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FLORISTIC STUDY OF WEST SUMBAWA, INDONESIA

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ABSTRACT
WIRIADINATA, H., GIRMANSYAH, D., HUNTER, J. M., HOOVER, W. S. & KARTAWINATA, K. 2013. Floristic Study of West Sumbawa, Indonesia. *Reinwardtia* 13 (5): 391−404. — A floristic survey was undertaken in mountains forest of West Sumbawa and some surrounding lower forests, an area of Indonesia receiving limited biological study. Three hundred sixteen species of Angiosperms and ferns were collected from this area in 2004 and 2005. The collection represents 101 families and 234 genera.

Key words: Botanical exploration, mountains, West Sumbawa.

ABSTRAK
WIRIADINATA, H., GIRMANSYAH, D., HUNTER, J. M., HOOVER, W. S. & KARTAWINATA, K. 2013. Studi flora Sumbawa Barat, Indonesia. *Reinwardtia* 13 (5): 391−404. — Survei flora di kawasan hutan pegunungan Sumbawa Barat dan hutan daerah rendah disekitarnya telah dilakukan, merupakan lokasi di Indonesia yang kurang dipelajari biologinya. Tiga ratus enambelas jenis dari kelompok Angiospermae dan paku-pakuan telah dikoleksi dari wilayah ini pada tahun 2004 dan tahun 2005. Koleksi yang didapat terdiri atas 101 suku dan 234 marga.

Kata kunci: Eksplorasi botani, pegunungan, Sumbawa Barat.

INTRODUCTION

Sumbawa is situated between Lombok to the West and Flores to the East. Botanical exploratory efforts on Sumbawa are summarized from van Steenis-Kruseman's (1950), *Cyclopedia of Botanical Exploration in Malaysia*. The earliest botanical exploratory efforts in Sumbawa were based out of Bima, in the eastern part of the island. Brief descriptions of the explorers and the geographic areas they explored are as follows:

Caspar George Carl Reinwardt may be the first botanist to have undertaken exploration of east Sumbawa from Mar. 20-23, 1821. Subsequently, Heinrich Zollinger collected in east Sumbawa in 1847, including Mts. Tambora, Hoeroe, Soenkar, Padjo, Gempo and Aroehasa (Zollinger, 1848; 1850; 1854). Zollinger has likely explored more mountains in Indonesia than any other single botanist (Hoover, *et al.,* 2004; 2009). Odoardo Beccari visited east Sumbawa in Oct. 1874, Wenzel Svoboda on 30 Febr. 1886, Max Wilhelm Carl Weber in 1889, Anna AntoinettenWeber-Van Bosse in April 1899 and Otto Warburg in Nov. 1888, the

latter undertaking exploration around Mts. Donggo and Sambori. From 1909-10 Johannes Elbert lead a Sunda Island expedition which placed him in Bima in Nov. 1909 (Elbert, 1911-12). The expedition resulted in the collection of about 16,300 herbarium specimens representing 4284 numbers, but no record of numbers of collections for Sumbawa were indicated. A second trip by Elbert to Sumbawa resulted in collecting another 707 numbers. Much of the earlier collection from the time of Odoardo Beccari in 1874, were not deposited at the Bogor Herbarium, even though the Herbarium was founded in 1857. Several other botanists visited and made collections in East Sumbawa in the early 20th century: Alfred Ernst on Mar. 13, 14, 1906, van Harreveld collected in G. Tambora and Tanjung Pasumba in Oct. 1920, Victor Emiie van Straelen in 1929, Oene Posthumus in 1932, Otto Jaag on April 24, 1938, Siebe Bloembergen in 1939, Leendert van der Pijl June 28, 1941, and foresters of the Forest Research Institute (*e.g*. Atang, Daroesman, Panggabean, Soewondo, de Voogd, *etc*.) in 1923-1934 collected 224 numbers (under the bb. Series).

Mrs. Ilse Maier-Rensch accompanied her husband zoologist, Bernard Rensch, Head, Division of Mollusks, Zoological Museum, Berlin University, on an expedition to the Lesser Sunda Islands in 1927 as a botanical collector. From late April to early June she undertook botanical collecting in West Sumbawa on Mts. Batu Dulang and Batu Lante (Rensch 1931); the former is a target site for exploration in the present paper. She may have been the first botanist to explore these mountains in West Sumbawa.

Cornelis Nicolaas Abraham de Voogd made two separate trips to West Sumbawa; the first trip in 1933 (Oct. 28-Nov. 1) and a second trip in 1936 (June 7-11), collecting around the East and West parts of the island. A phytosociological and silvicultural analysis was undertaken by Meijer-Drees (1938, 1951) for E. Sumbawa. Van Steenis (1957) identified vegetation types throughout Indonesia and Whitmore (1984) further studied vegetation throughout Malesia. However, no further botanical exploration of West Sumbawa was conducted until 34 years after the Rensch expedition of 1927, when in 1961 Kostermans and his team (including A. Fedorov of the USSR Academy of Sciences) (Kostermans & Kartawinata, 1961) revisited the area. A survey report by Kostermans (1965) followed up on the expedition, describing mostly tree families and genera with a few herbs and shrubs mentioned. This paper has tabulated Kostermans (1965) survey.

Recent botanical explorations in March 2004 and July 2005 conducted by Herbarium Bogoriense (RCB-LIPI) sponsored by New England Tropical Conservatory, USA just preliminary survey by collecting herbarium specimen from west Sumbawa within six study sites (between Sumbawa Besar to Batu Dulang, Batu Dulang complex, Mount Pasak complex, Mount Ngengas complex, Tepals complex and Jaran Pusang complex) hoping that the data can be used for a compliment a check list flora of Sumbawa.

STUDY SITES

Fig. 1 shows the location of the 2004 and 2005 expeditions. The interior of West Sumbawa is dominated by the following mountains: Batu Pasak (1700 m), Batu Linting "lante" (1650 m), Batu Dulang (1700 m) and Puncak Ngengas (1700 m.). All mountains were ascended and explored and are described in the present study. Rugged lower mountains, ridges, hills, and small valleys comprise most of the remaining, interior landscape, with a narrow coastal plain forming a fringe vegetation zone adjacent to the Indian Ocean to the South and Bali Sea to the North. Access to these mountains, and the collection sites around them, was by a grueling road out of the city of Sumbawa Besar and hiking from the road.

