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## Flora of vascular plants in the Chilgapsan Provincial Park, Korea

Ro-Young Lee<sup>a</sup>, Hyun-Do Jang<sup>b</sup>, Yoon-Young Kim<sup>b</sup>, Sun-Gyu Yang<sup>b</sup>, Hyeok-Jae Choi<sup>c</sup>,  
Sung-Jin Ji<sup>d</sup>, Byoung-Un Oh<sup>b,\*</sup><sup>a</sup> Department of Variety Examination, National Forest Seed and Variety Center, Chungju, Chungbuk 380-941, Republic of Korea<sup>b</sup> Department of Biology, Chungbuk National University, Cheongju, Chungbuk 361-763, Republic of Korea<sup>c</sup> Department of Biology, Changwon National University, Changwon, Gyeongnam 641-773, Republic of Korea<sup>d</sup> Division of Forest Biodiversity and Herbarium, Korea National Arboretum, Pocheon, Gyeonggi-do 487-829, Republic of Korea

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## ABSTRACT

The flora of Chilgapsan Provincial Park in Cheongyang-gun (Chungcheongnam-do), Korea was surveyed from 2000 to 2014. In 19 field surveys, vascular plants were revealed 490 taxa belonging to 97 families, 309 genera, 433 species, four subspecies, 48 varieties, and five forms. Plants of various categories were discovered in this study. For the Korean endemic plants 15 taxa were recorded, and 11 taxa designated by the Korean Forest Service as rare plants were investigated in this region. The plants above the third degree among the floristic regional indicator plants designated by the Korean Ministry of Environment were 10 taxa. In addition, 33 taxa of naturalized and 73 taxa of cultivated plants were recorded.

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## Introduction

Chilgapsan mountain (561 m), which was designated as a provincial park in 1973, is located at the end of the Charyeong mountain range that extends southwestward from the Baekdu mountain range. It is located in Daechi-myeon, Jangpyeong-myeon, and Jeongsan-myeon of Cheongyang-gun in Chungcheongnam-do of the administrative district (north latitude 36°23'–36°26', east longitude 126°49'–126°55'), has a total area of 32.5 km<sup>2</sup>, and is one of the most famous tourist attractions. Centering on the main peak of Chilgapsan, the main ridge stretches toward the north and south, while the second peak of Chilgapsan, Samhyeongjaebong (542 m), is located to the south of the main peak and Daedeokbong (470 m) to the north. The overall terrain of Chilgapsan is compared to the altitude of the main peak, the valleys are deep and has steep valley slope. In terms of plant geography, this area corresponds to the northern region of the southern province (Lee and Yim, 2002), and geographically, it is located near the Yellow Sea to the west, thus having both continental and oceanic climate features depending on

the season (Kim and Kim, 2010); therefore, it is anticipated to have high biodiversity. The annual average temperature of Cheongyang-gun is 11.5°C, with the average temperature being –2.8°C in January and 26.3°C in August, and the annual average precipitation is 1600 mm (Cheongyang-gun, 2010).

In previous studies on the flora of the region by Yu (1976), 71 families, 126 genera, and 126 taxa were identified. Lee and Lee (1979) examined the vascular plant flora of Chilgapsan, and reported 107 families, 302 genera, and 420 taxa. Oh and Kim (2000) and Oh and Yang (2009) conducted studies on the flora of the Chilgapsan region reported in the second and third national natural environment studies by the Ministry of Environment, and prepared a plant list containing 89 families, 263 genera, and 380 taxa, and 83 families, 204 genera, and 302 taxa, respectively, based on the evidence specimens. Recently, Jang and Moon (2010) recorded 107 families, 318 genera, and 450 taxa in the research on Chilgapsan flora.

These findings confirmed that approximately 800 taxa are distributed in the Chilgapsan Provincial Park. However, cultivated plants, such as *Acer buergerianum* Miq., *Hibiscus syriacus* L., and *Zizyphus jujuba* var. *inermis* (Bunge) Redher, and plants judged to be erroneously named, such as *Artistolochia manshuriensis* Kom., *Abeliophyllum distichum* Nakai, and *Pinus thunbergii* Perl., are also included in the list. Therefore, this study aims at reviewing the plant list of existing literature and accurately identifying vascular plants based on the evidence specimens procured through field

\* Corresponding author. Tel.: +82 43 261 2296.

E-mail address: [obutaxon@chungbuk.ac.kr](mailto:obutaxon@chungbuk.ac.kr) (B.-U. Oh).

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studies at Chilgapsan. Furthermore, it aims at providing basic data for preservation of biodiversity by checking the distribution of precious plants (rare and endemic plants).

## Materials and methods

In order to identify the vascular plants at Chilgapsan Provincial Park, 19 field studies were conducted from 2000 to 2014 to collect evidence specimens (Figure 1, Table 1). For the accuracy of identification, the targets of collection were those with reproductive organs such as flowers, fruits, and spores. However, in the case of certain taxa, such as those of rare plants, only photographs were available and these were included in the plant list without specimens. The collected plants were processed into voucher specimens and stored in the Chungbuk National University Herbarium. Identification of taxa was carried out based on illustrated plant books of Lee (1996, 2003), Park (2009), and Kim and Kim (2011); some of the ferns based on the literature of the Korean Fern Society (2005) and Park et al. (2008); conifers based on the literature of Yang et al. (2012); and Poaceae and Cyperaceae based on the literature of Park et al. (2011) and Hoshino and Masaki (2011).

