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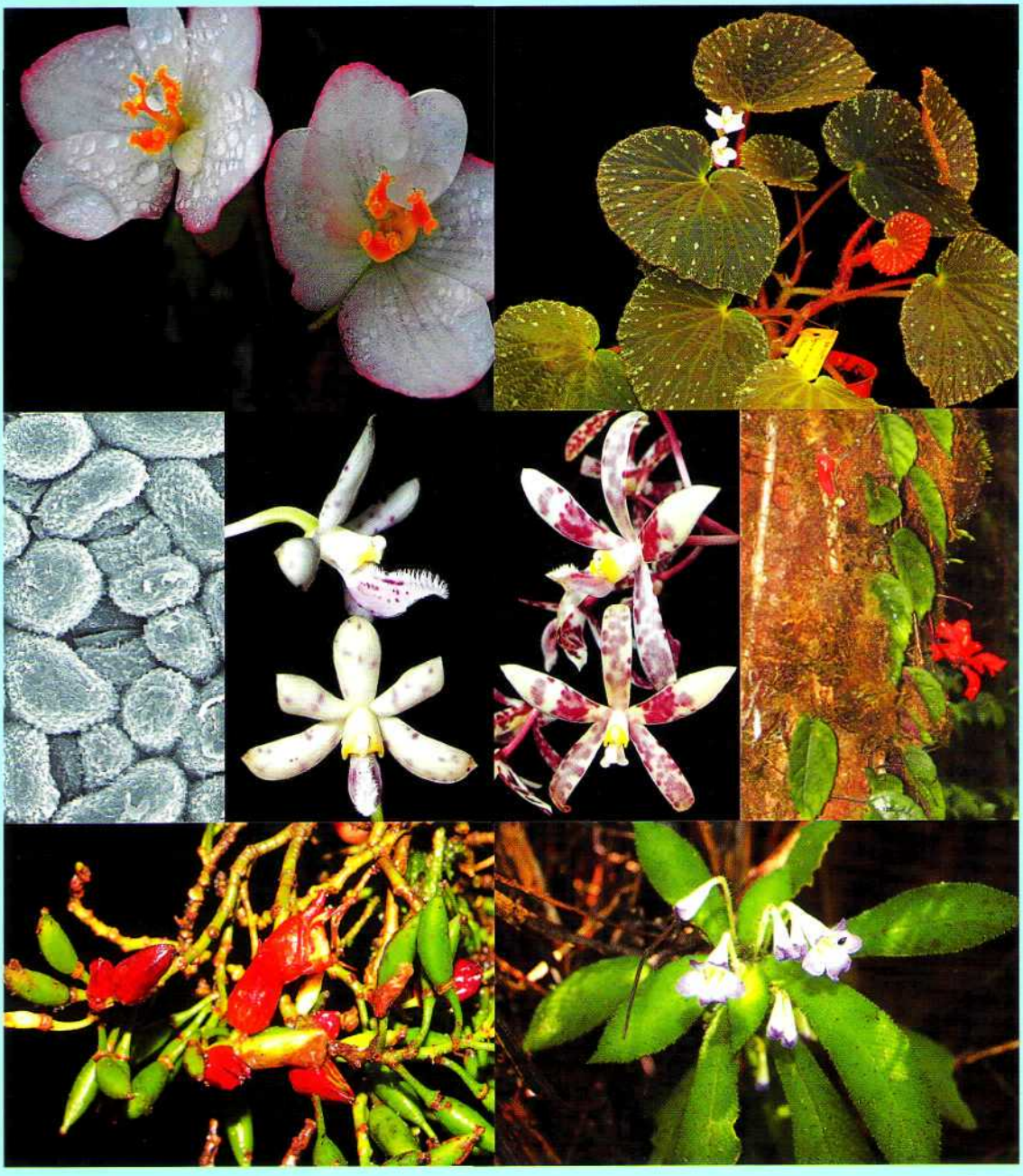

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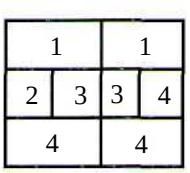

Cover images: 1. *Begonia holosericeoides* (female flower and habit) (Begoniaceae; Ardi *et al.); 2.* Abaxial cuticles of *Alseodaphne rhododendropsis* (Lauraceae; Nishida & van der Werff); *3. Dipodium puspitae, Dipodium purpureum* (Orchidaceae; O'Byrne); 4. *Agalmyla exannulata, Cyrtandra coccinea* var. *celebica, Codonoboea kjellbergii* (Gesneriaceae; Kartonegoro & Potter).