METHODS

The present study was undertaken in March 2004 and July 2005 as a botanical exploratory effort, as little previous biological survey work has been done in West Sumbawa. Expedition base camps were established near Brangbosang bridge, foot of Mt Batu Pasak (08º 37' 729" S, 117º 15' 476" E at 1400 m asl.) and in the forest at foot of Mt. Ngengas upper village of Tepal, (08º 35' 654" S, 117º 08' 860" E at 1278 m asl). All the base camps themselves were framed from trees with a tarp covering the frames. Standard botanical techniques for herbarium specimen acquisition were employed. Herbarium especially fertile specimen were collected along the trails from several vegetation types from lowland to top of mountains and sterile specimen herbarium were collected within 2 plots (each plot 0.1. ha) at the slope of Mt. Ngengas and at the foot of Mt. Pasak. First set of herbarium specimen stored in Herbarium Bogoriense (RCB-LIPI), Cibinong and second set sent to Smithsonian Institute, Washington as duplicate.

RESULTS

As a result of these botanical explorations species collected from the expedition is presented in Table 1.

Fig. 1. One of expedition locations at Mountain Batu Pasak (1700 m asl).

Flora between Sumbawa Besar and Batu Dulang (146–327 m asl)

Vegetation along the road from Sumbawa Besar to Batu Dulang is typical monsoon forest or savanna with some big trees such as *Borassus flabelifer* (very common)*, Cassia siamea, Schleicera oleosa, Alstonia scholaris, Lagerstroemia speciosa* and *Tamarindus indica* grow here and there. Several trees that can be found along the road are: *Albizia saponaria, Parkia timoriana, Buchanania arborescens, Dracontomelon dao, Dysoxylum nutans, Elaeocarpus petiolatus, Freziera calophylla, Ficus racemosa, F. septica, Grewia multiflora, Homalium tomentosum, Knema cinerea, Tabernaemontana sphaerocarpa, Litsea glutinosa* and *Microcos paniculata.* Among the big trees there are small trees and shrubs compose of *Antidesma montanum, Cordia mixa, Leea angulata* and *Melastoma malabatricum.* Among climbers that occur along the way can be mentioned here are *Asparagus racemosus, Caesalpinia sappan, Cayratia geniculata, Cissampelos pereira, Cissus javana, Clematis smilacifolia, Ipomoea pes-caprae* and among grasses there are some herbs such as *Asystasia nemorum, Corcorus olitorius, Crotalaria pallida, Desmodium cephalotes, D. gangeticum, Hyptis suaveolens* and *Indigofera zollingeriana.* Ferns very rare, among the collections there are *Adiantum philippense, Vittaria elongata* and *Lycopodium flexuosum.*

Flora of Batu Dulang complex area (800–1000 m asl)

Batu Dulang can be reached on foot from Semongkat Atas village by car, but from Batu Dulang to Brangbosang bridge many landslides cause no car can pass the road.

Natural vegetation of the area between Batu Dulang and Brangbosang camp already converted into coffee plantation with *Erythrina subumbrans* and *Ceiba pentandra* planted as shade trees. Following a trail road from Batu Dulang to Brangbosang there is secondary forest dominated by *Dipterocarpus hasseltii,* a rare species as representative of Dipterocarpaceae for Lesser Sunda Island (SLI). There are several interesting plants *e.g. Pandanus* which is also endemic species of LSI, *Cyathea* sp. a tree fern which grows here and there in a rather wet area and sometime found abundance locally, *Exocarpus pullei* a root parasitic plant with long leaf and red fruit grows in open area, among grasses, *Cyrtandra nemorosa* of Gesneriaceae a common small shrub with yellow flower and sausage fruit. Around the Brangbosang bridge (*ca*. 1000 m asl.) the vegetation compose of small trees, shrubs such as *Saurauia bracteata, Adinandra sorosanthera, Lasianthus capitatus, Villebrunea rubescens;* common herbs such as *Centella asiatica, Kylingia* sp.*, Pillea melastomoides, Strobilanthes blumei, Rubus rosaefolius* and some alien herbs which already

naturalised in this area such as *Ageratum conyzoides, Stachytarpheta jamaicensis, Spermacoce laevis, Piper sarmentosum, Centella asiatica* and *Urena lobata*. Climbers are very rare, among them are *Frecynetia elongata* and *Tetrastigma papilosum;* ferns are also rare, several species that can be mentioned here are *Cyathea* sp., *Nephrolepis* sp., *Asplenium caudatum*, *Lycopodiella cernua, Selaginella plana* and *Gramitis obliqua*.

Flora of Mts Pasak complex area (1000–1700 m asl)

Mountains Pasak complex compose of several mountains with the highest elevation belong to Mt. Batu Pasak peak (1700 m asl.) and second high elevation Mt. Batu Linting "Batu lante" (1600 m asl). Vegetation on the foot of those mountains is still good. The tall trees belong to *Dacrycarpus neriifolius*. Other tall trees composes of this mountain forest are *Calophyllum soulatri, Memecylon myrsinoides, Adinandra sarosanthera, Chionanthus polygamus, Elaeocarpus punctatus, Polyalthia subcordata, Polyscias javanica, Neolitsea triplinervia, Gomphandra javanica* and *Weinmannia blumei*. Secondary canopy composes of *Eonymus javanicum, Saurauia bracteosa, Villebrunea rubescens, Lasianthus capitatus, Medinella speciosa, Cyrtandra nemorosa, Homalanthus populneus, Evodia latifolia, Cinnamomum* sp., *Strobilanthes blumei* and the forest floor composes of herbs such as *Selaginella wildenowii*, *Elatostema* sp. and *Polygonum* sp. On the top of mountains vegetation compose of *Cletra sumbawaensis, Adinandra sarosanthera, Weinmannia blumei, Homalanthus populneus, Ficus* spp. and *Schefflera elliptica.*

Flora of Mts Ngengas complex area (1250–1700 m asl)

Some of forest areas already converted to coffee plantation with *Erythrina subumbrans* as shade trees. The forest already disturbed indicated by the present of *Laportea stimulans* and *Homalanthus populneus* which occur abundant in the forest. Floristic composition of mountain Ngengas forest are *Gomphandra javanica, Aglaia sylvestris, Aglaia odoratissima, Aglaia teijsmaniana, Neolitsea diversifolia, Dacrycarpus imbricatus, Nauclea excelsa, Drypetes longifolia, Ficus septica, Ficus subulata.* Second canopy composes of *Hypobathrum frutescens, Pittosporum moluccanum, Villebrunea rubescens, Glochidion rubrum, Ardisia myristicaefolia*. The forest floor covered by *Phlagacanthus celebicus, Elatostema rostratum, Mycetia cauliflora, Adathoda vesica, Sida acuta, Hypoetes rosea*, and *Ardisia japonica.* Orchids are rare; some terrestrial species of orchids occurs in this forest are *Calanthe susanne* and *Macodes patola* since the epiphytic orchids are *Dendrobium* sp., *Bulbophyllum* sp. and *Eria* sp. all are sterile.

