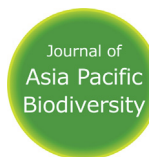




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## Original article

## The distribution of vascular plants in Banrongsan (Mt.) at Jeongseon Gangwon-do, Korea



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## ABSTRACT

To study the distribution of vascular plants in Banrongsan (Mt.) located in Jeongseon-gun, Gangwon-do, Korea. The vascular flora in Banrongsan (Mt.) were surveyed a total of four times—three times from May 2010 to October 2010, and once in August 2012. This result revealed 447 taxa in total: 89 families, 278 genera, 390 species, four subspecies, 47 varieties, and six form. In the flora of this area, 15 taxa were Korean endemic plants including *Aconitum pseudolaevae* Nakai, *Lysimachia coreana* Nakai, and *Saussurea macrolepis* (Nakai) Kitam., and 17 taxa were rare and endangered plants of Korea including *Astragalus koreiensis* Y.N. Lee, *Pseudostellaria japonica* Pax, and *Paeonia japonica* (Makino) Miyabe and Takeda. Three taxa were found as a special forest conservation species designated by the Korea Forest Service including *Delphinium maackianum* Regel and *Daphne pseudomezereum* var. *koreana* (Nakai) Hamaya. Besides, 76 taxa were found to be specific floristic plants designated by the Ministry of Environment, whereas naturalized plants in this area were 32 taxa. Resource plants were categorized by usage into eight groups: 189 edible, four fiber, 127 medical, 48 ornamental, 150 pasturing, three industrial, 10 dyeing, and eight timber plants.

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## Introduction

Banrongsan (Mt.) (1068 m) borders with Bongjeong-ri, Yeoryang-ri, and Goyang-ri in Jeongseon-gun, Gangwon-do, Korea and has a latitude of 37° measured at 26' 37.3" north and a longitude of 128° measured at 45' 29.5" east. In the north of Banrongsan (Mt.), there is Nochsusan (Mt.) (1322 m) with the long Goljicheon Stream flowing through east to west. Goyangsan (Mt.) (1152.7 m) is located in the south of Banrongsan (Mt.); Jungbongsan (Mt.) (1284 m) and Dutasan (Mt.) (1353 m) in the east; and Gariwangsan

(Mt.) (1560.6 m) bordering with Bukpyeong-myeon in the west. Banrongsan (Mt.) is approximately 1.6 km of ridge reaching to Banryunsan (Mt.) (1010 m; [Figure 1](#)). The annual average temperature and wind speed for the recent 2 years (2011–2012) are 9.8 °C and 1.8 m/second, with the highest wind speed in March to April each year. The annual average relative humidity and precipitation are 67% and 1,363.3 mm (1,761.4 mm in 2011, 965.1 mm in 2012), respectively, less than the annual average precipitation in Korea (1,550.9 mm) and higher fluctuation between the annual precipitation.

The colony areas of *Saussurea* and Royal Azalea in Banrongsan (Mt.) were designated as Natural Monument No. 348 in 17 April 1986 for protection and management. In 23 October 2008, the Eastern District Forest Service designated six roots of Royal Azalea and its surrounding area of 1 ha as the forest genetic resource conservation zone to thrive to protect the genes, species, and forest ecosystem within the regional forest. Royal Azalea growing at 1040 m above sea level in Banrongsan (Mt.) is estimated to be approximately 200 years old with 4.98 m of height, 78 cm of girth, and 6.9 m of east–west crown and 6.7 m of south–north crown, the

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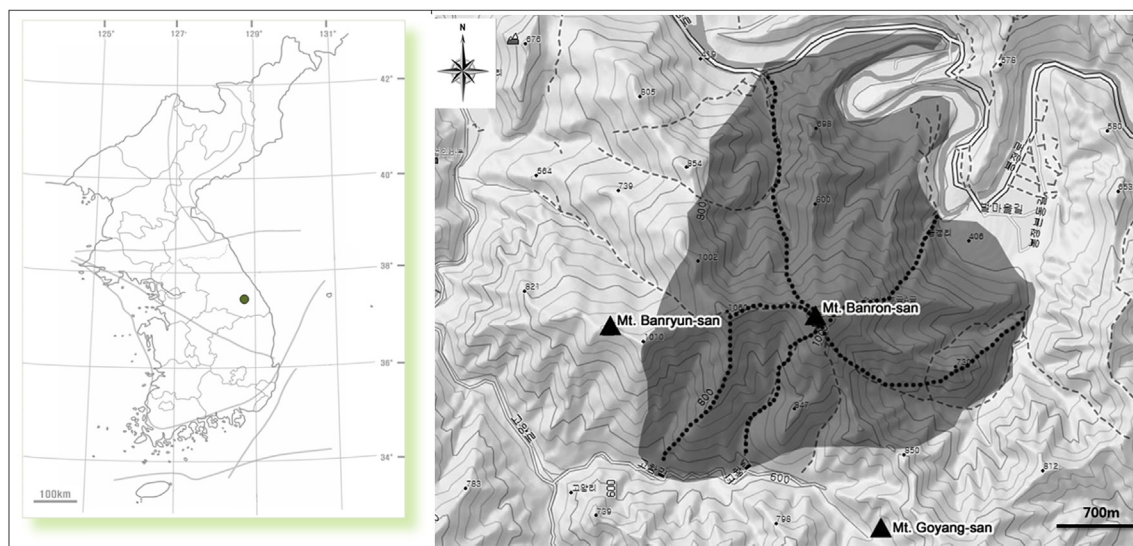