Drafting of the vascular plant list was carried out according to the Engler classification system (Melchior, 1964), and the genus and species names within families were written in alphabetical order (Appendix 1). The scientific and Korean names were in accordance with the National Standard Plant List (Korea National Arboretum and The Plant Taxonomic Society of Korea, 2007). Korean endemic plants (Oh et al., 2005a), rare plants (Lee, 2008; Lee et al., 2011), floristic regional plants (Ministry of Environment, 2006), and useful plants (Lee, 1976) were arranged to present the entire vascular plant list separately. In addition, for the planted species, previous studies were analyzed to prepare a separate table (Table 2) and they were excluded from the native plant list. Meanwhile, parts of the plants collected in this study have been reported in the Ministry of Environment's national natural environment study (Oh and Kim, 2000; Oh and Yang, 2009), and these voucher specimens were reviewed to correct erroneously listed plants (Table 3). Plants that were difficult to identify due to defectiveness of specimen status were excluded from the list.

## Results

### Vascular plants

Vascular plants of the Chilgapsan Provincial Park identified during this study belonged to 97 families, 309 genera, 433 species, four subspecies, 48 varieties, and five forms for a total of 490 taxa. There were seven families, 15 genera, 18 species, and two varieties (4.1%) for pteridophyta; two families, three genera, and five species (1.05%) for gymnosperm; 76 families, 221 genera, 306 species, four subspecies, 37 varieties, and four forms (71.6%) for dicotyledones of angiosperms; and 12 families, 70 genera, 104 species, nine varieties, and one form (23.3%) for monocotyledons (Table 4). This corresponded to 10.03% of the 4881 taxa of vascular plants of the Korean Peninsula (Korea National Arboretum and The Plant Taxonomic Society of Korea, 2007).

In Chilgapsan, a slight difference was observed in the plant life of the eastern and western slopes centering on the long ridge that stretches north and south. The three valleys on the eastern slope had relatively high water contents and maintained a damp growth and development environment, while the Cheonjang valley and Majae valley on the western slope had relatively less water content and a dry environment. Thus, although both the eastern and the western slopes showed relatively rich biodiversity, *Akebia quinata* (Thunb.) Decne., *Arisaema amurense* Maxim., *Corydalis remota* Fisch. ex Maxim., and *Impatiens textori* Miq. were normally observed on the western slope, and *Cephalanthera erecta* (Thunb.) Blume, *Cephalanthera falcate* (Thunb.) Blume, and *Lespedeza juncea* (L.f.) Pers. on the eastern slope. *C. remota* was widely distributed, covering almost the entire Janggok Valley, and a large colony of *Adonis pseudoamurensis* W. T. Wang was observed in the valley heading toward Yulnae-dong.

Special plants included *Eranthis byunsanensis* S. Y. Sun, *Fallopia koreana* B. U. Oh & J. G. Kim, and *Rhamnella franguloides* (Maxim.) Weberb. One *E. byunsanensis* was found at Janggokcheon stream, and it was assumed that it flowed downward from a valley near Janggokcheon. Due to the growth characteristics of *E. byunsanensis*, there is a possibility that a large colony can be found if nearby valleys are examined closely. In addition, it is worth noting that *F. koreana*, which grows in the dry ridges of Jirisan, Baekunsan,

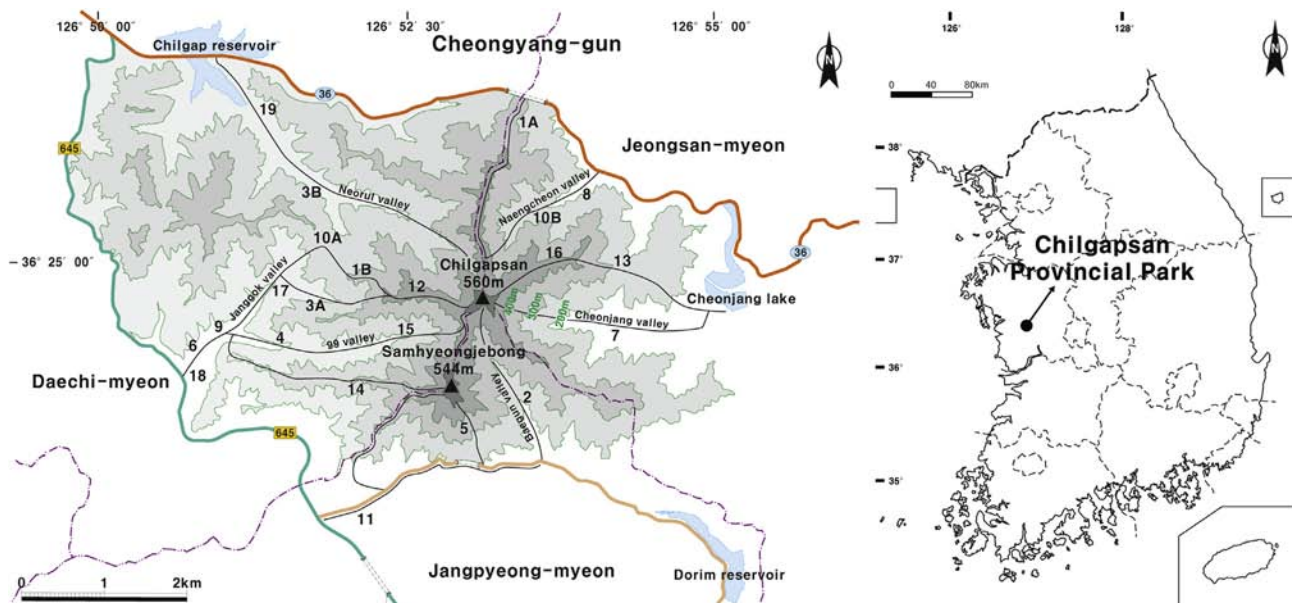


Figure 1. Area investigated (Chilgapsan Provincial Park) in this study.

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