Flora of Tepal village complex (1000 – 1400 m asl)

Tepal village can be reached by car from Sumbawa Besar through Semongkat Atas and Poenik village. Some of natural vegetation already converted to coffee plantations. Around Tepal complex there are many bamboos such as *Gigantochloa apus* and *Schizostachyum blumei*. Among coffee plantation there are some trees occurs such as *Ficus* spp., *Alstonia scholaris, Breynia racemosa, Homalanthus populneus* and *Glochidion rubrum.* Forest in the upper part of the village rather disturbed, there are many *Laportea stimulans* which dominated the vegetation. Among trees collected from this forest are *Gomphandra javanica, Pittosporum moluccanum, Adinandra javanica, Aglaia sylvestris, Pipturus argenteus, Memecylon bakerianum* and *Casearia coriacea.* The floor of the forest composes of small trees, shrub such as *Saurauia nudiflora, Debregeasia longifolia*, *Clerodendrum buchanani* and *C. confusum, Andrographis laxiflora, Ardisia javanica*, *Begonia* spp., *Belosynopsis ciliata capitata, Forrestia mollissima, Hypoetes polythyrsa, Mycetia cauliflora, Ophiorrhiza neglecta* and ferns such as *Asplenium caudatum, A. normale, Selaginella plana, Cardamine africana* and *Ctenopteris obliquata.*

Flora of Jaran Pusang (0–1000 m asl)

Jaran Pusang lies in eastern part of Sumbawa Besar and can be reach by car. Vegetation of the foot of Jaran Pusang dominated by *Ziziphus mauritiana, Ziziphus jujuba* and *Bambusa spinosa*. Among the forest trees occurs in this area are: *Aglaia sylvestris, Syzygium javanicum, Allophyllus cobbe, Diospyros cauliflora, Gyrinops versteegii, Elattostachys verrucosa* and *Euodia latifolia.* Some small trees and shrubs composes of *Zanthoxylum avicenae, Ardisia javanica, A. lanceolata, Bridelia insulana, Acronychia trifoliata, Ixora paludosa, Lasianthus attenuatus, Memecylon myrsinoides, Homalanthus populneus, Glycosmis cochinchinensis, Phaleria octandra, Randia reinwardtiana, Suregada glomerulata* and *Lepionurus sylvestris.* On the forest floor there are several species of herbs such as *Amomum aculeatum, Asystasia nemorum, Cyrtandra insignis, C. nemorosa* and *Heliotropium indicum.* Climbers very rare and among the species collected from this area are *Capparis sepiaria var. fischeri,*

Pseudouvaria rugosa and *Tetracera scandens.*

DISCUSSION

The low elevation of Sumbawa Besar to the south west are mostly savanna with typical trees such as *Borassus flabellifer, Schleicera oleosa, Lagerstroemia speciosa, Cassia siamea* and *Tamarindus indica* grow here and there among grasses. In low and higher elevation some area of the vegetations especially near the villages of Semongkat Atas, Batu Dulang, Phonik and Ngengas are already converted into coffee plantation, even though in the rest forest still rich of plant species. Among the coffee plantation many trees such as *Erythrina subumbrans* and *Gliricidia maculata* are planted as shade trees. The secondary forest dominated by *Laportea stimulans, Homalanthus macrophyllus* and *H. populneus,* as secondary species.

Tree ferns (*Cyathea*) are observed abundantly at 600-800 m at two forest "patches" before Phonik and Batu Dulang. *Cyathea* abundance and density is so great in these two patches that they may be considered to be highly unusual for such a low elevation. These two forest patches may have considerable scientific interest for Sumbawa, as characteristics of both lowland forest and upper elevation forest are represented. These forest patches may represent an upper limit of lowland evergreen forest, based on initial observations of tall, canopy, evergreen trees, some with large buttressing and upper elevation forests indicated by the presence and abundance of *Cyathea*. The observation of, what appears to be, lowland wet evergreen forest on a "dry island" like Sumbawa, further makes the existence of these forest patches especially interesting. *Dipterocarpus hasseltii,* is a rare and an endemic species of Java and LSI. This species that occurs in Batu Dulang as representative of Dipterocarpaceae for Lesser Sunda Island (SLI). It grows in small population. *Pandanus* which is also endemic species of LSI, can be found at Batu Dulang complex, usually grows in the forest under canopy, wet area and along the small river. *Exocarpus pullei* a root parasitic plant with long leaf and red fruit grows in open area, among grasses. It has very hard wood, usually use for stick. Vernacular name in Semongkat Atas village is 'Kayu Sulaeman' and it use as ritual for protecting the house from thief. *Cyrtandra nemorosa* of Gesneriaceae a common small shrub with yellow flower and sausage fruit. This species rather common along the trail from Batu Dulang to Brangbosang bridge, this plant usually grows in wet area and shade area even in open area.

Fig. 2. Habitat and habit of *Begonia* sp.

