

THE RARE PTERIDOPHYTES OF MT. SLAMET WITH THREE SPECIES NEW RECORDS FOR JAVA

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Titien Ngatinem Praptosuwiryo. 2013. *Pteridofita* Langka dari Gn. Slamet dengan Tiga Jenis Rekaman Baru untuk Jawa. *Floribunda* 4(6): 138–146. — Diperkirakan bahwa Jawa memiliki kurang lebih 500 jenis tumbuhan paku. Namun demikian status konservasi kelompok tumbuhan ini di Jawa belum tersedia. Oleh karena itu usaha-usaha untuk menginventarisasi keanekaragaman tumbuhan paku Jawa dan menaksir statusnya sangat diperlukan. Tujuan dari penelitian ini adalah: (1) menghasilkan daftar awal tumbuhan paku yang berstatus jarang yang terdapat di Gunung Slamet dan (2) menentukan jangkauan penyebaran dan habitat untuk tiap-tiap jenis. Jenis dikategorikan sebagai jenis jarang jika jenis tersebut terhidung kurang dari 10 situs atau populasinya kurang dari 20 individu. Jenis dikategorikan sebagai jenis jarang bila ditemukan kurang dari 10 tempat dan atau populasinya kurang dari 20 individu. Pencarian acak dengan transek sabuk (20 m x 500 m dengan sub seri 20 m x 100 m) dibangun untuk mencatat kejadian jenis dalam satu hektar atau lebih. Dua belas jenis yang tercakup dalam 10 marga dan delapan suku tercatat sebagai jenis yang berstatus jarang di Gunung Slamet yaitu: (1) *Asplenium paradoxum* Blume, (2) *Christensenia aesculifolia* (Blume) Maxon, (2) *Cyathea glabra* (Blume) Copel., (4) *Cyathea oinops* Hask., (5) *Huperzia phlegmaria* (L.) Rothm., (6) *Pityrogramma austroamericana* Domin, (7) *Psilotum complanatum* Sw., (8) *Pteris insignis* Mett. Ex Kuhn, (9) *Pteris wallichiana* J. Agardh., (10) *Pyrrosia aterosora* (Baker) Hovenkamp, (11) *Tectaria zollingeri* (Kurz) Holttum, dan (12) *Thylacoptersi papillosa* (Blume) J.Sm. Tiga jenis dilaporkan sebagai catatan baru untuk Jawa, yaitu *Pteris insignis*, *P. wallichiana*, dan *Pyrrosia aterosora*. Tiap jenis mempunyai jangkauan persebaran dan karakteristik habitat tersendiri.

Kata kunci: G. Slamet, Jawa, jenis paku jarang, Pteridofita, tumbuhan paku.

Titien Ngatinem Praptosuwiryo. 2013. The Rare *Pteridophytes* of Mt. Slamet with Three Species New Records for Java. *Floribunda* 4(6): 138–146. — It is estimated that Java has about 500 species of *Pteridophytes*. Nevertheless conservation status of the *Pteridophytes* in Java has not been provided yet. Therefore inventory on the *Pteridophytes* of Java and assessing their conservation status are need to be done. The objectives of this study are: (1) to provide the preliminary list of the rare species of *Pteridophytes* in Mt. Slamet, (2) determine the distribution and habitat of each species. The species was categorized as rare species if it was encountered in less than 10 sites and or the population was less than 20 plants. Random search with belt transect (20 m x 500 m with a sub set 20 m x 100 m) was set up to record the occurrence of species in one or more hektar. Twelve species included in 10 genera are recorded as the rare species in Mt. Slamet namely: (1) *Asplenium paradoxum* Blume, (2) *Christensenia aesculifolia* (Blume) Maxon, (2) *Cyathea glabra* (Blume) Copel., (4) *Cyathea oinops* Hask., (5) *Huperzia phlegmaria* (L.) Rothm., (6) *Pityrogramma austroamericana* Domin, (7) *Psilotum complanatum* Sw., (8) *Pteris insignis* Mett. Ex Kuhn, (9) *Pteris wallichiana* J. Agardh., (10) *Pyrrosia aterosora* (Baker) Hovenkamp, (11) *Tectaria zollingeri* (Kurz) Holttum, dan (12) *Thylacopteris papillosa* (Blume) J.Sm. Three species are reported as new records for Java, viz. *Pteris insignis*, *P. wallichiana*, and *Pyrrosia aterosora*. Every species has its own distribution range and habitat characteristics

Keywords: Mt. Slamet, Java, rare fern species, Pteridophytes, Ferns.

Ferns and fern allies are a significant component of flora of Java. It was estimated that Java has about 500 species of ferns and fern allies (Kato 1992). Backer and Posthumus (1939) recorded 515 species of pteridophytes, 475 species of ferns and 40 species fern allies.

