup>, Cho Hee Park<sup>3</sup>, Ki Seon Song<sup>4</sup>, Soon Young Kim<sup>5</sup>, Seo Hyun Kim<sup>6</sup> and Chae Sun Na<sup>6\*</sup>

<sup>1</sup> Baekdujisan National Arboretum, 7160-51, Moseon-ro, Cheongnyeong-myeon, Tongil-eup,

Gyeongsangbuk-do, 36329, Republic of Korea

<sup>2</sup> Arboretum Non Profit Organization, 39, Gyeonggi-dong, Adeok-gu, Gyeonggi-do, 16729, Republic of Korea

\* Author for correspondence (E-mail: chaeus@kang.ac.kr)

(Submitted November 2021; Accepted April 2022; Published online May 2022)

#### Abstract

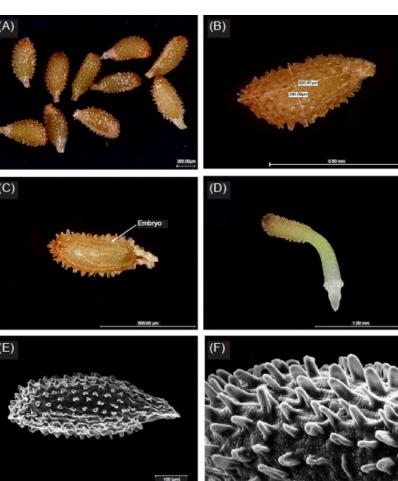
*Penthorum chinense* (Penthoraceae) is a threatened South Korean medicinal plant used to treat alcohol-related diseases and prepare traditional medicine. In this study, we analyzed the dormancy mechanism of *P. chinense* seeds and the way to decompose it by gibberellic acid and urban development. In recent years, in this study, we considered the effect of temperature and gibberellic acid treatment on *P. chinense* seed germination to improve the probability of germination. We conducted a germination experiment using alternating temperature treatment and alternating temperature treatment (no condenser). In addition, gibberellic acid (GA) treatment was conducted to decompose seed dormancy. The germination rate was measured every 24 h for 14 days to reach 50% maximum germination (T<sub>50</sub>). The optimum temperature regimen was 7°C/23°C. GP was 95%, and the T<sub>50</sub> value was 6.3 days. After the GA treatment, the germination rate was 94%, and the T<sub>50</sub> value was 6.3 days. When the T<sub>50</sub> value from 14 to 6.3 days at concentrations above of 50 µg L<sup>-1</sup>. After the GA treatment, the growth of roots was inhibited. For the germination of *P. chinense* seeds, a diurnal temperature difference of ≥ 15°C is required.

Keywords: *Penthorum chinense* Pursh, restoration, seed germination, seedbank, storage management, dormancy, gibberellic acid.

#### Introduction

*Penthorum chinense* (Penthoraceae) is a neopeltidic genus of plants in the order Saxifragales and family Penthoraceae. The genus consists of two species, one from east Asia (*Penthorum chinense* Pursh) and one from eastern North America (*P. sedoides* L.). The former is widely distributed in East Asia, including China, Japan, Korea, and Russia.

© 2022 M.H. Lee et al. This is an open access article distributed in accordance with the Creative Commons Attribution Non-Commercial (CC BY-NC 4.0) license, which permits others to download, reuse, adapt, build upon, or redistribute the material, but only if they cite the original author(s) and the copyright holder, and that this work is properly cited and the use is non-commercial. See: <https://creativecommons.org/licenses/by-nc/4.0/>



## -Brief News-

### Baedudaegan Global Seed Vaults, gathered in one place to explore the direction of medium and long-term missions, and visions.

Seed Vault management center held the 5th management advisory committee in the grand meeting room on May 31st.

This management advisory committee was held with the onsite participation of six advisors including the director Lee Jong-Gun, and two additional participants through a video call. They discussed innovation plans including Seed Vault's medium, and long-term missions, visions, building the second tunnel, and seed storage diversification plan.

With advice and discussions from the advisory committee, the Seed Vault management center will do its best to move forward and live up to the name of Baekdudaegan's Global Seed Vault.



### Bakedudaegan National Arboretum collected domestic unreported species, the seeds of "Wando-sul-kot-na-mu (*Stachyurus praecox*)".

On Wednesday, June 8, a special seed arrived from Jeollanamdo Forest Resources Research Institute(JFRRRI). It is the seed called 'Wando-sul-kot-namu(*Stachyurus praecox*)'. Two hundred of their trees were identified on an island near the Wando area by the JFRRRI as an unreported species in the country during an investigation of the research project called "Monitoring and preserving strategies of rare, specialty species of Jeollanam-do" for future climate change and reported on the paper of the Korean Society of Plant Taxonomists. Wando-Sul-Kot-na-mu is a deciduous tree that normally grows around 2-4 meters tall (maximum 8 meters). The flowers are dioecious. Also, light yellow petals bloom before leaves and sag from the leaves axil similar to ears. They bloom from March to April. It has been known they were only discovered in Japan until their recent discovery in Korea. Not only was JFRRRI's find a splendid feat, but also Seed Vault's acquisition and permanent preservation of this seed for future generations was an amazing triumph.