Flora around Brangbosang bridge on the foot of Mountain Pasak complex mostly dominated by shrubs due the area is expose to sunlight, such as *Lasianthus capitatus, Cyrtandra nemorosa, Villebrunea rubescens, Strobilanthes blumei, Spermacoce laevis* and *Rubus rosaefolius*. On the river bank and moist area some ferns such as *Nephrolepis* sp., *Asplenium caudatum*, *Lycopodiella cernua, Selaginella plana* and *Gramitis obliqua* can be found. There are many exotic and naturalised species grow in this area such as *Ageratum conyzoides, Stachytarpheta jamaicensis,* and *Centella asiatica.*

Flora of Mts Ngengas complex area. Like many other area which lies close to village in the last decade the forest of mount Ngengas converted to

coffee plantation with *Erythrina subumbrans* as shade trees. Beside the pioneer species such as *Omalanthus populneus*, the *Laportea stimulans* becomes abundant in the forest edges. The mount Ngengas seem has good forest since there are still many trees such as *Gomphandra javanica, Aglaia sylvestris, Aglaia odoratissima, Aglaia teijsmaniana, Neolitsea diversifolia, Nauclea excelsa, Drypetes longifolia, Ficus septica, F. subulata, Hypobathrum frutescens, Pittosporum moluccanum, Villebrunea rubescens, Glochidion rubrum* and *Ardisia myristicaefolia, Phlagacanthus celebicus, Elatostema rostratum, Mycetia cauliflora, Adathoda vesica, Sida acuta, Hypoetes rosea*, *Ardisia japonica, Calanthe susanne* and some orchids such as *Macodes patola, Dendrobium* sp., *Bulbophyllum* sp. and *Eria* sp. are also can be found here. Interesting issue found from the top of this mountain because there are few novelties of Begonias beside *Begonia multangula* and *B. isoptera eg. Begonia* sp 1 (Fig. 2). which has red coloured under leaf. These Begonias usually grow at the high elevation, near small rivers, in the virgin forest under the canopy and do not like direct sunlight.

The forest in Mountains Pasak complex, Mountain Batu linting 'batu lante' complex are still good, there are many big trees with height more than 20 m and more than 50 cm in diameter. The emergent tree such as *Dacrycarpus neriifolius* has diameter around up to 90 cm dbh, and height 20-25 m, compare to Java this species is very rare in this area. The first canopy layer consists of trees such as *Elaeocarpus punctatus, Gomphandra javanica, Memecylon myrsinoides*, *Neolitsea triplinervia, Adinandra sarosanthera, Chionanthus polygamus* and *Polyalthia subcordata. Calophyllum soulatri* mostly occur in the slope facing south. *Polyscias javanica, Weinmannia blumei* and *Villebrunea rubescens* usually found at forest edge, are found between shrub in the open area. Secondary canopy layer composes of trees of 10-15 m height such as *Evodia latifolia, Eonymus javanicum, Saurauia bracteosa* and *Lasianthus capitatus.* The secondary species such as *Homalanthus gigantea, H. populneus* and *Laportea stimulans* grow in open area at disturbed forest edges. The forest floor composes of herbs such as *Medinella speciosa, Cyrtandra nemorosa, Strobilanthes blumei, Selaginella wildenowii*, *Elatostema* sp. and *Polygonum* sp. On the top of mountains vegetation compose of *Cletra sumbawaensis* which is endemic to the island, and other plants such as *Adinandra sarosanthera, Weinmannia blumei, Homalanthus populneus, Ficus* spp. and *Schefflera elliptica* since these species can grow in open area and they have been known as demanding light species.

Jaran Pusang complex lies in south east of Sumbawa Besar and can be reach by car. In this complex area there is a dam for reservoir. Around the lake the vegetation dominated by *Ziziphus rotundifolia* and *Z. oenophlia*, the torny shrub with many branches. *Bambusa spinosa* dominated the foot of Jaran Pusang, it seem that this species is invasive. Interesting rare species found in this complex is *Gyrinops versteegii.* This species is included in CITES appendix 2. Many people cut the wood for insence due it has very high economic value. Population of this species in the wild decrease rapidly and it status becomes vulnerable.

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Table 1. List of Species collected from Sumbawa

No	Species	Family	Location					
			I	II	III	IV	V	VI
1	*Achyrospermum densiflorum* Blume	Lamiaceae			×	×		
3	*Acronychia trifoliata* Zoll. et Merr.	Rutaceae		×				×
4	*Adhatoda vasica* Nees	Acanthaceae				×		
5	*Adiantum philippense* L.	Adianthaceae	×					
7	*Adinandra javanica* Choisy.	Theaceae				×	×	
8	*Adinandra sarosanthera* Miq.	Theaceae			×			
9	*Agalmyla elongata* (Blume) B.L. Burtt.	Gesneriaceae			×			
10	*Aglaia odoratissima* Blume	Meliaceae				×		
11	*Aglaia rubiginosa* (Hiern) Pannell	Meliaceae		×				
13	*Aglaia silvestris* (M. Roem) Merr.	Meliaceae			×	×	×	×
14	*Aglaia teysamanniana* (Miq.) Miq.	Meliaceae				×		
15	*Albizia lebbeck* (L.) Benth.	Leguminosae		×				
16	*Albizia saponaria* (Lour) Miq.	Leguminosae	×	×				
17	*Albizia splendens* Miq.	Leguminosae		×				
19	*Albizia tomentella* Miq.	Leguminosae		×				
20	*Allophylus cobbe* (L.) Raeusch.	Sapindaceae						×
21	*Alpinia* sp.	Zingiberaceae			×			
22	*Alstonia scholaris* (L.) R. Br.	Apocynaceae			×			
23	*Alstonia spectabilis* R. Br.	Apocynaceae				×		
24	*Amischotolype mollissima* (Blume) Hassk.	Commelinaceae					×	
25	*Amomum aculeatum* Roxb.	Zingiberaceae						×
26	*Anaphalis longifolia* (Blume) Blume ex. DC.	Compositae		×		×		
27	*Andrographis laxiflora* (Blume) Lindau	Acanthaceae		×			×	
28	*Antidesma montanum* Blume	Phyllanthaceae	×			×		
29	*Antrophyum semirostratum* Blume	Vittariaceae					×	
30	*Apidopterys elliptica* (Blume) Juss.	Malphigiaceae		×				
31	*Ardisia diversifolia* Koord. et Valeton	Primulaceae		×				
32	*Ardisia japonica* (Thumb.) Blume	Primulaceae				×	×	×
33	*Ardisia javanica* A. DC.	Primulaceae			×	×	×	×
34	*Ardisia purpurea* Reinw. ex Blume	Primulaceae						×
35	*Ardisia myristicifolia* Blume ex Scheff.	Primulaceae			×	×	×	
36	*Arthropteris obliterata* (R. Br.) J.Sm.	Nephrolepidaceae					×	
37	*Asclepias curassavica* L.	Asclepiadaceae		×			×	
38	*Asparagus racemosus* Willd.	Asparagaceae	×					
39	*Asplenium caudatum* G. Forst.	Aspleniaceae			×		×	
40	*Asplenium normale* D. Don.	Aspleniaceae					×	
41	*Asplenium salignum* Blume	Aspleniaceae					×	
42	*Asplenium unilaterale* Lam.	Aspleniaceae					×	
43	*Astronia spectabilis* Blume	Melastomataceae			×	×		
44	*Asystasia nemorum* Nees	Acanthaceae	×	×				×
45	*Bauhinia fulva* (Korth.) Blume	Leguminosae	×					
46	*Bauhinia integrifolia* Roxb.	Leguminosae	×	×				
47	*Begonia* cf. *isopteran*	Begoniaceae			×	×		
48	*Begonia* cf. *multangula*	Begoniaceae			×			
49	*Begonia* cf. *robusta*	Begoniaceae				×		
50	*Begonia* sp1	Begoniaceae			×	×	×	
51	*Begonia* sp2	Begoniaceae			×		×	
52	*Begonia* sp3	Begoniaceae			×		×	
53	*Begonia* sp4	Begoniaceae						×
54	*Belosynopsis ciliata* (Blume) R.S. Rao	Commelinaceae					×	
55	*Blumea chinensis* (L.) DC.	Compositae					×	
56	*Blumea balsamifera* (L.) DC.	Compositae				×		
57	*Boeninghausenia albiflora* (Hook.) Reichb. ex. Meisn.	Rutaceae		×		×		