After Backer & Posthumus (1939) there is no checklist of ferns and fern allies of Java. Moreover information on the conservation status of this group plants in Java has not been provided yet. Therefore any efforts to reinventory the ferns and fern allies diversity of Java and assess their status

are urgently needed. Re-exploration and inventory of pteridophytes in each hotspots area of diversity is an important step to collect data in providing check list of Java ferns and ferns allies. A new check list will be very important for management of our plant diversity including in the pteridophytes conservation efforts.

An important step towards the conservation of our natural resources is to expand the knowledge of the rare species of our flora. Rare species are component of biodiversity, so research on rare species will necessarily be part of the research needed to understand and manage biodiversity as a whole (Adam 2002). Rare species are of interest because of the risk of their extinction, which would result in the loss of their potential economic or medical use, as well as their ecosystem function (Kaye et. al. 1997). Darwin (1859) stated that rarity is the precursor of extinction. Therefore, in order to maintain biological diversity, conservation efforts are largely focused on rare species.

A description of a species' rarity should include three components: habitat range, geographic range, and population size (Mills & Schwartz 2005, Rabinowitz 1981). Not all rare species have small geographic ranges or small population sizes. Fiedler and Ahouse (1992) classified rare species into one of several groups based on geographic distribution and population size: (1) narrow distribution but large population sizes; (2) narrow distribution and small population sizes; and (3) wide geographic distribution but small population sizes. Endemic species, those that only occur in a particular area, be it one mountain top, a county, or a state, can have small or large population sizes, so are placed into the first or second group. Species in the third group are the sufficively rare species (Schoener 1987), those that are found over a wide geographic range but are consistently rare throughout their distribution (Rabinowitz 1981). Rabinowitz (1981) determined species rarity into seven categories, viz.: 1. Large geographic range, wide habitat specificity, small population size; 2. Large geographic range, narrow habitat specificity, large population size; 3. Large geographic range, narrow habitat specificity, small population size; 4. Small geographic range, wide habitat specificity, large population size; 5. Small geographic range, wide habitat specificity, small population size; 6. Small geographic range, narrow habitat specificity, large population size; 7. Small geographic range, narrow habitat specificity, small population size.

A thorough evaluation of the rare plants in a flora requires sound information as to which spe-

cies are rare, combined with knowledge of their distributions, threats, and ecology (Kaye et. al. 1997). The purposes of this work are: (1) to produce a preliminary list of rare ferns those occur in Mt. Slamet, Central Java, and (2) to identify the range distribution and habitat of each species.

Schoener (1987) distinguished between two measures of rarity: occurrence rarity is when a species occurs in few localities and abundance rarity is when the absolute population size in these localities is small. It is very difficult to obtain data on the abundance rarity of plants at a regional or even at a local level. Therefore, we use occurrence rarity to define the rare fern species assemblage of Mt. Slamet. Rare species are defined as those recorded from ten or less 1-km² square cells within the area, regardless of their abundance within the squares.

MATERIALS AND METHOD

As study sites, Mount Slamet is the second highest volcano in Java (3.428 m). This mount is situated among five districts of Central Java Province, Indoneia, namely: Banyumas District, Purbalingga District, Brebes District, Tegal District and Pemalang District. Geographically Mt. Slamet is situated at coordinate point 7° 14,40' S and 109° 12,30' E (Figure 1).

Field study was conducted in four slopes region, viz. northern, southern, western and eastern slopes of Mount Slamet in February 2011. Thirteen localities or sites with total 19.2 hektares were chosen for observation on rarity of ferns (Table 1). The assessment was determined by following Schoener (1987) and Sanchez (2006), the species was categorized as rare species if it was encountered in less then 10 sites and/or the population was less then 20 plants. Random search with belt transect was set up to record the occurence of species in one or more hektar. It was set up in 20 m x 500 m with a sub set 20 m x 100 m. Common fern species found in each locality was also recorded. The very common species were only recorded without collecting specimens. The living plants of rare species are planted in Baturraden Botanical Gardens, Central Java, whereas the herbarium specimens are housed at the Harbarium of Bogor Botanic Gardens (BOHB), West Java.

The global distribution was based on The Flora Malesiana. Whereas the distribution range of species in Java was followed Backer & Posthumus (1939) and cross checked by examining the specimens housed at Herbarium Bogoriense (BO), Sub Division of Botany, Biology Research Center, In-

donesian Institute of Sciences (LIPI). Classification followed Smith et al (2006).

RARE FERN AND FERN ALLIES ENCOUNTERED

Twelve species included in 10 genera and 8 families were recorded as rare species in Mt. Slamet. List of these species, vernacular name, distribution in Java, the wider distribution, habitat, and last record in Mt. Slamet are provided. Discussion of each species is presented in the notes. Study sites are presented in Table 1.

1. *Huperzia phlegmaria* (L.) Rothm. (*Lycopodiaceae*)

Common name. Coarse tassel fern. Kumpai pare, kumpai rante (Javanese)

Distribution in Java. West to East Java (Backer & Posthumus 1939)

Wider distribution. This species is widespread in tropical Africa and Asia.