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NEW CYTOTYPES OF PTERIS ENSIFORMIS VAR. VICTORIAE FROM INDONESIA

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ABSTRACT
EFENDI, M., CHIKMAWATI, T. & DARNAEDI, D. 2014. New cytotypes of *Pteris ensiformis* var. *victoriae* from Indonesia. *Reinwardtia* 14(1): 133 – 135. — New cytotypes of *Pteris ensiformis* var. *victoriae* and one cytotype of var. *ensiformis* are recorded from Indonesia: var. *victoriae* with 2n=58 (sexual diploid) from Gorontalo, North Sulawesi, and 2n=87 (triploid) from Lombok Island and Bogor, West Java; and var. *ensiformis* with 2n=116 (sexual tetraploid). The diploid is smaller than the triploid in plant size. Results indicate a cytological variation in var. *victoriae*, like in var. *ensiformis.*

Key words: chromosome numbers, cytotypes, *Pteris ensiformis* var. *victoriae.*

ABSTRAK
EFENDI, M., CHIKMAWATI, T. & DARNAEDI, D. 2014. Sitotipe baru *Pteris ensiformis* var. *victoriae* dari Indonesia. *Reinwardtia* 14(1): 133 – 135. — Sitotipe baru *Pteris ensiformis* var. *victoriae* dan satu sitotipe var. *ensiformis* tercatat dari Indonesia: var. *victoriae* dengan jumlah kromosom 2n=58 (diploid seksual) dari Gorontalo, Sulawesi Utara, dan 2n=87 (triploid) dari Pulau Lombok dan Bogor, Jawa Barat; dan var. *ensiformis* dengan 2n=116 (tetraploid seksual). Tumbuhan diploid lebih kecil ukurannya bila dibandingkan dengan tumbuhan triploid. Hasil penelitian mengindikasikan bahwa variasi sitologi pada var. *victoriae*, sama dengan variasi pada var. *ensiformis.*

Kata kunci: Jumlah kromosom, sitotipe, *Pteris ensiformis* var. *victoriae.*

INTRODUCTION

Pteris ensiformis Burmann is a terrestrial fern growing in more or less in shady places, in crevices, or on old wet walls. It is distributed from Ceylon to India, Nepal, China, Japan, Taiwan, throughout South East Asia to Northern Australia and Polynesia (Holttum, 1966). *P. ensiformis* comprises three varieties, *i.e.* var. *ensiformis* Burmann, var. *victoriae* Backer and var. *rheophila* M. Kato, D. Darnaedi *et* K. Iwatsuki. *P. ensiformis* var. *ensiformis* has fully green leaves, while var. *victoriae* has variegated leaves (Holttum, 1966). *P. ensiformis* var. *rheophila* has flexible leaf axes and dentate pinnae margine (Kato *et al*., 1991).

The cytological variation of *P. ensiformis* with base chromosome number x=29 in Asia has been reviewed by Chao *et al*. (2012). *P. ensiformis* var. *ensiformis* consists of a sexual diploid, apogamous triploid, sexual tetraploid, apogamous tetraploid, and apogamous pentaploid and a sexual tetraploid was added from Bogor by Praptosuwiryo and Darnaedi (2008). Sexual tetraploid *P. ensiformis* var. *victoriae* (2n=116) was reported from Java by Walker (1962). *P. ensiformis* var. *victoriae* in India reported to be aneuploid 2n=84 and 2n=164 (Kuriachan & Ninan, 1976 in Chao *et al*., 2012). Intraspesific variation of *P. ensiformis* and their relationship is unknown, especially in Indonesia. Therefore, the aim of this study was to examine the intra spesific variation of *P. ensiformis* in Indonesia. Morphology, cytology and reproductive mode, as well as ecology, were intensively explored.