Table 1. List of Species collected from Sumbawa (continued)

No	Species	Family	Location					
			I	II	III	IV	V	VI
58	*Breynia virgata* (Blume) Muell. Arg.	Phyllanthaceae			×			
59	*Bridelia insulana* Hence	Phyllanthaceae						×
60	*Bryophyllum pinnatum* (Lam.) Oken	Crassulaceae				×		
61	*Buchanania arborescens* Blume (Blume)	Anacardiaceae	×					
62	*Buddleja asiatica* Lour.	Scrophulariaceae			×			
63	*Caesalpinia sappan* L.	Leguminosae	×					
64	*Callicarpa longifolia* Lam.	Lamiaceae		×	×			
65	*Calophyllum soulatri* Burm. f.	Calophyllaceae			×			×
66	*Canthium conferta* (Korth.) Merr.	Rubiaceae			×			
67	*Capparis cantoniensis* Lour.	Capparidaceae			×			
68	*Capparis sepiaria* var. *fischeri* (Pax) De-Wolf	Capparidaceae						×
69	*Cardamine africana* L.	Brassicaceaee			×		×	
70	*Casearia coriaceae* Vent.	Salicaceae			×	×	×	
71	*Cayratia geniculata* (Blume) Gagnep.	Vitaceae	×	×				
72	*Centella asiatica* (L.) Urb.	Apiaceae		×				
73	*Chionanthus polygamus* (Roxb.) Kiew	Oleaceae				×		
74	*Cippadessa baccifera* Miq.	Meliaceae			×			
75	*Cissampelos pareira* L.	Menispermaceae	×					
76	*Cissus javana* DC.	Vitaceae	×					
77	*Cissus repens* Lam.	Vitaceae		×				
78	*Clausena excavata* Burm. f.	Rutaceae		×				
79	*Cleidion spiciferum* Merr.	Euphorbiaceae			×	×		
80	*Clematis smilacifolia* Wall.	Ranunculaceae	×					
81	*Clerodendrum buchanani* (Roxb.) Walp.	Lamiaceae		×	×			
82	*Clerodendrum confusum* Hall.f.	Lamiaceae					×	
83	*Clethra sumbawaensis* Sleumer	Clethraceae			×	×		
84	*Coniogramme fraxinea* (D.Don) Fee ex Diels	Adianthaceae			×			
85	*Corchorus olitorius* L.	Malvaceae	×					
86	*Cordia myxa* L.	Boraginaceae	×					
87	*Crotalaria pallida* Aiton	Leguminosae	×					
88	*Croton cf. polot* Burm. f.	Euphorbiaceae						×
89	*Croton tiglium* L.	Euphorbiaceae						×
90	*Crypteronia paniculata* Blume	Crypteroniaceae			×			
91	*Cucumis javanicus* (Miq.) Ghebret. & Thulin	Cucurbitaceae	×					
92	*Cyrtandra insignis* C.B. Clarke	Gesneriaceae						×
93	*Cyrtandra nemorosa* Blume	Gesneriaceae			×	×		×
94	*Debregeasia longifolia* Wedd. var. *affinis* J.J.S.	Urticaceae			×	×	×	
95	*Decaspermum triflorum* A.J Scott	Myrtaceae				×		
96	*Desmodium cephalotes* (Roxb.) Benth.	Leguminosae	×					
97	*Desmodium gangeticum* DC.	Leguminosae	×					
98	*Desmodium laxiflorum* DC.	Leguminosae		×				
99	*Diospyros cauliflora* Blume	Ebenaceae						×
100	*Dipterocarpus hasseltii* Blume	Dipterocarpaceae		×			×	
101	*Dischidia longifolia* Becc.	Apocynaceae			×			
102	*Dischidia punctata* (Blume) DC.	Apocynaceae				×		
103	*Disporum cantoniense* (Lour.) Merr.	Asparagaceae		×				
104	*Dracontomelon dao* (Blanco) Merr. & Rolfe	Anacardiaceae	×					
105	*Drymaria cordata* (L.) Willd. ex Schult.	Caryophyllaceae					×	
106	*Dryopteris sparsa* (D. Don.) Kuntze	Dryopteridaceae			×			
107	*Drypetes longifolia* (Blume) Pax & K. Hoffm.	Putranjivaceae				×		
108	*Dysoxylum arborescens* (Blume) Miq.	Meliaceae		×				
109	*Dysoxylum nutans* (Blume) Miq.	Meliaceae	×					
110	*Elaeocarpus petiolatus* (Jacq) Wall.	Elaeocarpaceae	×					

Table 1. List of Species collected from Sumbawa (continued)