Habitat. Epiphytic fern, shady places in secondary and primary forest

Last record in Mt. Slamet. Petak 6, Lereng Selatan G. Slamet, Desa Kemutug Lor, Kec. Baturraden, Kab. Banyumas. 927 m 03-02-2011. TNgP 3170 (BOHB).

Occurrences/Plant encountered. One in one site

2. *Psilotum complanatum* Sw. (*Psilotaceae*)

Common name. Flatfork fern, Flat Whisk-fern. Kadaka Kumpai, Simbar Gonjoh (Javanese)

Distribution in Java. West to East Java (Backer & Posthumus 1939)

Wider distribution. Malay Peninsula, South Australia, Fiji islands, Mexico and South America. In India this species is reported only in Nicobar Island

Habitat. In Mt. Slamet *P. complanatum* lives in moist secondary forests

Last record in Mt. Slamet. Petak 3a, Kemutug Lor, Mt. Slamet, Baturraden. ca. 750 m, 18-2-2011, T.Ng. Praptosuwiryo 3272 (BOHB).

Occurrences/Plant encountered. one in one site

Notes. This species is rare in some countries. In Great Nicobar Island this species is also included in rare epiphytic fern ally. It is found in specific localities, particularly associated with tropical evergreen formations (Chauhan 2003).

3. *Christensenia aesculifolia* (Blume) Maxon

(*Marattiaceae*). Figure 2A & B

Distribution in Java. West Java (Backer & Posthumus 1939)

Wider distribution. India (Assam) to Java, not recorded from Cambodia, Laos or Vietnam.

Habitat. It grows terrestrially in deep shade places in secondary forest or production forest of *Agathis damara*. Generally this species grows on moist slopes near streams in dense moist forest.

Last record in Mt. Slamet. G. Bunder, kawasan G. Slamet, Dusun Kali Pagu, Desa Ketenger, Kec. Kedung Banteng, Kab. Banyumas. 700-710 m. 12-02-2011. TNgP 3244 (BOHB).

Occurrences/Plant encountered. 5 in one site.

Notes. *Christensenia aesculifolia* is a rare species in Malesia region, including in Java. Since Backer & Posthumus (1939) there is no record outside West Java, therefore the plant record in Mt. Slamet is new record for Central Java. In West Java the recently record of this species was in Mt. Salak in 2003. Praptosuwiryo in 2004 (unpublished data) recorded *C. aesculifolia* in Borneo, Central Kalimantan, Mts. Muller Range, Near Sungai Topus, track to Gunung Pumpung Sapat, south of Irung Kobilin, 200 m s.l.

4. *Cyathea glabra* (Blume) Copel. (*Cyatheaceae*). Figure 2C & D

Distribution in Java. In Mt. Slamet this species is found in the southern slope.

Wider distribution. Borneo, western Java, Sumatra and the Malay Peninsula.

Habitat. shady place in production forest of *Agathis damara*. Holttum (1963) recorded that it grows in lowland swamp forest and montane forest at an elevation of up to 1500 m.

Last record in Mt. Slamet. Petak 57f, G. Bunder, kawasan G. Slamet, Dusun Kali Pagu, Desa Ketenger, Kec. Kedung Banteng, Kab. Banyumas. 700 m. 12-02-2011. TNgP 3242, 3249 (BOHB)

Occurrences/Plant encountered. 7 in one site

5. *Cyathea oinops* Hask. (*Cyatheaceae*)

Distribution in Java. West Java and Central Java

Wider distribution. Sumatra, Java, Lesser Sunda Island to SW Celebes.

Habitat. Near small stream in moist humus rich soil

Last record in Mt. Slamet. G. Cendana, kawasan G. Slamet, Desa Windusari, Kec. Kedung Banteng, Kab. Banyumas (RPH Karang Gandul,