### Seed Vault set innovative mid and long-term management plans.



Baedudaegan Global Seed Vault looked back on the results of its operation over the past five years, discussed the future development directions, and came up with innovative mid, and long-term plans for the future. These plans were discussed in the direction of sharing past achievements and including future improvements. In the past, the purpose of the Seed Vault was to increase the amount of storage, but in the future, the main focus was to target the qualitative growth of stored seeds. With various related organizations, it included methods for securing and storing seeds for each purpose. In particular, it included content to prepare for a leap into the Global Seed Vault by forming overseas Seed Vaults network base regions such as Australia and Georgia.

[www.koagi.or.kr](http://www.koagi.or.kr)[www.bdna.or.kr.](http://www.bdna.or.kr)

Publisher: Bae Ki-Hwa

## -Brief News-

### Baedkudaegan Global Seed Vault will participate 7th Global Botanic Gardens Congress.

*Securing a position as a global seed vault by raising awareness of the importance of conservation of wild plant seeds*

Baedkudaegan Global Seed Vault will participate 7th Global Botanic Gardens Congress from September 23rd to 30th in Melbourne Australia.

Global Botanic Garden Congress is an international event attended by officials from botanical gardens and arborets around the world.

Baedkudaegan Global Seed Vault at this event will operate a promotion booth and it intends to inform the purpose and necessity of the Seed Vault and promote the establishment of a wild plant seed conservation network. With this, Baedkudaegan Global Seed Vault will inform it is a facility that takes the lead in the permanent preservation of wild plant seeds and aims to promote a leap forward into the Global Seed Vault with the entire world.

### Workshop on how to collect seeds in 2022

Baedkudaegan National Arboretum 2022 seed collection workshop standardized the methods of wild plant seed preservations for ex-situ conservation.

The Korea Arboretum and Garden Institute under Korea Forest Service held a workshop to discuss the methods of wild plant seed preservations and history management for ex-situ conservation from March 24th to 25th at the Baedkudaegan National Arboretum 2nd Yeonsu-dong auditorium.

74 participants participated in this event including professor Jung Kyu-Hyung of An-dong University, the Baedkudaegan National Arboretum took the lead and shared the video of the seed collection manual. It was decided to distribute the video online in the future, such as on YouTube.



### Korea National Park Research Institute held a 2022 Seed Vault seed donation ceremony.

*Baedkudaegan Arboretum and National Park Research Institute take the lead in responding to climate change through seed preservation of wild plants.*

Baedkudaegan National Arboretum, of Korea Arboretum and Garden Institute, a public institution under the Korea Forest Service held a seed donation ceremony and research exchange meeting with Korea National Park Research Institute in June 16th. This research exchange meeting was conducted to review the results of the three-year business agreement between Baedkudaegan National Arboretum and Korea National Park Research Institute from 2019 and to seek directions for future development.

The seeds of 10 species (12 seeds) such as white oak and cicadas which were collected together at Jirisan National park in 2021 were donated to Seed Vault under the name of the National Park to respond to future climate change and ensure the safe preservation of plant species.

## -Advertisement-

### Baedudaegan National Arboretum opens “Summer Bongja Festival”



Gyeongbuk Bonghwa Baekdudaegan National Arboretum prepared various events such as the ‘Summer Vacation Special Program’ and the ‘Summer Bongja Festival’ ahead of the vacation season in July.

Baedudaegan National Arboretum under Korea Forest Service will hold a free summer vacation program for visitors from July. This summer vacation special programs consist of the ‘Forest Hammock’ experience where you can lie down and feel the nature in the forest, the ‘Sand Art Experience’ where you draw pictures with sand, and the ‘Native Plant Gardening experience’ event using the wild loosestrifes from Baekdudaegan.

In addition, the ‘Garden Stay-Summer Scent’ program at Dunaecheon in the arboretum is an education program where visitors can accommodate and spend a cool summer and avoid blistering heat. Reservations can be made on the Arboretum website ([www.bdna.or.kr](http://www.bdna.or.kr))

Baedudaegan Arboretum will hold the 2002 Summer Bonghaw Native Flower Festival (Bongja Festival in short) from the 28th of July to the 7th of August to promote the value of community and mutual growth with native plants grown by local farmers.

The Bongja Festival has been held since 2019 to generate sustainable income for the local community and raise public interest in forest biodiversity, is in full swing this year with more diverse attractions to welcome visitors.

As the largest arboretum in Asia, visitors can enjoy the beauty of native flowers and relax in the forest of Baekdudaegan with 39 exhibition gardens. More than 500,000 wild loosestrifes are planted on the wildflower hill and form a beautiful pink garden that visitors can enjoy. People also can take the picture of a lifetime with the overwhelming huge tiger air sculpture and the mountain grandpa who protects Baekdudaegan in the photo zone. A variety of special exhibitions that can only be seen in the arboretum, a ‘Forest Flea Market’ created with local small business owners, a cultural performance ‘Stage 102’, and an educational experience zone where everyone of all ages can enjoy are prepared. Let’s get away from everyday life and participate in various forest vacation programs where you can feel a real rest in the arms of the Baekdudaegan.

Importantly, the Bonja Festival is an ESG(Environmental, Social, and Governance) festival that cares about the environment. It aims an eco-friendly festival that minimizes waste. All banners decorated at the festival are collected and reborn as a gardening apron. In addition, opportunities for sustainable income generation through contract cultivation (420,000 plants) are provided for 31 farmers in the Bonghaw area to enhance financial independence and strive for balanced regional development.

The event period is the same as the BongHaw Sweetish Festival, the well-known festival of Bonghaw-gun, which will be held from July 30th. We recommend that you leave the bustling city and go on a summer vacation to Bonghaw-gun, Korea’s iconic clean mountain village.