No	Species	Family	Location					
			I	II	III	IV	V	VI
111	*Elaeocarpus punctatus* (Wall.) ex Mast.	Elaeocarpaceae			×			
112	*Elattostachys verrucosa* (Blume) Radlk.	Sapindaceae		×				×
113	*Elatostema rostratum* (Blume) Hassk.	Urticaceae				×		
114	*Elsholtzia pubescens* Benth.	Lamiaceae				×		
115	*Embelia javanica* A. DC.	Primulaceae				×		
116	*Etlingera* sp.	Zingiberaceae			×			
117	*Euonymus indicus* B. Heyne ex Wall.	Celastraceae			×			
118	*Eurya acuminata* DC.	Pentaphylacaceae			×			
119	*Exocarpos pullei* Pilg.	Santalaceae			×			
120	*Fagara rhetsa* DC.	Rutaceae	×					
121	*Fatoua pilosa* Gaudich	Moraceae	×					
122	*Ficus fistulosa* Reinw. ex Blume	Moraceae		×				
123	*Ficus nervosa* subsp. *pubinervis* (Blume) C.C. Berg.	Moraceae				×		
124	*Ficus racemosa* L.	Moraceae	×					
125	*Ficus ribes* Reinw. ex Blume	Moraceae			×		×	
126	*Ficus septica* Burm.	Moraceae	×			×		
127	*Ficus subulata* Blume	Moraceae				×		
128	*Freycinetia insignis* Blume	Pandanaceae			×	×		
129	*Freziera calophylla* Triana & Planch.	Pentaphylacaceae	×					
130	*Geniostoma rupestre* J.R. Forst & G. Forst.	Loganiaceae				×		
131	*Globba* sp.	Zingiberaceae		×				
132	*Glochidion glomerulatum* (Miq.) Boerl.	Phyllanthaceae				×		
133	*Glochidion philippicum* (Cav.) C.B. Rob.	Phyllanthaceae				×		
134	*Glochidion zeylanicum* var *arborescens (*Blume) Chakrab. & M. Gangop.	Phyllanthaceae			×			
135	*Glycosmis cochinchinensis* (Lour.) Pierre ex Engl.	Rutaceae						×
136	*Gomphandra javanica* (Blume) Valeton	Stemonuraceae			×	×	×	
137	*Goniophlebium persicifolium* (Desv.) Bedd.	Polygonaceae			×		×	
138	*Gramitis obliquata* (Blume) Hassk.	Gramitidaceae			×		×	
139	*Grewia multiflora* Juss.	Malvaceae	×	×				
140	*Gynura procumbens* (Lour.) Merr.	Compositae					×	
141	*Gyrinops versteegii* (Gilg.) Domke	Thymelaeaceae						×
142	*Helicia serrata* (R.Br.) Blume	Proteaceae				×		
143	*Heliotropium indicum* L.	Boraginaceae						×
144	*Homalanthus giganteus* Z. & M.	Euphorbiaceae		×				
145	*Homalanthus populneus* (Geisel) Pax	Euphorbiaceae			×			×
146	*Homalium tomentosum* Benth.	Salicaceae	×					
147	*Hoya diversifolia* Blume	Apocynaceae					×	
148	*Humata repens* (L.f.) Diels.	Davalliaceae			×			
149	*Huperzia serrata* (Thunb.) Trevis.	Lycopodiaceae			×			
150	*Hypobathrum frutescens* Blume	Rubiaceae				×		
151	*Hypoestes polythyrsa* Miq.	Acanthaceae			×			
152	*Hypoestes rosea* Nees	Acanthaceae		×		×	×	
153	*Hyptis suaveolens* (L.) Poit.	Lamiaceae	×					
154	*Impatiens platypetala* Lindl.	Balsaminaceae		×	×			
155	*Indigofera zollingeriana* Miq.	Leguminosae	×					

Table 1. List of Species collected from Sumbawa (continued)

No	Species	Family	Location					
			I	II	III	IV	V	VI
156	*Ipomoea grandifolia* (Dammer) O'Donell	Convolvulaceae	×	×				
157	*Ipomoea indica* (Burm.) Merr.	Convolvulaceae		×				
158	*Ipomoea pes-caprae* (L.) R. Br.	Convolvulaceae	×					
159	*Ipomoea pesti-gridis* L.	Convolvulaceae	×					
160	*Itea macrophylla* Wall.	Iteaceae		×	×			
161	*Ixora paludosa* (Blume) Kurz	Rubiaceae						×
162	*Jasminum elongatum* (P.J. Bergius) Willd.	Oleaceae				×		
163	*Josephinia imperatricis* Vent.	Pedaliaceae	×					
164	*Justicia japonica* Thunb.	Acanthaceae	×	×				
165	*Kleinhovia hospita* L.	Malvaceae		×				
166	*Knema cinerea* (Poir.) Warb.	Myristicaceae						×
167	*Knema glauca* (Blume) Warb.	Myristicaceae	×					
168	*Lagerstroemia speciosa* (L.) Presl.	Lythraceae	×					
169	*Lantana camara* L.	Verbenaceae		×				
170	*Lasianthus attenuatus* Jack	Rubiaceae						×
171	*Lasianthus capitatus* Blume	Rubiaceae			×	×		
172	*Leea angulata* Korth. ex Miq.	Vitaceae	×					
173	*Leea indica* (Burm. f.) Merr.	Vitaceae		×	×			
174	*Lepionurus sylvestris* Blume	Opiliaceae						×
175	*Leucas decemdentata* var. *decemdentata*	Lamiaceae	×					
176	*Lindernia crustacea* (L.) F. Muell.	Scrophulariaceae		×				
177	*Litsea diversifolia* Blume	Lauraceae			×	×		
178	*Litsea glutinosa* (Lour) C.B.Rob	Lauraceae	×					
179	*Litsea noronhae* Blume	Lauraceae			×			
180	*Litsea timoriana* Span	Lauraceae		×				
181	*Litsea tomentosa* Nees	Lauraceae		×				
182	*Lycianthes biflora* (Lour) Bitt.	Solanaceae					×	
183	*Lycopodiella cernua* (L.) Pic. Serm.	Lycopodiaceae		×				
184	*Lygodium flexuosum* (L.) Sw.	Schizaeaceae	×					
185	*Maesa perlarius* (Lour.) Merr.	Primulaceae		×	×		×	
186	*Mallotus dispar* M.A.	Euphorbiaceae			×			
187	*Mallotus philippinensis* (Blume) Mull. Arg.	Euphorbiaceae		×				
188	*Mallotus mollicimus* (Geiseler) Airy Shaw	Euphorbiaceae		×		×		
189	*Medinilla speciosa* Blume	Melastomataceae			×	×		
190	*Melastoma malabathricum* L.	Melastomataceae	×	×	×	×		
191	*Melastoma setigerum* Blume	Melastomataceae			×			
192	*Melicope latifolia* DC.	Rutaceae				×		×
193	*Memecylon bakerianum* Cogn.	Melastomataceae					×	
194	*Memecylon edule* Roxb.	Melastomataceae			×			
195	*Memecylon myrsinoides* Blume	Melastomataceae						×
196	*Microcos paniculata* L.	Malvaceae	×					
197	*Micromelum minutum* Wight. & Arn.	Rutaceae		×	×			
198	*Mucuna macrophylla* Miq.	Leguminosae		×			×	
199	*Mycetia cauliflora* Reinw.	Rubiaceae			×		×	
200	*Myristica fatua* Houtt	Myristicaceae						×
201	*Myristica fatua* Houtt var. *sphanoghena*	Myristicaceae		×				
202	*Myristica gualtheriifolia* A. DC.	Myristicaceae					×	
203	*Neolitsea cassiaefolia* (Blume) Merr.	Lauraceae			×			
204	*Neolitsea latifolia* Blume	Lauraceae		×				
205	*Neolitsea triplinervia* (Blume) S. Moore	Lauraceae			×	×		