Table 1. Study Sites of Mount Slamet in Assessing the Rare Ferns Species

No	Site Name and Position	Observed Areas (Ha)	Altitude (m)	Rare Ferns Found	Common Ferns Found
1.	Petak 3a, Kemutug Lor, Mt. Slamet, Kec. Baturraden, Kab. Banyumas	1.5	750–760	<i>Psilotum complanatum</i>	<i>Asplenium nidus</i> , <i>Cyathea contaminans</i> , Some species of Thelypteridaceae
2.	Hutan Produksi Petak 6, Lereng Selatan G. Slamet, Desa Kemutug Lor, Kec. Baturraden, Kab. Banyumas 07°17'58.5" S 109°13'46.3" E–07°17'41.7" S 109°12'25.6" E	1.5	900–1000	<i>Huperzia phlegmaria</i>	<i>Cyathea contaminans</i> , <i>Cy. squamulata</i> , <i>Diplazium subserratum</i> , <i>Dryopteris sparsa</i> , <i>Lyndsaea repens</i> , <i>Sellaginella sp.</i> , <i>Thelypteris parasitica</i> .
3.	Hutan Produksi Petak 5, Lereng Selatan G. Slamet, Desa Kemutug Lor, Kec. Baturraden, Kab. Banyumas 07°17'39.6" S 109°13'40.5" E–07°17'33.5"S, 109°13'37.6" E	1.2	ca.1000–1100	-	<i>Cyathea crenulata</i> , <i>Cy. squamulata</i> , <i>Cy. junghuhniana</i> , <i>Nephrolepis sp.</i> , <i>Pteridium sp.</i> , <i>Histiopteris incisa</i> , <i>Methathelypteris sp.</i> , <i>Diplazium accedens</i> <i>Lyndsaea repens</i>
4.	Hutan Lindung Telaga Pucung (=Hutan Lindung KRPH Lebak Siu, Petak 49) Lereng Barat G. Slamet, Desa Karang Tengah, Kec. Cilongok, Kab. Banyumas. 07°20'04.6" S 109°12'03.1" E–07°19'58.3" S 109°13'22.1" E	1	730–850	<i>Asplenium paradoxum</i>	<i>Asplenium nidus</i> , <i>Selaginella sp.</i> , <i>Asplenium excisum</i> , <i>Pleocnemia sp.</i> , <i>Cornopteris sp.</i> ,
5.	Pinggiran Hutan Produksi Petak 56-55, Pancuran Tujuh, Lereng Selatan, G. Slamet, Desa Ketenger, Kec. Baturraden, Kab. Banyumas. 07°18'18.2" S 109°13'33.2" E–07°18'38.9" S 109°13'39.9" E	1.5	700–865	-	<i>Asplenium nidus</i> , <i>Cyathea contaminans</i> , <i>Cyathea junghuhniana</i> , <i>Cy. Squamulata</i> , <i>Gleichenia truncatula</i> , <i>Dicranopteris linearis</i> , <i>Chingia clavipilosa</i> , <i>Blechnum orientale</i> , <i>Pronophrum sp.</i> , <i>Tectaria melanocaula</i> , <i>Deparia petersenii</i> , <i>Deparia sp.</i> , <i>Nephrolepis sp.</i> , <i>Tectaria melanocaula</i> , <i>Diplazium accedens</i> ,
6.	Hutan Track Kali Muntang, Lereng Timur G. Slamet, Desa Karang Jengkol, Kec. Kuta Sari, Kab. Purbalingga (KPH G. Slamet Barat, RPH Baturraden). 07°16'14.2" S 109°12'36.17" E–07°15'53.8" S 109°12'31.5" E	1.5	1000–1150	<i>Pityrogramma austroamericana</i>	<i>Pityrogramma calomelanos</i> , <i>Cyathea contaminans</i> , <i>C. squamulata</i> , <i>Histiopteris incisa</i> , <i>Diplazium polypodioides</i>

Table 1. Study Sites of Mount Slamet in Assessing the Rare Ferns Species (continued)