Figure 1. Investigated area in this study.

highest Royal Azalea among those known so far and the strongest tree vigor.

This area also forms a large colony where *Saussurea* grows. Banronsan (Mt.) is known to have colonies of endemic plants such as *Saussurea calcicola* Nakai and rare and endangered plants such as *Saussurea mongolica* (Franch.) (<http://www.jeongseon.go.kr>). This area has higher academic value because it is a southern colony for northern plants, and because plant survey, protection, and management are conducted within the reserve, there has been no survey on the distribution of flora or vascular plants across the whole area of Banronsan (Mt.) including this reserve. Therefore, the aim of this study is to provide the basic materials to more effectively conserve and manage endemic plants and rare and endangered plants based on their distribution surveys of vascular plants in the Banronsan (Mt.) area and further prepare the database of native plants.

**Material and methods**

The vascular flora in Banronsan (Mt.) located in Jeongseon-gun, Gangwon-do were surveyed a total of four times—three times from May 2010 to October 2010, and additionally once in August 2012 (Table 1). The *in situ* survey in principle targeted to collect the organisms with generative organs such as flower, fruit, and spore to

enhance the accuracy of results before making dry specimens. If an organism is not mature or has no generative organ, only those that could be explicitly identified were recorded in the list. Such collected plants were made into dry and immersion specimens and maintained in the Korea National Herbarium of the Korea National Arboretum (Gyeonggi, Korea). The identification of taxa was based on the illustrated guide to flora and fauna by Lee (1980, 2003) and Lee (1996, 2006), whereas especially noteworthy plants were identified based on the Ministry of Environment and National Institute of Environment Research (2012). Endemic plants were identified following Oh et al. (2005), Korea Forest Service (2012), Korea National Arboretum (2008), Park (1995, 2001, 2009) and Lee et al. (2011).

**Results**

*Vascular flora*

The vascular plants growing in Banronsan (Mt.) revealed by this survey include: 419 taxa in total (1001 organisms) with 87 families, 263 genera, 366 species, three subspecies, 43 varieties, and five forms in the first survey in 2010; and 114 taxa in total (191 organisms) with 44 families, 101 genera, 95 species, two subspecies, 16 varieties, and one form in the second survey in 2012. Adding 30 taxa to the first survey result, 447 taxa in total were confirmed with 89 families, 278 genera, 390 species, four subspecies, 47 varieties, and six forms; which consists of pteridophyta with 15 taxa of five

**Table 1**  
The dates and routes of investigations.

No.	Date	Investigation routes
1	2010 May 13	Gombari village–Banronsan (Mt.) (1,068 m)–Gommal village–Bongjeong-ri
2	2010 Jul 27	Gochanggol–Banronsan (Mt.) (1068 m)–Gochanggol
		27 Gommal village
		27 Gombari village
		27 Jeolgol village
3	2010 Oct 14	Gochanggol–Banronsan (Mt.) (1068 m)–Gochanggol
		14 Sammagol village
		14 Gommal village
4	2012 Aug 23	Gommal village
		23 Bongjeong-ri village

**Table 2**  
Summary of the Floristics of Banronsan (Mt.).

Taxa/system	Fam.	Gen.	Sp.	Subsp.	Var.	For.	Total
Pteridophyta	5	10	15	–	–	–	15
Gymnospermae	1	3	3	–	–	–	3
Angiospermae							
Dicotyledons	75	223	307	4	41	4	356
Monocotyledons	8	42	65	–	6	2	73
Total	89	278	390	4	47	6	447

Fam. = family; For. = form, Gen. = genera; Sp. = species; Subsp. = subspecies; Var. = variety.

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