Table 1. List of Species collected from Sumbawa (continued)

No	Species	Family	Location					
			I	II	III	IV	V	VI
206	*Neonauclea excelsa* (Blume) Merr.	Rubiaceae			×	×		
207	*Oldenlandia elmeri* Merr.	Rubiaceae			×	×		
208	*Onychium siliculosus* (Desv.) C. Chr.	Adianthaceae		×				
209	*Ophiorrhiza canescens* Blume	Rubiaceae			×			
210	*Ophiorrhiza neglecta* Blume ex DC.	Rubiaceae		×			×	
211	*Ophiorrhiza sumbawana* Val.	Rubiaceae				×		
212	*Ortosiphon aristatus* (Blume) Miq.	Lamiaceae	×					
213	*Pachyrhizus erosus* (L.) Urb.	Leguminosae	×		×			
214	*Paederia foetida* L.	Rubiaceae		×				
215	*Pararuellia napifera* (Zoll.) Bremek. & Nann.-Bremek.	Acanthaceae	×					
216	*Peperomia laevifolia* (Blume) Miq.	Piperaceae			×		×	
217	*Peperomia pellucida* (K.) Kunth.	Piperaceae	×	×				
218	*Peperomia tetraphylla* Hook. & Arn.	Piperaceae			×			
219	*Persicaria chinense* (L.) H. Gross	Polygonaceae						
220	*Perycamphyllus glaucus* (Lmk.) Merr.	Menispermaceae	×	×	×	×		
221	*Phaeanthus sumatrana* Miq.	Annonaceae						×
222	*Phaleria octandra* (L.) Baill.	Thymelaeaceae						×
223	*Phlogacanthus celebicus* Backer ex Bremek.	Acanthaceae				×		
224	*Photinia integrifolia* var. *integrifolia*	Rosaceae	×	×		×		
225	*Phyllanthus emblica* L.	Phyllanthaceae	×	×				
226	*Piper opizianum* Fuernr.	Piperaceae					×	
227	*Piper bantamense* Blume	Piperaceae		×				
228	*Piper caninum* Blume	Piperaceae	×					
229	*Piper majusculum* Blume	Piperaceae					×	
230	*Piper miniatum* (Miq.) Blume	Piperaceae					×	
231	*Piper retropractum* Vahl.	Piperaceae	×	×	×	×		
232	*Piper umbellatum* L.	Piperaceae		×				
233	*Pipturus argenteus* (G. Forst.) Wedd.	Urticaceae		×	×		×	
234	*Pittosporum moluccanum* (Lamk.) Miq.	Pittosporaceae	×	×	×	×	×	
235	*Pityrogramma calomelanos* (L.) Link	Adianthaceae		×	×			
236	*Planchonella firma* (Miq.) Dubard	Sapotaceae			×			
237	*Platea excelsa* Blume *var borneensis* (Harms.) SL.	Icacinaceae			×			
238	*Plectranthus amboinicus* (Lour.) Spreng.	Lamiaceae			×			
239	*Plumbago zeylanica* L.	Plumbaginaceae			×			
240	*Pogostemon heyneanus* Benth.	Lamiaceae		×		×	×	
241	*Polyalthia subcordata* Blume	Annonaceae			×			
242	*Polyosma integrifolia* Blume	Escalloniaceae			×			
243	*Polyscias javanica* Koord. et Valeton.	Araliaceae			×	×	×	
244	*Porana volubilis* Burm. f.	Convolvulaceae	×					
245	*Procris pedunculata* (J.R. & G. Forst.) Wedd.	Urticaceae					×	
246	*Pseudarthria viscida* (L.) Wight et Arn.	Leguminosae	×		×			
247	*Pseuderanthemum diversifolium* Radlk.	Acanthaceae				×		
248	*Pseudovaria rugosa* (Blume) Merr.	Annonaceae						×
249	*Psilotum nudum* (L.) P. Beauv.	Psilotaceae						×
250	*Psychotria malayana* Jacq.	Rubiaceae					×	
251	*Psychotria leptothyrsa* Miq.	Rubiaceae			×			
252	*Psychotria montana* Blume	Rubiaceae		×	×	×		

Table 1. List of Species collected from Sumbawa (continued)