7.	Hutan Lindung Petak 41, Hutan Lindung Jurang Mangu, Lereng Utara G. Slamet, Desa Karang Mangu, Kec. Pulosari, Kab. Pemalang (RPH Karang Sari, BKPH Moga, KPH Pekalongan Barat). 07°11'20.6"S 109°12'05.0"E-07°11'42.4"S 109°12'01.9"E	1.5	1300	<i>Pityrogramma austroamericana</i>	<i>Pityrogramma calomelanos</i> , <i>Pteris biaurita</i> , <i>Deparia sp.</i> , <i>Lindsaea sp.</i> , <i>Nephrolepis hirsutula</i> , <i>Pteridium esculentum</i> ,
8.	Hutan Lindung Petak 44, Hutan Lindung Jurang Mangu, Lereng Utara G. Slamet, Desa Karang Mangu, Kec. Pulosari, Kab. Pemalang (RPH Karang Sari, BKPH Moga, KPH Pekalongan Barat). 07°11'35.6" S 109°12'04.9" E-07°11'42.5" S 109°12'01.0"E	1.5	1390-1450	<i>Pteris wallichiana</i>	<i>Asplenium nidus</i> , <i>Asplenium caudatum</i> , <i>Anitrophium sp.</i> , <i>Vittaria elongate</i> , <i>Didymochlaena truncatula</i> , <i>Dryopteris hirtipes</i> , <i>Asplenium tenerum var. belangeri</i> , <i>Coniogramme fraxinea</i> , <i>Selaginella sp.</i> , <i>Asplenium laseritifolium</i> , <i>Microsorium sp.</i> , <i>Cyathea crenulata</i> , <i>Bolbitis subcordata</i> , <i>Diplazium procumbens</i> , <i>D. Polypodioides</i> ,
9	Hutan Produksi-Lindung G. Cendana, kawasan G. Slamet, Desa Windusari, Kec. Kedung Banteng, Kab. Banyumas (RPH Karang Gandul, BKPH G. Slamet Barat, KPH Banyumas Timur)	1.5	Ca.750-780	<i>Cyathea oinops</i>	<i>Asplenium nidus</i> , <i>Cyathea contaminans</i> , <i>Cy. squamulata</i> , <i>Cy. jungkuhiana</i> , <i>Pronephrum sp.</i> , <i>Nephrolepis falcata</i> , <i>Selaginella sp.</i> , <i>Diplazium bantamense</i> , <i>D. simplicivenium</i> .
10	Hutan Produksi Petak 57d dan 57f, G. Bunder, kawasan G. Slamet, Dusun Kali Pagu, Desa Ketenger, Kec. Kedung Banteng, Kab. Banyumas. 07°19'21.1" S 109°12'36.9" E -07°19'33.6" S 109°12'13.6" E.	2	700-750	<i>Christensenia aesculifolia</i> <i>Cyathea glabra</i>	<i>Cyathea squamulata</i> , <i>Cy. Crenulata</i> , <i>Pronephrum sp.</i> , <i>Sphaerostephanos sp.</i> , <i>Nephrolepis falcata</i> , <i>Pleocnemia sp (gigant)</i> , <i>Diplazium bantamense</i> , <i>D. xiphophyllum</i> , <i>D. Dilatatum</i> , <i>D. polypodioides</i> , <i>Selaginella sp.</i> , <i>Blechnum sp.</i> , <i>Gleichenia truncatula</i>
11.	Track Kali Pagu, Desa Ketenger, Kec. Baturraden, Kab. Banyumas. S 07° 19' 13.7" E 109° 12' 47.2"	1	615-630	<i>Tectaria zollingeri</i>	<i>Tectaria melanocaula</i> , <i>Selaginella spp.</i> , some species of Thelypteridaceae
12.	Petak Petak 6c-6d, Lereng Selatan G. Slamet, Desa Kemutug Lor, Kec. Baturraden, Kab. Banyumas 07° 18' 13.2" S 109° 14' 10.2" E	2	900-1000	<i>Pteris insignis</i>	<i>Cyathea squamulata</i> , <i>Cy. Contaminans</i> , <i>Lyndsaea repens</i> , <i>Taenitis blechnoides</i>
13.	Petak Petak 7, Lereng Selatan G. Slamet, Desa Kemutug Lor, Kec. Baturraden, Kab. Banyumas 07° 17' 44.3" S 109° 14' 10.6" E	1.5	900-1000	-	<i>Cyathea squamulata</i> , <i>Cy. contaminans</i> , <i>Adiantum sp.</i> , <i>Lyndsaea sp.</i>

BKPH G. Slamet Barat, KPH Banyumas Timur). 14-02-2011. TNgP 3259 (BOHB).

Occurrences/Plant encountered. 1 in one site.

6. *Pityrogramma austroamericana* Domin (*Pteridaceae*). Figure 2E & F

Common name. Gold fern/ leatherleaf gold-back fern

Distribution in Java. From West to East Java.

Wider distribution. Native to tropical Amerika

Habitat. In Mt. Slamet this species is found in open areas of forest margin.

Last record in Mt. Slamet. Petak 29, Alur BD, Track Kali Muntang, Lereng Timur G. Slamet, Desa Karang Jengkol, Kec. Kuta Sari, Kab. Purbalingga. 1020 m. 07-02-2011. (BOHB).

Occurrences/Plant encountered. 3 in two sites

Notes. In Mt. Slamet this species is found only in two sites, Northern and Eastern Slopes. Backer & Posthumus (1939) recorded this species *Pityrogramma tartarea* Maxon var. *Ochracea* Christ.

7. *Pteris insignis* Mett. Ex Kuhn (*Pteridaceae*). Figure 4C & D

Distribution Java. West and Central Java (Praptosuwiryo unpublished data)

Wider distribution. South China, Malaysia (Holttum 1966)

Habitat. This species grows in rather open area on humus rich moist soil.

Last record in Mt. Slamet. Petak 6d, Lereng Selatan G. Slamet, Desa Kemutug Lor, Kec. Baturraden, Kab. Banyumas. 875 m. 16-02-2011. TNgP 3264 (BOHB)

Occurrences/Plant encountered. 5 in three sites

Notes. *Pteris insignis* is new record for Pteridophytes in Java. Praptosuwiryo recorded *P. insignis* from Mt. Salak, West Java, in 2010 (Praptosuwiryo unpublished).

8. *Pteris wallichiana* J. Agardh. (*Pteridaceae*). Figure 3A & B

Common name. Hualien Giant', Wallich's Giant Table Fern.

Distribution in Java. West and East Java (Backer & Posthumus 1939)

Wider distribution. N India, S China, Laos, S Japan to Taiwan, south to Java, Sulawesi, and a

variety in Samoa.