MATERIALS AND METHODS

In total 60 plants were collected from various place in Java, Sulawesi and Lombok (Table 1). Living materials were planted in the green house of Herbarium Bogoriense (BO), using mixture media (compost: burning husk: fern root = 3: 1: 1). Vouchers are deposited in Herbarium Bogoriense (BO). Herbarium specimens of *P. ensiformis* deposited in BO were also examined morphologically.

Cytological investigation was carried out for somatic chromosomes in the root tip cells by using squash method of Manton (1950) modified by Darnaedi (1991). Root tips were pretreated with 0.002 M 8-hydroxyquinoline for 24 hours at 20^{O}C and then fixed with 45% acetic acid for 10 minutes. The fixed root tips were macerated with a mixture of 45% acetic acid and 1 N HCl (1:3) for 3 -4 minutes at 60^{o}C and then stained with 2% aceto -orcein solution. Chromosome numbers were counted under a microscope (Olympus CX31) and photographed with a Nikon Camera.

Reproductive modes were suggested by counting spores produced in each sporangium. Five to 10 sporangia were collected from each of 60 individuals. Plants with 64 normal spores per sporangium were regarded as sexual, while those with 32 spores were regarded as apogamous (Walker, 1962).

RESULTS AND DISCUSSION

Ecology and Habitat

Pteris ensiformis is a weedy fern growing in various habitats in lowland and at medium altitudes. It can be found in open places, less or more shaded places, and different substrates including soil, clade and chalk and sometimes on river bank. *Pteris ensiformis* var. *ensiformis* grows at 150−800 m asl (above sea level) in Mt. Slamet, at 100−650 m asl in Mt. Salak, and at 0−11 m asl in Pelabuhan Ratu. The species occurs at the temperature of 23−32^{o}C and at the humidity of 62−89%.

Pteris ensiformis var. *victoriae* is often cultivated as ornamental. However, a wild type of this variety was recently found in Gorontalo, in rock crevices on steep slopes and on slightly shaded riverbank at 250 m asl. This is a new cytological and ecological discovery for var. *victoriae* in Indonesia.

Cytology and Reproductive Modes

Of 23 individuals examined, 13 individuals of *var. ensiformis* had 2n=116 (sexual tetraploid). Three individuals of var. *victoriae* had 2n=87 (triploid) and seven individuals of var. *victoriae* showed 2n=58 (sexual diploid) (Fig. 1). The base chromosome number of both var. *ensiformis* and var. *victoriae* was x=29.

The 64 spores produced in each sporangium were regular and the plants with those spores were regarded as sexual. However, the sporangia of three individuals of triploid var. *victoriae* were empty or produced irregularly-sized spores. Its reproduction types may be apogamous or sterile. Morphologically, diploid var. *victoriae* is smaller than triploid; the diploid was up to 20 cm tall, whereas the triploid was up to 75 cm tall.

We found sexual diploids (2n=58) and triploids (2n=87) in *P. ensiformis* var. *victoriae*. Taking the reported sexual tetraploid into account, it is possible that the apogamous or sterile triploid was derived by hybridization of the diploid and tetraploid, pending further analysis. The different base chromosome number (x=28), as seen in var. *victoriae* from India (Kuriachan & Ninan, 1976 in Chao *et al*., 2012), was not found in this study. A possible variation in base number in *P. ensiformis* should be examined by further analysis with materials from a wide range of distribution.

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Table 1. Data of chromosomes and inferred reproductive modes of *P. ensiformis* from eight localities in Indonesia.