No	Species	Family	Location					
			I	II	III	IV	V	VI
253	*Psychotria sarmentosa* Blume		×					
254	*Randia reinwardtiana* (Blume) Backer					×		
255	*Rapanea avenis* (Blume) Mez.	Primulaceae		×	×			
256	*Rauvolfia sumatrana* Jack	Apocynaceae	×			×		
257	*Remusatia vivipara* (Roxb.) Schott	Araceae	×					
258	*Rhynchoglossum obliquum* Blume	Gesneriaceae		×			×	
259	*Rubus lineatus* Reinw. ex Blume	Rosaceae			×			
260	*Rubus moluccanus* L.	Rosaceae		×	×			
261	*Rubus rosifolius* Sm. ex Baker	Rosaceae	×	×				
262	*Ryssopterys tiliaefolia* (Vent.) Juss.	Malphigiaceae	×	×				
263	*Sambucus javanica* Reinw. ex Blume	Adoxaceae			×		×	
264	*Sarcolobus globbosus* Wall.	Apocynaceae					×	
265	*Saurauia bracteosa* DC.	Actinidiaceae			×			
266	*Saurauia nudiflora* DC.	Actinidiaceae					×	
267	*Sauropus androgynus* (L.) Merr.	Phyllanthaceae		×				
268	*Schefflera elliptica* (Blume) Harms	Araliaceae			×			
269	*Schefflera lucida* (Blume) Frodin	Araliaceae			×			
270	*Schoutenia ovata* Korth.	Malvaceae	×	×				
271	*Scoparia dulcis* L.	Scrophulariaceae		×				
272	*Scutellaria orientalis* subsp. *bicolor* (Hochst) J.R. Edm.	Lamiaceae					×	
273	*Scutellaria discolor* Colebr.	Lamiaceae			×			
274	*Selaginella plana* Hieron.	Sellaginellaceae		×				
275	*Selaginella willdenowii* (Desv. ex Poir) Bak.	Sellaginellaceae					×	
276	*Senna timorensis* DC.	Leguminosae		×				
277	*Senna tora* L.	Leguminosae		×				
278	*Smithia conferta* Sm.	Leguminosae		×				
279	*Solanum rudepannum* Dunal.	Solanaceae		×				
280	*Spermacoce laevis* Lam.	Rubiaceae		×				
281	*Stachytarpheta jamaiensis* (L.) Vahl.	Verbenaceae		×				
282	*Stephania capitata* (Blume) Spreng.	Menispermaceae			×			
283	*Strobilanthes blumei* Bremek.	Apocynaceae			×			
284	*Strophanthus caudatus* (L.) Kurz.	Apocynaceae				×		
285	*Suregada glomerulata* (Blume) Baill.	Euphorbiaceae						×
286	*Syzygium cumini* (L.) Skeels.	Myrtaceae						×
287	*Syzygium formosum* (Wall.) Masam.	Myrtaceae			×			
288	*Syzygium nervosum* A. Cunn. ex DC.	Myrtaceae		×				
289	*Syzygium racemosum* (Blume) DC.	Myrtaceae			×			×
290	*Tabernaemontana sphaerocarpa* Blume	Apocynaceae		×			×	
291	*Tephrosia pumila* (Lmk.) Presl.	Leguminosae	×					
292	*Tephrosia purpurea* (L.) Presl.	Leguminosae	×					
293	*Tetracera scandens* (L.) Merr.	Dilleniaceae	×					×
294	*Tetrastigma laevigatum* (Blume) Gagnep	Vitaceae		×				
295	*Tetrastigma lanceolarium* (Roxb.) Planch	Vitaceae		×	×			
296	*Thespesia lampas* (Cav.) Dalz. & Gibs.	Malvaceae	×					
297	*Thunbergia javanica* C.F.Gaertn.	Acanthaceae	×					
298	*Torenia cardifolia* Roxb.	Scrophulariaceae		×				
299	*Toxocarpus villosus* Decne.	Apocynaceae	×					
300	*Trema orientalis* (L.) Blume	Ulmaceae			×			×
301	*Triumfetta indica* (L.) Backer	Malvaceae		×				
302	*Vaccinium laurifolium* Miq.	Ericaceae				×		
303	*Vernonia arborea* Buch. Ham	Compositae			×			
304	*Viburnum lutescens* Blume	Caprifoliaceae				×		
305	*Viburnum sambucinum* Blume	Caprifoliaceae		×	×	×		
306	*Vigna radiata var. sublobata* (Roxb.) Verdc.	Leguminosae	×					
307	*Villebrunea rubescens* Blume	Urticaceae				×	×	
308	*Vittaria elongata* Sw.	Vittariaceae	×					

Table 1. List of Species collected from Sumbawa (continued)

No	Species	Family	Location					
			I	II	III	IV	V	VI
309	*Wendlandia glabrata* DC.	Rubiaceae				×		
310	*Zanthoxylum avicenae* (Lamk.) DC.	Rutaceae				×		
311	*Ziziphus oenophlia* (L.)Mill.	Rhamnaceae	×					
312	*Ziziphus rotundifolia* Lamk.	Rhamnaceae						×

Notes
I. Between Sumbawa Besar to Batu Dulang (146-327 m asl)
II. Batu Dulang complex area (800-975 m asl)
III. Mount Pasak complex area (1000-1650m asl)
IV. Mount Ngengas complex area (1260 - 1650 m asl)
V. Tepals complex area(1000-1370 m asl)
VI. Jaran Pusang complex area (0-1000 m asl)

INSTRUCTION TO AUTHORS

Reinwardtia is a scientific irregular journal on plant taxonomy, plant ecology and ethnobotany. Manuscript intended for a publication should be written in English represent an article which has not been published in any other journal or proceedings. Every manuscript will be sent to two blind reviewers.

The manuscript of no more than 200 pages by using Times New Romance letter type submitted to the editor through <reinwardtia@mail.lipi.go.id>

For the style of presentation, authors should follow the latest issue of Reinwardtia very closely. Title of the article should be followed by author's name and mailing address in one-paragraphed. English abstract of not more than 250 words. Keywords should be given below each abstract. Author(s) should send the preferred running title of the article submitted.

Taxonomic identification key should be prepared using the aligned couplet type.

Strict adherence to the International Code of Botanical Nomenclature is observed, so that taxonomic and nomenclatural novelties should be clearly shown. English or Latin description for new taxon proposed should be provided and the herbaria where the type specimens area deposited should be presented. Name of taxon in taxonomic treatment should be presented in the long form that is name of taxon, author's name, year of publication, abbreviated journal or book title, volume, number and page.

Map, line drawing illustration, or photograph preferably should be prepared in landscape presentation to occupy two columns. Illustration must be submitted as original art accompanying, but separated from the manuscript. The illustration should be saved in JPG or GIF format at least 350 pixels. Legends or illustration must be submitted separately at the end of the manuscript.

Bibliography, list of literature cited or references follow the Harvard system.

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