Habitat. Terrestrial in moist humus soil in light shade or half-shaded places.

Last record in Mt. Slamet. Petak 44, Hutan Lindung Karang Mangu, Lereng Utara G. Slamet, Desa Karang Mangu, Kec. Pulosari, Kab. Pematang (RPH Karang Sari, BKPH Moga, KPH Pekalongan Barat). 1450-1460 m. 09-02-2011. TNgP 3217 (BOHB); 10-02-2011. TNgP 3236 (BOHB).

Occurrences/Plant encountered. 5 in three sites

Notes. Backer & Posthumus (1939) did not record *Pteris wallichiana* in the Varenflora voor Java. Therefore the occurrence of this species in Mt. Slamet is new record for Java. Recently observation in Mt. Salak, West Java showed that this species is rare (Praptosuwiryo unpublished data).

9. *Asplenium paradoxum* Blume (*Aspleniaceae*). Figure 3C & D

Distribution in Java. West and Central Java

Wider distribution. West Malesia

Habitat. Epilithic, growing on moist mossy rocks at 830–840 m.

Last record. Kab. Banyumas, Kec. Cilongok, Desa Karang Tengah, Lereng Barat G. Slamet, Hutan Lindung KRPB Lebak Siu, Hutan Lindung Telaga Pucung, Petak 49. 830-840 m. 05-02-2011. TNgP 3192 (BOHB).

Occurrences/Plant encountered. 1 in one site

Notes. In Mt. Halimun, Jawa Barat, this species also grows epilithic on and epilythic on mossy basal trees near at 900–1000 m dpl.

10. *Tectaria zollingeri* (Kurz) Holttum (*Tectariaceae*). Figure 3E & F

Distribution in Java. West and Central Java.

Wider distribution. Java, South West Celebes, Moluccas (Tanimbar Is., Ambon) (Holttum 1991)

Habitat. Terrestrial fern growing in rather open area. Occasionally this species grows among rocks.

Last record in Mt. Slamet. Dusun Kali Pagu, Desa Ketenger, Kec. Baturraden, Kab. Banyumas. 615 m. 14-02-2011. TNgP 3260 (BOHB).

Occurrences/Plant encountered. 7 in one site.

Notes. Backer & Posthumus (1939) recognized this species as *Hemigramma latifolia* Copel.