No	specimen voucher	Chromosome number (2n)	Ploidy level	Reproductive mode	Location
	Pteris ensiformis var. *ensiformis*				
	SL. 1.1	116	tetraploid	Sexual	Mt. Slamet, Central Java, 209 m asl
	SL. 1.2	116	tetraploid	Sexual	Mt. Slamet, Central Java, 350 m asl
	SL. 1.3	116	tetraploid	Sexual	Mt. Slamet, Central Java, 690 m asl
	CTR. 1	116	tetraploid	Sexual	City Forest of Subang, West Java, 250 m asl
	BJR. 1	116	tetraploid	Sexual	Serayu river, Banjarnegara, Central Java, 200 m asl
	SKB. 1	116	tetraploid	Sexual	Pelabuhan Ratu, Sukabumi, West Java, 11 m asl
	BGR. 1	116	tetraploid	Sexual	Research Forest Bogor Agricultural University, West Java, 201 m asl
	BGR. 2	116	tetraploid	Sexual	Bogor, West Java, 300 m asl
	BGR. 4	116	tetraploid	Sexual	Bogor, West Java, 350 m asl
	SLK. 1	116	tetraploid	Sexual	Mt. Salak, West Java, 259 m asl
	SLK. 2	116	tetraploid	Sexual	Mt. Salak, West Java, 400 m asl
	SLK. 3	116	tetraploid	Sexual	Curug Nangka, Mt. Salak, West Java, 650 m asl
	WN. 1.1	116	tetraploid	Sexual	Wonogiri, Central Java, 300 m asl
	Pteris ensiformis var. *victoriae*				
	DD 21	58	diploid	Sexual	Nantu, Gorontalo, Sulawesi, 250 m asl
	DD 22	58	diploid	Sexual	Nantu, Gorontalo, Sulawesi, 250 m asl
	DD 23	58	diploid	Sexual	Nantu, Gorontalo, Sulawesi, 250 m asl
	DD 24	58	diploid	Sexual	Nantu, Gorontalo, Sulawesi, 250 m asl
	DD 27	58	diploid	Sexual	Nantu, Gorontalo, Sulawesi, 250 m asl
	DD 44	58	diploid	Sexual	Nantu, Gorontalo, Sulawesi, 250 m asl
	DD 46	58	diploid	Sexual	Nantu, Gorontalo, Sulawesi, 250 m asl
	LMB. 1	87	Triploid	-	Mataram, Lombok Island, 11 m asl
	LMB. 2	87	Triploid	-	Mataram, Lombok Island, 11 m asl
	BGR. 3	87	Triploid	-	Dramaga, Bogor, West Java, 210 m asl

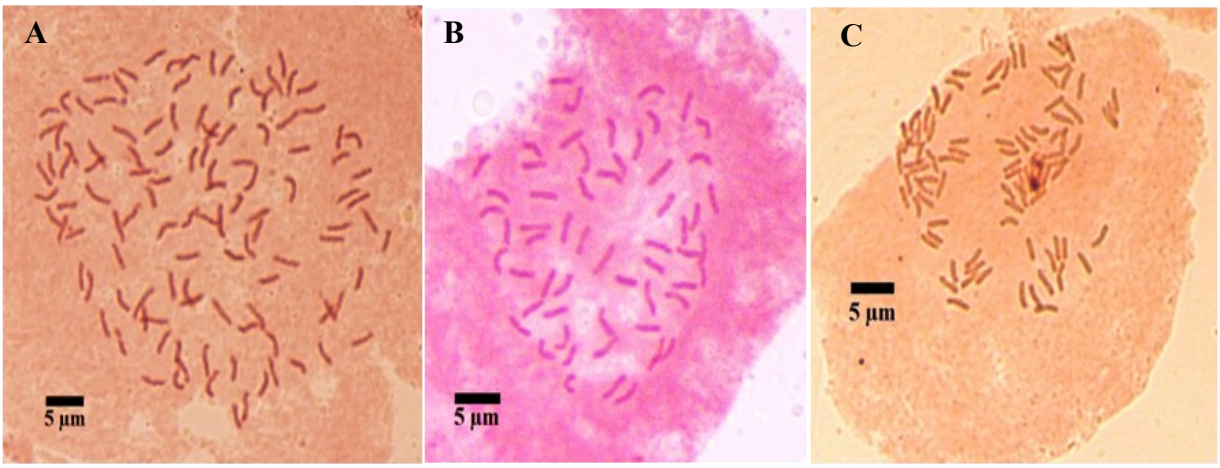

Fig. 1. Somatic chromosomes at metaphase in root tip cells of *Pteris ensiformis.* A. var. *ensiformis*, 2n=116 (tetraploid); B. var. *victoriae*, 2n=58 (diploid); C. var. *victoriae*, 2n=87 (triploid). Bar=5 µm.

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