11. *Pyrrhosia asterosora* (Baker) Hovenkamp (*Polypodiaceae*). Figure 4E & F

Distribution in Java. Central Java

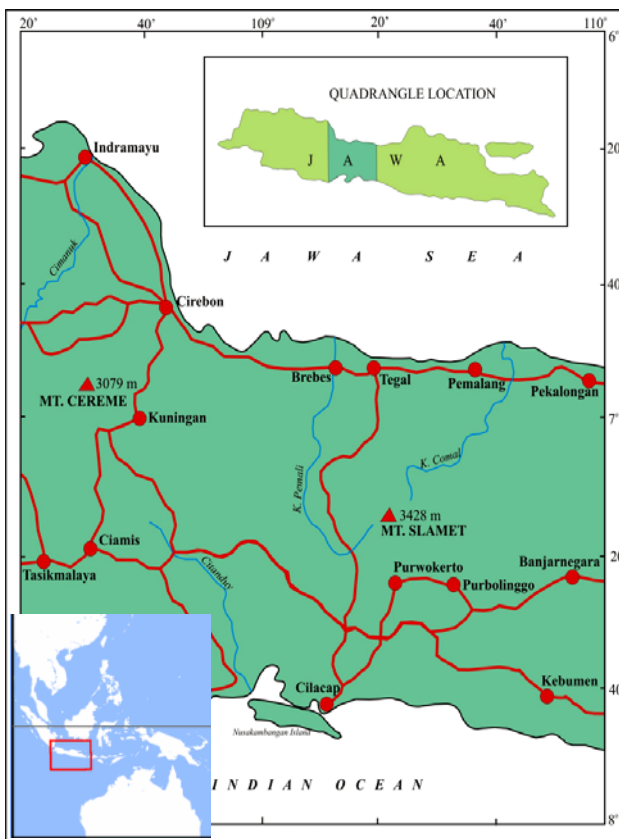


Figure 1. Map showing location of the Mount Slamet in Central Java, Indonesia

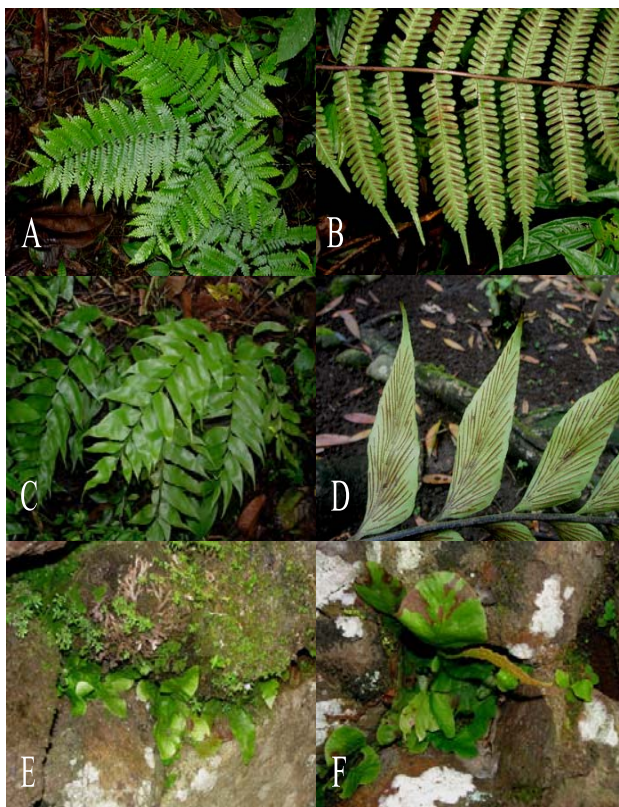


Figure 3. A-B. *Pteris wallichiana*; C-D. *Asplenium paradoxum*; E-F. *Tectaria zollingeri*.

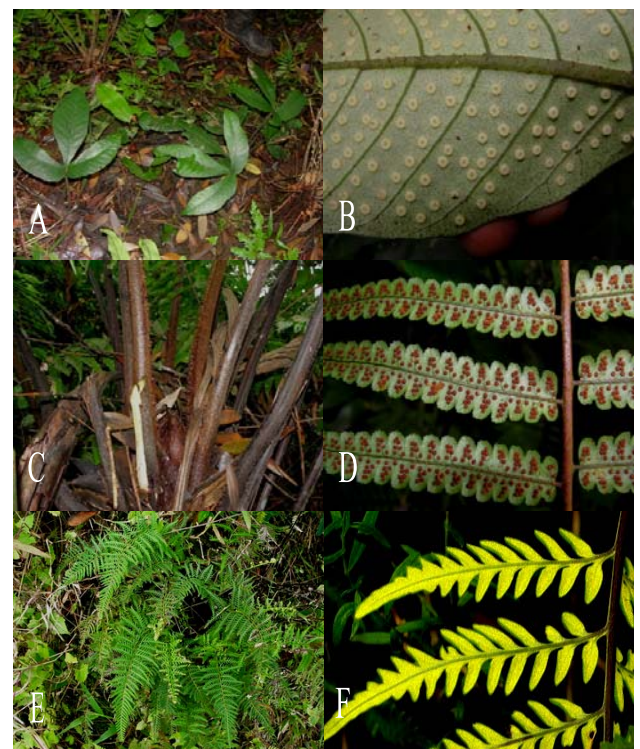


Figure 2. A–B. *Christensenia aesculifolia*; C – D. *Cyathea glabra*; E - F. *Pityrogramma austroamericana*

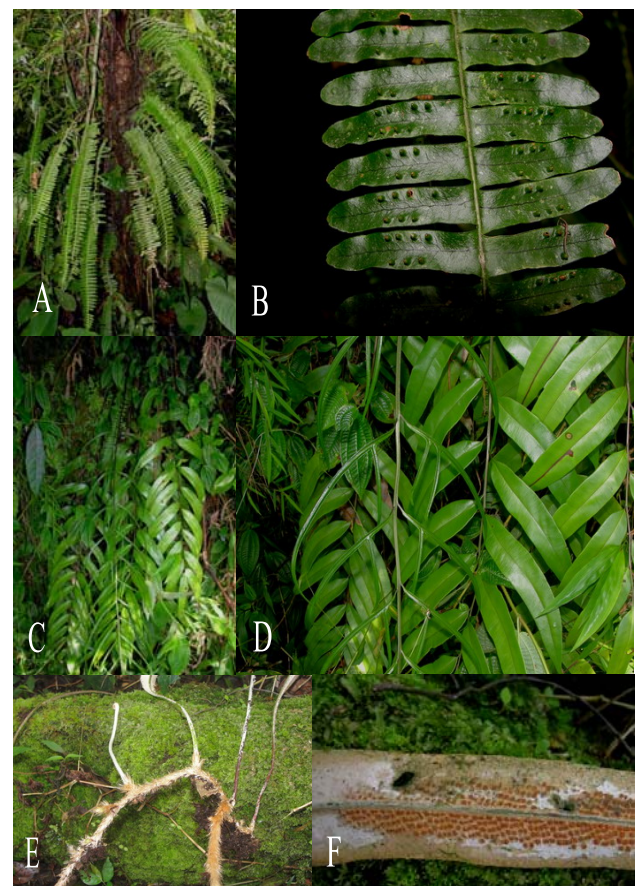


Figure 4. A-B. *Thylacopteris papillosa*.; C-D. *Pteris insignis*; E-F. *Pyrrosia asterosora*

Wider distribution. Sumatera (Hovenkamp 1998) and Java (present study).

Habitat. In Mt. Slamet this species is found as epiphytic in primary forest at 1400–1470 m.

Last record in Mt. Slamet. Petak 44, Hutan Lindung Karang Mangu, Lereng Utara G. Slamet, Desa Karang Mangu, Kec. Pulosari, Kab. Pematang (RPH Karang Sari, BKPH Moga, KPH Peka-longan Barat). 1455 m. 10-02-2011. TNgP 3221. (BOHB).

Occurrences/Plant encountered. 3 in one sites

Notes. Hovenkamp (1998) reported that *Pyrrrosia asterosora* is distributed only in Sumatera. Therefore the record of this species from Mt. Slamet is new record of *Polypodiaceae* for Java.

12. *Thylacopteris papillosa* (Blume) J.Sm. (*Polypodiaceae*). Figure 4A & B

Distribution in Java. West to East Java (Backer & Posthumus 1939)

Wider distribution. Throughout Malesia, except for New Guinea

Habitat. It grows epiphytic on mossy trees at shady place. In Mt. Slamet this species is found at 800–830 m.

Last record in Mt. Slamet. Hutan Lindung Telaga Pucung, Petak 49, Hutan Lindung KRPH Lebak Siu, Lereng Barat G. Slamet, Desa Karang Tengah, Kec. Cilongok, Kab. Banyumas. 830 m. 05-02-2011. TNgP 3190 (BOHB).

Occurrences/Plant encountered. Two in two sites

Notes. Backer & Posthumus (1939) described this species under the name *Polypodium papillosum* Blume.

CONCLUSIONS

Twelve species of pteridophytes included in 10 genera of 7 families in Mt. Slamet are recorded as rare species in Java, namely: (1) *Asplenium paradoxum* Blume, (2) *Christensenia aesculifolia* (Blume) Maxon, (3) *Cyathea glabra* (Blume) Copel., (4) *Cyathea oinops* Hask., (5) *Huperzia phlegmaria* (L.) Rothm., (6) *Pityrogramma austro-americanum* Domin, (7) *Psilotum complanatum* Sw., (8) *Pteris insignis* Mett. ex Kuhn, (9) *Pteris wallichiana* J. Agardh., (10) *Pyrrrosia asterosora* (Baker) Hovenkamp, (11) *Tectaria zollingeri* (Kurz) Holttum, and (12) *Thylacopteris papillosa* (Blume) J.Sm. Every species has its own distribution range and habitat characteristics.

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REFERENCES

- Adam P. 2002. Rarity, rare plant species and the New South Wales *threatened species conservation act*—conservation opportunities and challenges. *Cunninghamia* 7(4): 651–669.
- Backer CA & Posthumus O. 1939. *Varenflora voor Java*. Uitgave van's Lands Plantetuin, Buitenzorg.
- Darwin C. 1859. *The origin of species by means of natural selection*. John Murray, London.
- Fiedler PL & Ahouse JJ. 1992. Hierarchies of cause toward an understanding of rarity in vascular plant species. In: Fiedler PL & Jain SD (eds). *Conservation Biology: The Theory and Practice of Nature Conservation, Preservation, and Management*. Routledge, Chapman & Hall, Inc., New York, pp. 23–48.
- Kato M. 1992. Cytotaxonomic and reproductive-biological atlas of Asian Pteridophytes. *Proc Sem Asian Pterid II*: 5–8.
- Kaye TN, Meinke RJ, Kagan J, Vrilakas S, Chambers KL, Zika PF & Nelson JK. 1997. Patterns of rarity in the Oregon flora: implications for conservation and management. In: Kaye TN, Liston A, Love RM, Luoma D, Meinke RJ & Wilson (eds). *Conservation and management of native plants and fungi*. Native Plant Society of Oregon, Corvallis, Oregon. Pp. 1–10.
- Kramer KU & Green PS. 1990. *Pteridophytes and Gymnosperms*. Berlin: Springer-Verlag.
- Mills MH & Schwatz MW. 2005. Rare plants at the extremes of distribution: broadly and narrowly distributed rare species. *Biodiversity and Conservation* 14: 1401–1420.
- Rabinowitz D. 1981. Seven forms of rarity. In: Synge H. (ed). *The Biological Aspects of Rare Plant Conservation*. Wiley, New York, pp. 205–217.

- Sánchez C, Caluff GM, Gabancho LR & Morejón R. 2006. A preliminary evaluation of the current conservation status of Cuban endemic true ferns. *Willdenowia* 36: 491–505.
- Schoener TW. 1987. The geographical distribution of rarity. *Oecologia* 74: 161–173.
- Smith AR, Pryer KM, Achuettpelz E, Korall P, Schneider H & Wolf PG. 2006. A classification for extant ferns. *Taxon* 55 (3): 705–731.